BOND UNIVERSITY

What Makes an Exceptionally Good Doctor?

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Dr Mark Jones and Dr Jeremy Howick

Abstract

Background – It is unknown what makes an exceptionally good doctor or even if such doctors exist. While there has been some research, specifically surveys, on what makes a good doctor, there is no research on whether there are exceptionally good doctors, how common they might be, or how to differentiate between a good doctor and an exceptionally good doctor. It is unknown what effect and what difference medical physicians, who are substantially better than their peers, have and make on a patient's physical health, outside of known factors such as patient and doctor demographics. What is known, is that in clinical trials doctors have a clustering effect but said trials do not establish whether that is due to patient demographics or varying doctor abilities.

Aims – To assess whether doctors make a difference to patients' physical health and, if so, to what extent does that have on patients' physical health. To determine whether there are doctors who could be considered as exceptionally good. Should they exist, this thesis further aims to identify the characteristics of exceptionally good doctors.

Methods – Two systematic and one methodological review and two primary studies were conducted. We conducted systematic and methodological reviews of cohort and case control studies, and randomised controlled trials to assess surgeons' and non-surgical doctors' performances regarding patients' physical health, after all known prognostic information had been accounted for. A qualitative study collected, and analysed data gathered from interviews conducted with 13 medical doctors regarding their opinions on what makes an exceptionally good doctor and what their experience is of such doctors. Further, a survey of 580 members of the public was conducted on their experiences of exceptionally good doctors.

Results – The results of the systematic reviews showed that, outside of all known influencing factors, doctors do affect patients' physical health. Effects are heterogeneous, ranging from negligible to large, and positive and negative performance outliers appear regularly among doctors.

The methodological review concluded that many existing datasets could be reanalysed to assess doctors' performance and provided suggestions on how to analyse and report in a standardised way to enable future meta-analysis of findings

The qualitative study included interviews with 13 medical doctors and demonstrated that the participants had each met exceptionally good doctors and tended to retain detailed knowledge of those doctors and experienced them as long-remembered role models. This study also showed that exceptionally good doctors may be both celebrated and vilified by their peers and the health system they work in, precisely for being exceptionally good.

The survey yielded results showing that most participants had met at least one exceptionally good doctor and the majority had met two or more. The doctors who received the most positive evaluation from the public, were doctors who willingly listened to the patient to the end. The results also showed that participants who expressed more positive attitudes towards an exceptionally good doctor, were more negative than other participants when rating average doctors. This could potentially provide a motivation for doctors to undermine exceptionally good doctors.

Conclusions – Doctors can make a substantial difference to their patients' physical health, independent of known factors including intervention, doctor, and patients' demographics. Even a minimal positive difference applied to the billions of consultations each year could yield a clinically useful improvement. Exceptionally good doctors can be identified and are well known to medical doctors and members of the public. Members of the public particularly value doctors who willingly listen to the end and evaluate average doctors more negatively than other members of the public, giving a potential motivation for exceptionally good doctors to be undermined by other doctors.

Keywords

doctors' performance; cross-sectional survey; exceptionally good doctors; systematic review; thematic analysis; methodological review;

Declaration by Author

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy by Research.

This thesis represents my own original work towards this research degree and contains no material that has previously been submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made.

Name: Christoph Schnelle

Date: 3 November 2022

Signature: 

Declaration of author contributions

Christoph Schnelle (CS) is the author of Chapter 1 (General Introduction) and Chapter 6 (Conclusions and Implications). Four chapters include publications (6 published, 1 submitted for publishing) which also have other authors, with CS as first author and lead in each case.

For all the papers CS was responsible for the design, concept, plan, execution, data gathering, data processing and analysis, and interpretation. In addition, CS wrote in each case the initial draft, made the articles ready for submission to publishers, responded to reviewers, and revised the publications in response to the publishers' requests. In these activities CS was supported by his co-authors.

In the systematic reviews the roles of two of the co-authors were being the second reviewer of the 10,000 publications investigated (RM), putting together a sophisticated and well-considered search strategy that reduced the number of publications to be investigated to 10,000 (JC).

In all papers, my principal supervisor, Dr Mark Jones, was a co-author, providing unstinting support in every phase of the publishing process, from refining the initial concept to high quality editing and support for all reviewer requirements, including some of the more baffling ones

Publications	Statement of contribution
Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. *Therapeutics and Clinical Risk Management*	CS 72% JC 3% RM 5% MAJ 20%
Is there a doctors' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review.	CS 72% JC 3% RM 5% MAJ 20%
The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review.	CS 80% MAJ 20%
Protocol for a qualitative study on doctors' opinions on and experiences of exceptionally good doctors. *Advances in Medical Education and Practice*	CS 80% MAJ 20%
Exceptional doctors exist but may not always be appreciated by their peers. Qualitative study of medical doctors on their experiences and opinions of the characteristics of exceptionally good doctors.	CS 80% MAJ 20%
Characteristics of exceptionally good doctors: A protocol for a cross-sectional survey of adults	CS 80% MAJ 20%
Characteristics of exceptionally good doctors: A cross-sectional survey of adults	CS 80% MAJ 20%

Research Outputs

Peer-reviewed publications [1-6]

1. Schnelle C, Clark J, Mascord R, Jones M. Is There a Surgeons' Effect on Patients' Physical Health, Beyond the Intervention, That Requires Further Investigation? A Systematic Review. Ther Clin Risk Manag. 2022;(18):467-490. doi:https://doi.org/10.2147/TCRM.S357934

2. Schnelle C, Clark J, Mascord R, Jones M. Is there a doctors' effect on patients' physical health, beyond the intervention and all known factors? A systematic review. Ther Clin Risk Manag. 2022;18:721-737. doi:10.2147/TCRM.S372464

3. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. Clinical Epidemiology. 2022 Jul 18 2022;14:851-870. PMC9307914. doi:10.2147/CLEP.S357927

4. Schnelle C, Jones MA. Qualitative Study of Medical Doctors on Their Experiences and Opinions of the Characteristics of Exceptionally Good Doctors. Adv Med Educ Pract. 2022;13:717-731. doi:https://doi.org/10.2147/AMEP.S370980

5. Schnelle C, Jones MA. Characteristics of exceptionally good doctors: A protocol for a cross-sectional survey of adults. Patient Related Outcome Measures. 2022.

6. Schnelle C, Jones MA. Protocol for a Qualitative Study on Doctors' Opinions on and Experiences of Exceptionally Good Doctors. Adv Med Educ Pract. 2022;13:103-109. doi:10.2147/AMEP.S343554

Conference Presentation

1. Turning Tides HSM Medical & Postgraduate Research Conference on 28/9/2022: Presentation of "Characteristics of exceptionally good doctors: A cross-sectional survey of adults"

Ethics Declaration

The two systematic reviews and the methodological review of published studies did not require ethical approval. The fourth and fifth study, published as “Protocol for a qualitative study on doctors’ opinions on and experiences of exceptionally good doctors. Advances in Medical Education and Practice”, and “Exceptional doctors exist but may not always be appreciated by their peers. Qualitative study of medical doctors on their experiences and opinions of the characteristics of exceptionally good doctors.” received ethical approval Number CS03393 from the Bond University Human Research Ethics Committee on September 27th, 2021.

The sixth and seventh study, published as “Characteristics of exceptionally good doctors: A protocol for a cross-sectional survey of adults”, and “Characteristics of exceptionally good doctors: A cross-sectional survey of adults” received ethical approval CS03416 on April 27th, 2022, by the Bond University Human Research Ethics Committee.

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I have an amazing principal supervisor in Dr Mark Jones who has a long list of virtues that make working with Mark an absolute pleasure. Mark has a vast understanding of medical research and statistics, is extremely responsive and has the ability to put any idea or proposal in perspective, to see whether it is desirable or even possible to go down that particular route. Mark is also very patient when needed but keeps close tabs on progress and gives great reminders when things slowed down. Mark's experience in publishing hundreds of articles came in useful again and again and allowed me to publish both what I wanted to be part of this PhD and in a format that would be acceptable. I cannot think of a better principal supervisor.

Without Nicola Lessing, my wife, this project would have stopped long ago. Nicola's unstinting support through a multi-year enterprise of a person in his 60s (the author) has been amazing and a joy to behold.

I owe a deep debt of gratitude to Paul Glasziou who welcomed me as a PhD student in the Institute for Evidence-Based Healthcare at Bond University and, through his amazing management capabilities, created a working environment for the entire institute that is second to none.

Jeremy Howick, as my second supervisor, has done an exceptional job especially at the conceptual stage where it took a full year to come to a PICO as we were going where no man has gone before, as the phrase goes. His ability to think outside the square, to consider how to measure doctors' performance or even whether it is worthwhile to look for doctors' performance on patients' physical health, or to look at not just the least effective but also the most effective doctors and to come up with strategies to execute such research has made this PhD possible. Thank you, Jeremy.

The amazing staff at Bond University have made life so much easier for me, allowing me to work remotely almost all of the time and giving me their generous support when I needed to for administrative and budget matters, including answering the questions I didn't know to ask. Thank you, Tanya, Vinese, Minori!

Working remotely in a team can be challenging but the team at the IEBH made it easy, including search master extraordinaire Justin Clark and my fellow PhD students and post-docs Oyuka, Rebecca, Eman, Kwame, Dominique, and Ann.

Reflections on my PhD Journey

When I was young, I was very good at mathematics and was told at age 19 that a paper I wrote in number theory could be the basis for a PhD if I so chose. That paper showed a recurrent theme in my life: I did something very simple, starting out with the natural numbers 1, 2, 3, ... and investigated various options to remove subsets of them, for example every 2nd number, then every 3rd etc. It turned out that a special case was the Sieve of Eratosthenes, an ancient Greek method to extract prime numbers. It was a really simple idea, but nobody had done it before in that particular way.

When I finished high school, I was torn between studying medicine or mathematics but, erroneously, thought that I wasn't much good with people – even though I was the agony aunt for a 15-strong group of friends – so didn't pursue medicine and then spent 6 months working on my mathematical project as I had also acquired a German government university scholarship given to the top 1% of students. However, at the end of the 6 months I had a breakthrough and mathematics suddenly became even easier for me. To my surprise I then realised that I did not want to pursue mathematics professionally and decided to travel around the world for two years.

When I came back I didn't want to study but became a programmer, moved at age 24 to Australia, started a business, that, after my wife came on board at age 33, received $5 million in venture capital and $2 million in R&D grants and loans due to me having some very simple, patented ideas how to store hierarchical data in a relational database with little loss of efficienc , that allowed the creation of legislative databases that allowed looking at legislation as it was at any particular point in time.

At age 44 we sold the business, I retired for 2 years and then became a financial adviser, still with no degree. By age 53 there was a push for financial advisers to be more qualified, so I decided to do a degree and, when Nicola, my wife, asked me what I was interested in, the answer was 'statistics' and I did a Master of Medical Statistics. One reason was that my interest in medicine never went away, and my personal health and vitality had also massively improved since age 44, so I could see what was possible with medicine.

Partly as a hobby and partly because I have a lot of medical practitioners as clients, I started to have a look at evidence-based medicine and wrote an unpublished 40,000-

word treatise on the strengths and weakness of evidence-base medicine. My main insight was that every medical interaction has a doctor, a patient, and an intervention, with evidence-based medicine largely concentrating on the intervention but there was little research on what the doctor's influence on those billions of annual medical interactions was, and I thought that that would be a fun research project.

One of my Masters lecturers was Dr Mark Jones and he suggested that I could do a PhD at Bond University on the subject of doctors' performance. Once I found out that I would get a scholarship from the Institute for Evidence-based Healthcare paying my university fees I was away and had an absolutely great time since.

The beginning of the PhD was technically difficult as there was so little research on doctors' performance of the kind I was looking for. There was plenty of research checking whether tenure, number of operations, qualifications or other variables had an influence on the quality of a doctor and the answer generally was yes but there were no systematic reviews or any substantial body to find out whether doctors themselves make a difference, even after accounting for all known information like doctor demographics, patient risk factors, intervention etc. and when I found such research the results were worded in a completely different way from publication to publication. Mark and Jeremy during that time were extremely helpful in assisting me to continue until something turned up and we could get started with the systematic review.

I am working full-time as a financial adviser, so the PhD is a great discipline working in the mornings, evenings, and weekends. Every public holiday is a boon. I have learnt to pace myself, to do things early, so urgent deadlines are rare or non-existent and to organise the various components of the PhD properly. I have also learnt to collaborate with other researchers, recruit, and interview doctors and to write a lengthy survey that despite its length most participants still finished

On a technical level I have learnt how to execute systematic reviews, write a methodological review, do a qualitative study using thematic analysis, write protocol papers, and put together a detailed, complex survey and analyse the resulting data. One of the steeper learning curves was putting together the qualitative study as the methods are very different from quantitative studies. Having a survey specialist go over my survey was an enlightening experience as well, as there were many areas of improvement. In general, I acquired a lot of understanding about evidence-based

medicine and its usage. Particularly rewarding was learning much about doctors' performance, that doctors make a difference, to see where and how doctors make a difference to patients' health and to be to my knowledge the first to investigate exceptionally good doctors in such detail.

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Abbreviations

Confidence Interval	CI
General Practitioner (Family medicine practitioner)	GP
Intra-class correlation coefficient	ICC
Institute for Evidence-Based Healthcare	IEBH
Randomised Controlled Trial	RCT

CHAPTER 1:

GENERAL INTRODUCTION AND THESIS OUTLINE

Introduction

There are billions of medical interactions in the world each year[8,9] that consist of a doctor, a patient, and a medical intervention. While medical interventions impact a patient's physical health, an effect that is patient-dependent, it is unclear whether the doctor makes a difference to patients' physical health beyond the medical intervention. In other words, are doctors effect modifiers? There are doctors who cause serious harm to their patients[10,11], and some studies have shown a relationship between doctors' demographic variables, such as the number of operations performed, and patients' physical health outcomes,[12,13] however, there have been no systematic reviews that examine whether doctors have an effect on their patients' physical health outcomes after all known variables have been accounted for.

Knowing whether something that is applied billions of times a year worldwide has an effect or not and knowing details of any such effect seems to be an interesting and societally valuable research subject.

As there is very little research on whether doctors' performance varies where it matters most – patients' physical health outcomes, it follows that it is not even known whether doctors inherently differ in their performance. As a result, a type of investigation that is very common in other areas of life, namely examining exceptionally good performers[14-24], doesn't exist at all in medical research. To quote one example[24]:

> *High-achieving employees, the "stars" of an organization, are widely credited with producing indispensable, irreplaceable, value-enhancing contributions. From the recruitment of celebrity chief executive officers to the fierce competition for star scientists, and from lucrative contracts for sports icons to outsized bonuses for top salespeople, human capital strategies have long promoted the importance of star performers.*

In other words, to research doctors' performance we can look at, inter alia, reducing negative outliers, measures to improve doctors' performance generally, ignore doctors and concentrate on the intervention or the patient, look at what characterises good doctors, or, in addition, look at 'star performers' or exceptionally good doctors. Such doctors are already recognised if they are star researchers but not as clinicians. There is extensive research on the first three of these five options and there is some research

on the fourth but no research on the fifth area, exceptionally good doctors. It seems sensible to research this last, least-covered area, especially as in other areas of life these star performers produce 'indispensable, irreplaceable, value-enhancing contributions'.(ibid)

This need to examine star medical performers is further supported by one of the original definitions from David Sackett in 2000 in the Encyclopedia of Biostatistics of the dominant paradigm of medical practice:

> *In this definition, the practice of evidence-based medicine means integrating individual clinical expertise with a critical appraisal of the best available external clinical evidence from systematic research. By individual clinical expertise is meant the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care.25*

Evidence-based medicine is here defined as the integration of the "best external clinical evidence" and "individual clinical expertise" which among many other ways leads to better diagnosis and better patient care. The definition of evidence-based medicine seems to strongly imply that the clinician and their expertise is equal in importance to the best available evidence. By 2017 this had changed substantially as shown, for example, in a Lancet article,[26] evidence-based medicine *"has increasingly stressed the need to combine critical appraisal of the evidence with patient's values and preferences through shared decision making"* and the clinician's presence is only implied, even though both famous authors are qualified medical doctors. One reason may be that defining a good practitioner of clinical expertise was considered to be difficult or impossible as shown in a 2002 special BMJ edition that asked "what makes a good doctor?" and concluded that the question was unanswerable as *"defining a good doctor … lies in degree of difficulty somewhere between defining a good composer and a good human being. In fact, it's impossible"*.[27]

Evidence-based medicine has had many successes by bringing scientific rigour to the evaluation of interventions but has not led to any increase in life expectancy.[28] One reason for this lack of population-wide success, if it is not caused by other factors, could be the downgrading of the importance of the clinician in evidence-base medicine which has led to a situation where many millions of papers have been published on interventions but very few, if any, answering the following questions:

Do doctors make a difference to patients' physical health? If yes, is this difference only due to external factors such as their level of knowledge or their experience or are some doctors innately better or worse than others? In other words, is researching the 'clinical expertise' part of evidence-based medicine worthwhile?

If doctors make a difference to patients' physical health, when do they make a difference and how large is that difference? Do some doctors produce exceptionally good results, i.e. do exceptionally good doctors exist?

If doctors do make a difference, then it is worth examining star performers, exceptionally good doctors, to see whether they also produce 'indispensable, irreplaceable, value-enhancing contributions'(ibid).

Taking a wider view, the question arises whether exceptional levels of 'clinical expertise' are valued by medical doctors and whether they are valued by patients? Are medical doctors aware of exceptionally good practitioners of the clinical expertise part of evidence-based medicine and, if yes, what is their experience of such doctors? Do medical doctors consider their encounters of exceptionally good doctors to be important?

The same questions apply to patients: What is their experience, if any, of exceptionally good doctors and was that experience important to them?

Once we know more about the clinical expertise part of evidence-based medicine it will be easier to assign the importance of the clinician in the practise of evidence-based medicine, whether the doctor's contribution should be central, with scientific evidence used as appraised by the doctor, according to Sackett's[25] definition, or whether the clinician's presence can be more or less ignored as expressed by Djulbegovic and Guyatt.[26]

1.2 Research Aim

The aims of this PhD research were to determine:

(1) whether doctors affect patients' physical health, and if so;

(2) how large is the doctor's effect on patient's physical health;

(3) how common are exceptionally good doctors;

(4) the characteristics of exceptionally good doctors.

To achieve this, we conducted the following studies:

1.3 Research Questions and Objectives

Research question 1

Is there a doctors' effect on patients' physical health after all known factors have been accounted for?

Objectives: To systematically review the evidence on doctors' effect on patients' physical health.

Project 1, Studies 1 and 2: Two systematic reviews, one for surgeons, one for all other medical doctors.

Research question 2

How can the doctors' effect on patients' physical health, after all known factors have been accounted for, be reported most effectively, with the results made available for meta-analysis?

Objectives: To conduct a study that evaluates the design, analysis, and reporting of research studies on doctors' effect on patients' physical health.

Project 2, Study 3: A methodological review on how to report the doctors' effect on patients' physical health.

Research question 3

How do medical doctors describe the characteristics of their exceptionally good peers, and how did they experience such doctors?

Objectives: To gain knowledge on and provide material for further study of exceptionally good doctors.

Project 3, Study 4: A qualitative study of medical doctors on their experiences and opinions of the characteristics of exceptionally good doctors.

Research question 4

What is the experience of the general public of exceptionally good doctors?

Objectives: To conduct a survey of the general public on whether they have ever experienced an exceptionally good doctor and to provide a detailed description of these doctors.

Project 4, Study 5: A cross-sectional survey of the general public on characteristics of exceptionally good doctors.

1.4 Thesis Outline

Chapter 1 – General introduction

The first chapter provides a brief introduction on the genesis of this thesis and to the studies that were conducted and are reported in the following chapters.

Chapter 2 – Systematic reviews (Studies 1 and 2)

Chapter 2 reports on the two systematic reviews, one on surgeons, one on all other medical doctors, of published studies on doctors' effects on patients' physical health after accounting for all known information about the doctor, patient, intervention, and any additional information such as medical institution and geographical area.

Chapter 3 – Methodological review (Study 3)

Chapter 3 reports on the methodological review on how to report the doctors' effect on patients' physical health.

Chapter 4 – Qualitative study of doctors (Study 4)

Chapter 4 reports on a qualitative study of 13 medical doctors on their experiences of exceptionally good doctors.

Chapter 5 – Cross-sectional survey of the general public (Study 5)

Chapter 5 reports on a survey of the general public on their experiences with and ratings of exceptionally good doctors.

Chapter 6 – Conclusions and implications

This final chapter provides a summary and discussion of the main results of all three studies, implications for practice and further research and present overall conclusions.

CHAPTER 2:

SYSTEMATIC REVIEWS (STUDIES 1 AND 2)

Study 1: *Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. https://doi.org/10.2147/TCRM.S357934*

Study 2: *Is there a doctors' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. https://doi.org/10.2147/TCRM.S372464*

2.1 Summary

The genesis of Studies 1 and 2; systematic reviews of the effect of surgeons and other medical doctors on patients' physical health, took some time to develop at the beginning of this PhD project. My literature review was initially fruitless, when looking for a doctor's effect. Research into the placebo effect,[29,30] an effect of medical intervention for which there is no explanation as to cause and thereby could also include a doctor's effect, proved to be a dead end. The second dead end was research into the large volume of literature on doctors' burnout where any conclusion that burnout (depression at work but not outside of work) has an influence on the effectiveness of doctors is controversial.[31-33] The first breakthrough in research came from finding out about the extensive investigations into a therapists' effect in psychotherapy. Researchers established that there are large differences between therapists, with some therapists performing much better or much worse than the average therapist, in improving a patients' mental health outcomes.[34,35]

Since 1996, evidence-based medicine has moved away from doctor-centred research and moved towards guidelines and research results becoming more influential in research on medical intervention. Numerous studies in evidence-based medicine have demonstrated that the opinions of senior doctors are not a substitute for well-run and properly conducted clinical trials. Opinions are considered the lowest rung in the hierarchy of evidence while randomised controlled trials constitute both the highest and second-highest rank of that hierarchy.[36] However, evidence-based medicine as a major change in medicine has not necessarily led to an increase in life expectancy or population health.[28] In fact, in some countries and for some population groups life expectancy experienced a drop[37] even before Covid-19.[38] What does have an influence on population health, is the level and quality of primary care, the least prestigious of the medical specialties.[39-41]

Anecdotal evidence suggests many patients are of the opinion that there are differences in quality between doctors but the literature showed no analogue for the therapists' effect among doctors, an effect that persists even after accounting for all known factors.

By now the PICO42 had become very simple: It consisted only of P (Population) = Medical Doctors and O (Outcome) = Patients' physical health outcomes. There was initially no I (Intervention) or C (Control). That simplicity led me to construct a systematic

review to see how many among the 25+ million published medical research papers, as per a Scopus search, showed a doctors' effect after accounting for all known factors. Despite the simplicity of the question the search strategy became elaborate and complicated as such a result in most published papers was only a secondary result or could only be inferred from the reporting. The search terms can be found in the appendix of the systematic reviews. Due to this complexity, the search strategy yielded just over 10,000 publications to review, further qualification led to only 79 medical papers making the final cut

The reporting of a doctors' effect on patients' physical health varied substantially and it took several, weeks to make sense of the results until it, again, became very simple: most papers showed one of two and in a few cases both items: they either graded doctors by results, with or without showing outliers whose performance 95% confidence interval was wholly above or below the average performance, or, showed the percentage of variation in patients' physical health outcomes that are due to the doctors' intervention. The latter type of results was described in many different ways and a thorough analysis was required to uncover that the studies expressed the same concept, specifically variations of the intra-class correlation coefficient (ICC)

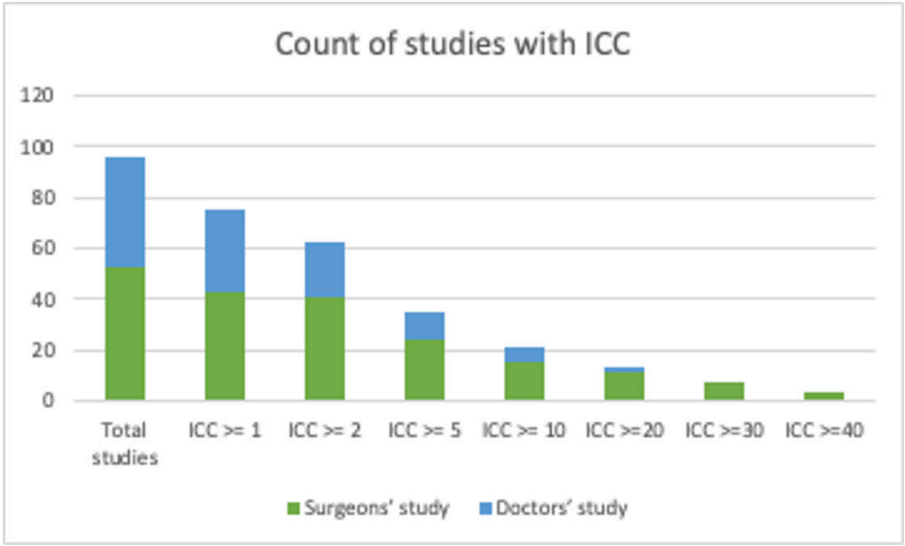
The outcome was that there is a doctors' or surgeons' effect on patients' physical health, that it varies in impact from the negligible to the substantial with even a small ICC of 1% having a substantial effect if it happens in a randomised controlled trial43 and that, in many cases, the risk- and demographic-adjusted performance of doctors also varies, with that variation ranging from very small to large. More information on the consequences of small ICCs is provided here.[35, pg 170,44, pg 53,45]

In the doctors' systematic review (study 2), the ICC was available for 43 combinations of intervention and outcome. An ICC >=1 was measured for 32 (74%) outcomes, of these 21 (49%) had an ICC >= 2, 11 (26%) an ICC >= 5, 6 (14%) an ICC >= 10, and 2 (5%) with an ICC >= 20.

The surgeon's effect on patients' physical health was even more pronounced, with the ICC available for 53 combinations of intervention and outcome. Of these 53 outcomes, 43 (81%) had an ICC >=1, of those, 41 (77%) an ICC >= 2, 24 (45%) an ICC >= 5, 15 (28%) an ICC >= 10, 11 (21%) an ICC >= 20, 7 (13%) an ICC >= 30, and 3 (6%) an ICC >= 40.

It follows that in the large majority of measured patients' physical health outcomes it mattered greatly which doctor or surgeon was chosen as 78% of measured outcomes had an ICC >= 1, with 22% of the time the effect being 10 times as strong with an ICC >= 10.

The ICC was calculated after accounting for all known information such as doctors' demographics, hospital effects, and patient risk factors.



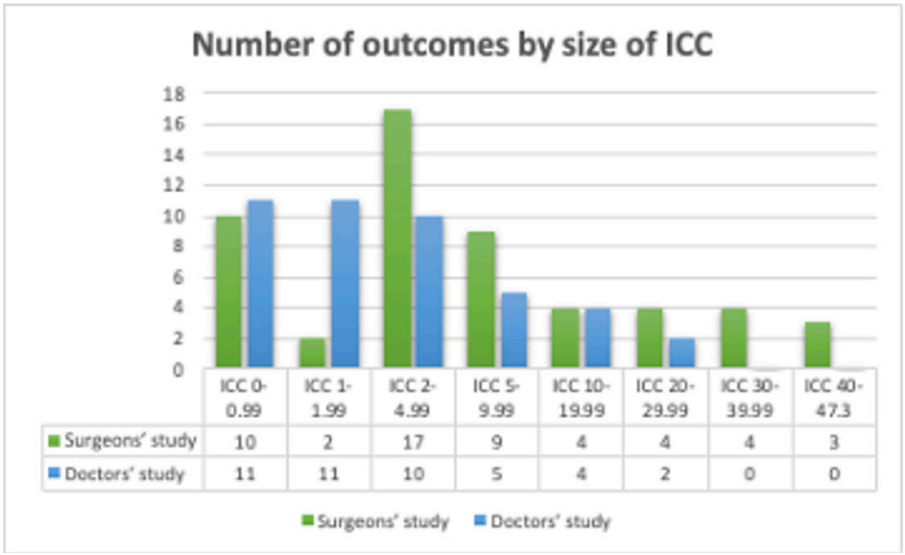


Figure 1 Count of studies with intra-class correlation coefficient (ICC) and number of outcomes – Chapter 2 Summary

Therapeutics and Clinical Risk Management

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REVIEW

Is There a Surgeons' Effect on Patients' Physical Health, Beyond the Intervention, That Requires Further Investigation? A Systematic Review

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Video Abstract

Point your SmartPhone at the code above. If you have a QR code reader the video abstract will appear. Or use: https://youtu.be/pL-eGyAGh5k

Objective: To find and review published papers researching surgeons' effects on patients' physical health. Clinical outcomes of surgery patients with similar prognoses cannot be fully explained by surgeon skill or experience. Just as there are "hospital" and "psychotherapist" effects, there may be "surgeons" effects that persist after controlling for known variables like patient health and operation riskiness.

Methods: Cohort studies and randomized controlled trials (RCTs) of any surgical intervention, which, after multivariate adjustment, either showed proportion of variance in patients' physical health outcomes due to surgeons (random effects) or graded surgeons from best to worst (fixed effects). Studies with <15 surgeons or only ascribing surgeons' effects to known variables excluded. Medline, PubMed, Embase, and PsycINFO were used for search until June 2020. Manual search for papers referring/referred by resulting studies. Risk of bias assessed by Cochrane risk-of-bias tool and Newcastle–Ottawa Scale.

Results: Included studies: 52 cohort studies and three RCTs of 52,436+ surgeons covering 102 outcomes (33 unique). Studies either graded surgeons from best to worst or calculated the intra-class correlation coefficient (ICC), the percentage of patients' variation due to surgeons, in diverse ways. Sixteen studies showed exceptionally good and/or bad performers with confidence intervals wholly above or below the average performance. ICCs ranged from 0 to 47%, median 4.0%. There are no well-established reporting standards; highly heterogeneous reporting, therefore no meta-analysis.

Discussion: Interpretation: There is a surgeons' effect on patients' physical health for many types of surgeries and outcomes, ranging from small to substantial. Surgeons with exceptional patient outcomes appear regularly even after accounting for all known confounding variables. Many existing cohort studies and RCTs could be reanalyzed for surgeons' effects especially after methodological reporting guidelines are published.

Conclusion: In terms of patient outcomes, it can matter which surgeon is chosen. Surgeons with exceptional patient outcomes are worth studying further.

Keywords: physicians, physicians' effect, doctors' effect, therapists' effect, practice effect, clinical competence, professional practice gap, surgeons' practice pattern, quality of health care, delivery of health care

Introduction

What is already known on this topic: Previous research has shown associations between characteristics of surgeons, such as their level of surgical experience, and patient health outcomes. It is unclear whether surgeons have an influence on patients' physical health that has not been captured by known variables and how large that influence is.

What this study adds: This study is the first systematic review of unexplained surgeons' influence on patients' physical health. Findings are highly variable, depending on the type of outcome and surgery that can result in substantial differences in patient health outcomes between surgeons.

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Rationale

If you want to find a good surgeon, an internet query will provide advice from many sources.[3–5] There are also databases of what the database provider considers to be the best surgeons, calculated from raw death and complication rates plus other doctors' recommendations.[6] Surgeons themselves have given their opinion on what makes a good or outstanding surgeon,[7–11] with Barry Jackson's essay perhaps being the most comprehensive.[12] However, this information mostly relies on personal experiences, although Jackson's essay does mention "First-class outcomes after allowing for case-mix". Existing evidence suggests that some surgeons are more effective at applying interventions than others as there is, for example, a substantial volume effect, ie case volume, and years of practice effect in a number of surgical specialties.[13,14] In fact, there are few studies where author-selected outstanding practitioners are investigated,[15–17] with only Schenck et al mentioning surgeons.

It is well established that there is a hospital effect, ie that hospitals have a substantial influence on patients' health outcomes and that there are wide variations in patients' health outcomes between hospitals.[18–23] There is also substantial research on a therapist effect in psychotherapy with wide variations among therapists, so much so that this finding has made it into training material for psychotherapists.[24,25] Recent research also suggests that provider expectations could have a causal role in treatment effectiveness.[26] At the same time, the placebo effect, which can be substantial,[27] including in surgery[28–31] with some dissent for orthopedic surgery,[32] is suggestive of a surgeon's effect. The placebo effect shows that even with an inert or inactive intervention, there is an effect on patients. It is possible that part of this effect is due to the surgeon administering the placebo, usually a type of sham surgery.[28] However, there are currently no well-established standards on how to assess surgeons as an intervention in their own right or as an effect modifier of a given intervention. Recent research has endeavored to analyze the effect size of surgeons[33] by investigating 10 surgical trials for surgeon intra-cluster correlation coefficients (ICCs) and found that surgeons have a range of effects on patient health that differ between surgical specialties.

In the study by Udyavar et al[34] of 2149 surgeons performing 569,767 emergency surgeries it was shown that in five out of seven types of surgery, surgeons were responsible for 23% to 47% of the variability in patient mortality. This difference in outcome could not be explained by the choice of treatment, prognostic or diagnostic factors, patient clinical or demographic factors, hospital-level factors, or surgeon volume. To date studies such as Udyavar et al have not been synthesized. In this systematic review we have addressed this gap in the literature.

Objectives

This systematic review aims to identify and evaluate all the research to date examining the effect of surgeons on patient physical health outcomes after known variables have been accounted for. It is part of a larger research project that includes a systematic review of non-surgical practitioners, and a methodological study on how to report practitioners' effects on patients' physical health.

Methods

Eligibility Criteria

A systematic review was conducted following Synthesis without meta-analysis (SWiM) guidelines.[35] This review limits itself to studies that investigated actual patients' physical outcomes and excluded studies that focused on patients' opinions or satisfaction levels, with the rationale that these outcomes are often a more ambiguous way to measure surgeons' effects.[36]

The PICO is as follows:

Population	**P**	**Surgeons**
Intervention	I	
Comparison	C	
Outcome	O	Surgeons' effect on patients' physical health outcome

Information Sources and Search Strategy

We initially searched three databases: Medline via its PubMed interface, Embase, and PsycINFO from inception to June 2020 to identify relevant studies that investigate the influence of surgeons on patients' physical health outcomes. The search strategy used for each database is reported in Supplemental File 1 and was designed by JMC, a specialist in this area. In addition to the electronic search of databases, we further manually searched the references lists of the eligible articles and previous systematic reviews to identify potentially relevant studies that did not appear in the literature search. The following systematic review registries were searched for similar reviews: PROSPERO and Cochrane's CENTRAL register. One study was suggested by a reviewer.[37]

Selection Process and Further Eligibility Criteria

Two reviewers independently screened titles/abstracts for inclusion. Any discrepancies were resolved by discussion or in consultation with a third reviewer.

Study designs considered for inclusion were retrospective and prospective observational studies, case-control studies, and randomized controlled studies, where either the proportion of variance in patient outcomes explained by differences between practitioners, ie practitioners' random effects, are measured, or the difference between the individual practitioners is highlighted, ranging from best to worst, ie practitioners' fixed effects are measured. Any medical practitioner except psychotherapists were included. At this stage both surgeons and doctors who were not surgeons were included, however this paper only includes studies of surgeons. All other medical doctors are reviewed in a separate paper.

Any patient's physical health-related outcome was eligible, examples of which are repair reoperations, readmission rate, survival/mortality rate, embryo transfer rate, length of hospital stay, infection rate, estimated blood loss, recurrence rates, pain, and other post-operative complications. There were no date or language restrictions.

We excluded studies that only ascribed a surgeons' effect to particular surgeon-related variables, such as volume of procedures performed or specialty of surgeon; studies with fewer than 15 surgeons; cross-sectional studies, ie surveys of doctors or patients, as they had an increased risk of bias; and two studies that mentioned fixed or random effects but did not actually list the effects either graphically or in numerical form.[38,39]

The authors could not find a recommendation for the minimum number of clusters in a study for a systematic review – in this case the minimum number of practitioners. We took 15 practitioners as the smallest cluster size but appreciate that this is an arbitrary number. (Figure 1).

Data Collection Process and Data Items

Titles and abstracts were collected using Endnote 9 and uploaded into Rayyan for inclusion or exclusion where the two reviewers independently screened titles and abstracts. The resulting eligible studies were marked as members of a group in the original Endnote library and their full text documents were added to the library.

CS and a second extractor independently and in duplicate extracted the relevant data from each eligible study and collected the following variables using Excel:

- Unique publication identifier consisting of first author and year
- Surgical specialty
- Type of study (RCT, Cohort)
- Type of intervention (can be multiple)
- Outcome type (multiple)
- Significant surgeons' effect as per authors' evaluation Y/N
- Number of surgeons
- Number of patients or procedures
- Number of hospitals/institutions
- ICC (intra-class correlation coefficient) Number/NS
- Multivariate analysis Y/N

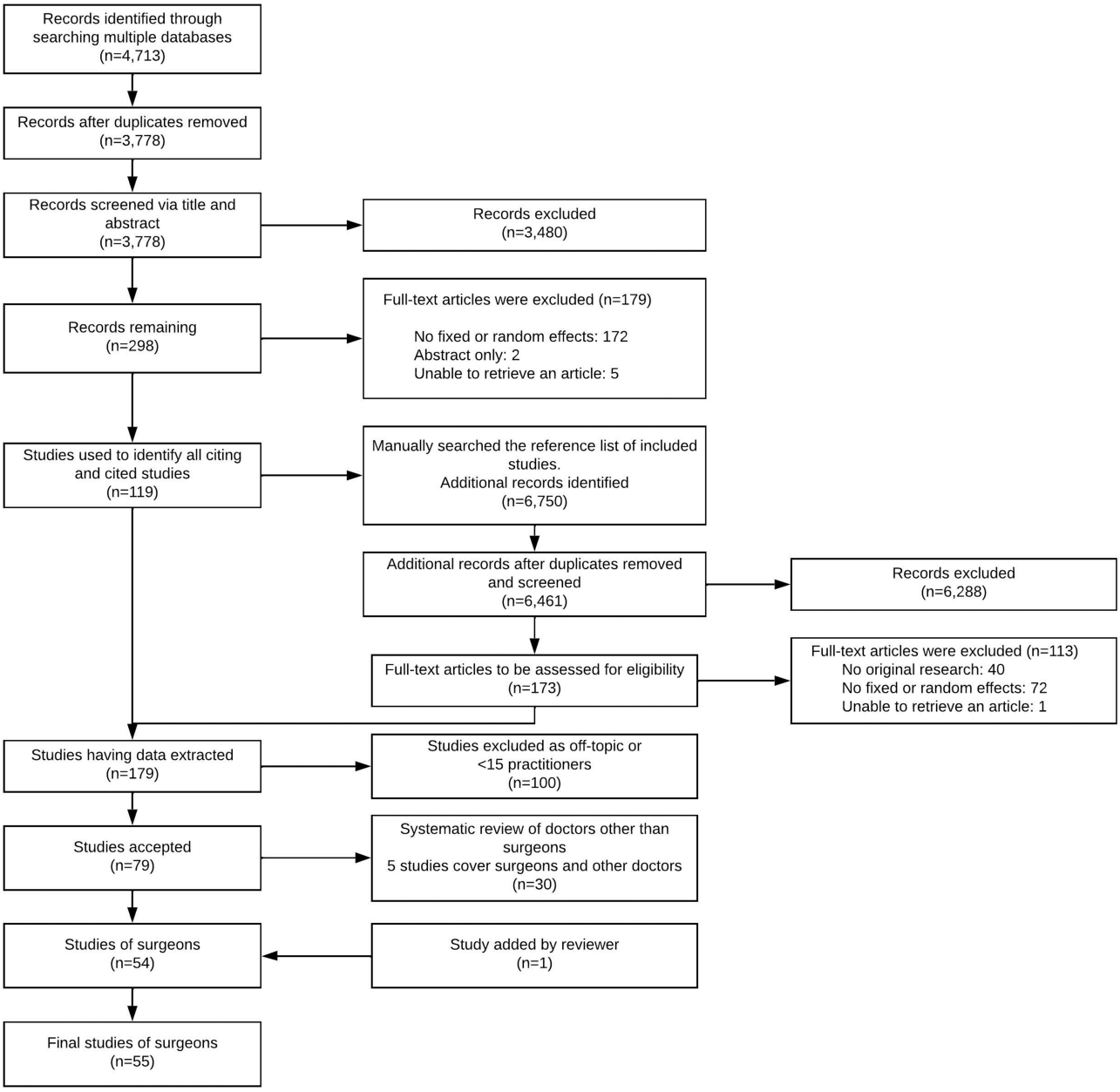

Figure 1 Flow diagram of selection of included documents.

- Number of negative and positive outliers
- Country of origin

Study Risk of Bias Assessment

Two reviewers independently used the Cochrane risk-of-bias assessment tool[2] for the three included randomized controlled studies (Figures 2 and 3), and the Newcastle-Ottawa Scale (NOS) for the included cohort studies.[40,41]

Effect Measures

The metric for the fixed effects is the percentage of positive and negative outliers as defined in the individual study reports. The metric for the random effects is the variance due to the practitioner or the intra-class correlation coefficient, defined as the variation in patient outcome due to the practitioner as a percentage of the total variation.

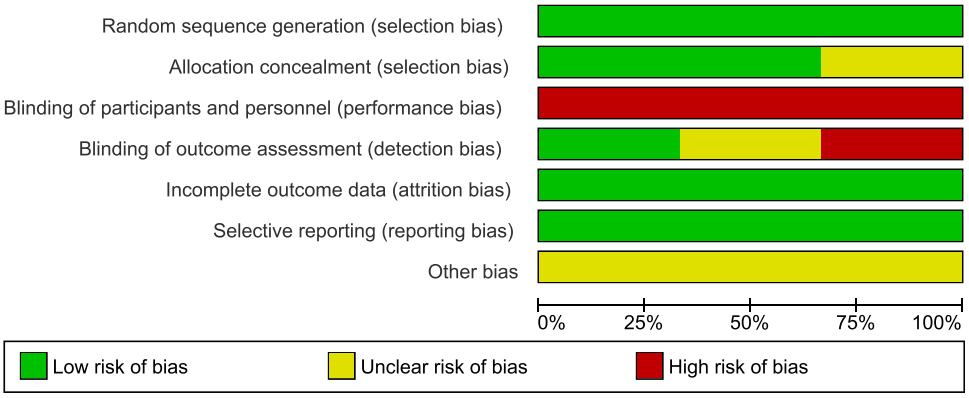

Figure 2 First risk of bias chart for the three randomized controlled trials included.

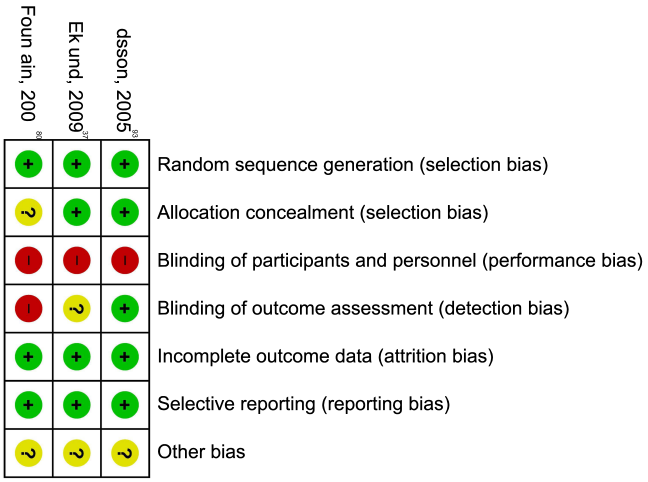

Figure 3 Second risk of bias chart for the three randomized controlled trials included.

Synthesis Methods

As the data are highly heterogenous and there are no established standards on recording doctors' effects or surgeons' effects, no statistical synthesis was used. There were 14 surgical specialties plus two papers covering multiple surgeries, 50 separate interventions and 31 separate outcomes.

The surgeons' effect on patients' physical health is described in two ways, using multilevel mixed effects regression modelling or hierarchical regression to understand both surgeon and system-level variation.[42,43]

Percentage of Variation in Patient Outcome Due to the Surgeon in the Form of the Intra-Class Correlation Coefficient (ICC)

Post-regression estimation gives the ICC, which as a number ranging from 0 to 1, gives the percentage of variation in outcome due to each level in the regression model. For example, in a three-level model of patients clustered per doctor, who in turn were clustered within hospitals, each level has an ICC with the total ICCs adding up to 1. In order to realize this, the studies included random effects for surgeons, and at times hospitals or other aggregators, such as county.

Patient risk scores and other available variables like surgeon demographic data or year of intervention were included as fixed effects in the regression analysis. The quality and depth of the analysis varied greatly between papers. Confidence intervals for the ICC were not reported.[44] A high quality study is Papachristofi et al.[45] There is also substantial other research on the ICC.[46–51]

Grading Surgeons from Best to Worst

In this approach surgeons are ranked by their patient results, usually with a 95% confidence interval and either the raw, unadjusted scores are reported, or patient risk scores and/or surgeon demographic variables and other data, such as year of operation, are included in the model. In the majority of cases the method to calculate the interval is not mentioned, though there are exceptions[52–59] and surgeons whose 95% confidence intervals rank wholly above or below the mean rate of outcomes are considered to be outliers. Reporting is done by listing the count of outliers, or graphically through a caterpillar or a funnel plot,[60] with a caterpillar plot being an outcome-ordered forest plot.

Reporting Bias and Certainty Assessment

Due to there being no synthesis, reporting bias and certainty assessments were not undertaken.

Results

Study Selection

Overall, 4713 records were identified from electronic records, in addition to 6461 from other sources. After removing the 1224 duplicates, 10,239 studies underwent screening for eligibility. Then, full-text versions were retrieved for 471 records. One study was added by a reviewer. Finally, after exclusion of ineligible articles, 55 studies of more than 52,436 surgeons were included in the final synthesis.

Study Characteristics

The 55 studies that are included reported 102 outcomes, 33 of which are unique. Of the outcomes, 28 (20 studies)[55–57,59,61–76] graded individual surgeons' performance from best to worst; 38 (12 studies)[34,77–87] recorded an ICC due to surgeons in a multivariate multi-level analysis; 14 (8 studies)[44,45,53,58,88–91] recorded both; 20 (13 studies)[37,52,92–102] provided a non-standard description of fixed effects; and 1 provided an ICC plus a non-standard description of fixed effects.[103] One study[104] graded surgeons from best to worst in one outcome (complications) and used a non-standard fixed effects description for another outcome (mortality).

Of the 55 studies, three were randomized controlled trials,[37,80,93] and 52 were observational cohort studies. The studies included various surgical specialties or aggregates thereof, including 8 or more specialties,[81,91] breast surgery,[59,73,74,101] cardiac surgery,[44,45,52,53,56,65–67,70,89,90,99,100] colorectal surgery,[34,61,68,71,78,85,92,103,104] ENT surgery,[75] gastrointestinal surgery,[34,83] general surgery,[34,37,57,77,79,82,86,93,95,96,102] obstetrics,[80] ophthalmology,[97] orthopedic surgery,[55,76,84,102] rectal surgery,[72,98] spinal surgery,[58] trauma surgery,[87] and urology.[62–64,69,88,94,102] 38 studies were conducted in the USA, 10 in the UK, two in Austria and Sweden, one each in Canada, France, and Germany. The volume of included surgeons ranged from 17 to 14,598. The characteristics of the included studies are summarized in Table 1.

Risk of Bias in Studies

For the cohort studies, of 97 outcomes in 52 studies, (1) scored 7 stars, (21) 8 stars and (75) 9 stars out of a maximum of 9 stars on the Newcastle-Ottawa Scale.[40,41] All studies scored the maximum points on the selection criteria and the outcome criteria. Those with 7 and 8 stars scored either 0 or 1 on comparability while the 9-star studies scored 2 (Table 1). The detailed risk of bias assessment of the three randomized controlled trials, using Cochrane RoB, is described in Figures 2 and 3, and Supplemental File 2.

Results of Individual Studies

Altogether 10 studies published caterpillar plots[59,61,64,67,71,74–76,89,91] and five studies presented funnel plots.[65,66,68–70] The plots showed the performance of surgeons for a particular patient outcome, usually sorted by performance, providing a 95% confidence interval for each surgeon and indicating whether that confidence interval was wholly above or below the average performance. Results ranged from no over- or underperformer[62,66,67,69,70,91] to substantial numbers of both.[59,61,62,64,72,73,75,76]

Table 1 Characteristics of Included Studies

Publication	Specialty	Detailed Intervention	Surgeons	Patients/ Procedures	Institutions	Outcome	NOS **
Anderson, 2016[52]	Cardiac surgery	Norwood operation	NS	2880	35	Mortality	9
Aquina, 2015a[92] pg e163	Colorectal surgery	Colorectal resection	NS	158,596	NS	C. difficile infection	9
Aquina, 2015b[61]	Colorectal surgery	Upper GI cancer resection	223	14,875	99	Blood transfusion, wound infection, pneumonia, sepsis	9
Aquina, 2016[103]	Colorectal surgery	Colorectal resection	3481	125,160	210	Blood transfusion, wound infection, pneumonia, sepsis, intra-abdominal abscess	9
Aquina, 2017[77]	General surgery	Inguinal hernia operation	1572	124,416	260	Reoperation	9
		Ventral hernia operation	2012	78,267	256	Reoperation	9
Arvidsson, 2005[93]	General surgery	Hernia operation	25	1068	7	Recurrence	RCT
Becerra, 2017[78]	Colorectal surgery	Lymph node examination in colectomy	1503	12,332	187	Suboptimal care	9
Begg, 2002[62]	Urology	Radical prostatectomy	159	10,737	72	Postoperative complications	9
						Incontinence	9
						Late urinary complications	9
						Mortality	9
Bianco, 2005[63]	Urology	Radical prostatectomy	159	5238	NS	Complications	9
						Incontinence	9
						Late urinary complications	9
Bianco, 2010[64]	Urology	Radical prostatectomy	54	7725	4	Cancer recurrence	9
Bolling, 2010[65]	Cardiac surgery	Mitral valve repair/ replacement	1088	28,507	639	Mitral valve repair rates	9
Bridgewater, 2003[67]	Cardiac surgery	Coronary artery surgery	23	8572	4	Mortality	9
Bridgewater, 2005[66]	Cardiac surgery	Aortic valve surgery	25	1097	4	Mortality	8
		Coronary artery surgery	25	9066	4	Mortality	8
Burns, 2011[68]	Colorectal surgery	Colorectal surgery	1557	246,469	156	Reoperation	9
Cromwell, 2013[69]	Urology and Gynecology	Urinary-genital tract fistula	490	1194	129	Reoperation	8
Dagenais, 2019[88]	Urology	Partial nephrectomy	19	1461	1	Estimated blood loss	9
Duclos, 2012[79]	General surgery	Thyroid surgery	28	3574	5	Hypoparathyroidism	9
						Recurrent laryngeal nerve palsy	9
Eastham, 2003[94]	Urology	Radical prostatectomy	44	4629	2	Positive surgical margins	9

(*Continued*)

Table 1 (Continued).

Publication	Specialty	Detailed Intervention	Surgeons	Patients/ Procedures	Institutions	Outcome	NOS **
Eklund, 2009[37]	General surgery	Inguinal hernia repair surgery	48	1275	NS	Recurrence	RCT
Faschinger, 2011[95]	General surgery	Cataract surgery	17	36,329	1	Capsule rupture	9
Fountain, 2004[80]	Obstetrics	Hysterectomy, Abdominal	43*	876	28*	Complications	RCT
		Hysterectomy, Vaginal	43*	504	28*	Complications	RCT
Gani, 2015[81]	[See on right]	8 (cardiac, GI* surgery, trauma, HPB*, BME*, thoracic, transplant, vascular)	56	22,559	1	Readmission	9
Glance, 2006[53]	Cardiac surgery	Cardiac surgery	138	51,750	33	Mortality	9*
Glance, 2016[89]	Cardiac surgery	CABG*	241	55,436	40	Major complications or mortality	9
Grant, 2008[70]	Cardiac surgery	Cardiac surgery	31	14,637	4	Mortality	9
Healy, 2017[71]	Colorectal surgery	Minimally invasive colectomy	97	3118	46	Complications	8
		Open colectomy	97	2078	46	Complications	8
Hermanek, 1999[72]	Rectal surgery	Rectal carcinoma resection	43	1121	7	Mortality	9
Hermann, 2002[96]	General surgery	Primary surgery for benign thyroid disease	20	16,443	1	Recurrent laryngeal nerve injury (RLNI)	8
Hoffman, 2017[82]	General surgery	General surgery	1128	183,283	601	Complications	9
Huesch, 2009[56]	Cardiac surgery	CABG*	398	221,327	75	Mortality	8
Hyder, 2013[83]	Gastrointestinal surgery	Pancreatoduodenectomy	575	1488	298	Readmission	9
Johnston, 2010[97]	Ophthalmologist	Cataract surgery	404	55,515	12	Posterior capsule rupture (PCR)	8
Justiniano, 2019[98]	Rectal surgery	Rectal carcinoma resection	345	1251	118	Mortality	9
Kaczmarski, 2019[73]	Breast surgery	Breast-conserving surgery	5337	291,065	NS	Reoperation	9
Kissenberth, 2018[84]	Orthopedic surgery	Rotator cuff repair	57	1703	NS	Single Assessment Numeric Evaluation (SANE) score	8
Landercasper, 2019[74]	Breast surgery	Breast-conserving surgery	71	3954	NS	Reoperation	9
LaPar, 2014[99]	Cardiac surgery	Mitral valve repair/ replacement	93	4194	17	Lack of repair	8
Likosky, 2012[100]	Cardiac surgery	CABG*	32	11,838	8	Postoperative low-output failure	9
Luan, 2019[57]	General surgery	Bariatric surgery	38	1277	21	Complications	9
Martin, 2013[58]	Spinal surgery	Lumbar fusion	298	6091	43	Complications	9
Martin, 2013[58]	Spinal surgery	Lumbar fusion	298	6091	43	Reoperation	9
McCahill, 2012[59]	Breast surgery	Breast-conserving surgery	54	2206	4	Reoperation	9

(*Continued*)

Table 1 (Continued).

Publication	Specialty	Detailed Intervention	Surgeons	Patients/ Procedures	Institutions	Outcome	NOS **
Papachristofi, 2014[90]	Cardiac surgery	Cardiac surgery	18	18,426	1	Mortality	9
Papachristofi, 2016[44]	Cardiac surgery	Cardiac surgery	127	110,769	10	Mortality	9
Papachristofi, 2017[45]	Cardiac surgery	Cardiac surgery	127	107,038	10	Length of stay	9
Quinn, 2018[91]	All surgeries	All surgeries	2724	123,141	51	Any morbidity	9
						Death or serious morbidity	9
						Mortality	9
						Readmission	9
						Reoperation	9
						Surgical site infection	9
Rudmik, 2017[75]	ENT surgery	Endoscopic sinus surgery	43	2168	NS	ESS* revision rate	9
Schumacher, 2017[101]	Breast surgery	Breast-conserving surgery	93	3470	56	Reoperation	7
Shih, 2015[85]	Colorectal surgery	Colectomy	345	5033	24	Complications	9
Singh, 2018[76]	Orthopedic surgery/ Neurosurgery	Spine surgery	3987	39,884	NS	Length of stay	8
						Readmission	8
Thigpen, 2018[55]	Orthopedic surgery	Rotator cuff repair	34	995	1	ASES* performance score	8
Udyavar, 2018a[34]	Colorectal surgery	Colectomy	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
	Gastrointestinal surgery	Peptic ulcer disease	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
		Small bowel resection	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
	General surgery	Appendectomy	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
		Cholecystectomy	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
		Laparotomy	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9
		Lysis of adhesions	2149*	569,767*	225*	Complications	9
						Mortality	9
						Readmission	9

(*Continued*)

Table 1 (Continued).

Publication	Specialty	Detailed Intervention	Surgeons	Patients/ Procedures	Institutions	Outcome	NOS **
		Overall	2149	569,767	225	Complications	9
						Mortality	9
						Readmission	9
Udyavar, 2018b[87]	Trauma surgery	Trauma surgery	175	65,706	31	Mortality	9
Udyavar, 2019[86]	General surgery	Emergency surgery	5816	215,745	198	Complications	9
Xu, 2016[104]	Colorectal surgery	Colectomy	276	2525	44	Complications	9
						Mortality	9
Xu, 2019[102]	General surgery	Laparoscopic cholecystectomy	2476	1,884,842*	NS	Complications	8
	Urology	Other transurethral prostatectomy	1663*	1,884,842*	NS	Complications	8
		Radical prostatectomy	1663*	1,884,842*	NS	Complications	8
	Orthopedic surgery	Cervical spinal fusion	10,459*	1,884,842*	NS	Complications	8
		Lumbar spinal fusion, anterior column	10,459*	1,884,842*	NS	Complications	8
		Lumbar spinal fusion, posterior column	10,459*	1,884,842*	NS	Complications	8
		Total hip arthroplasty	10,459*	1,884,842*	NS	Complications	8
		Total knee replacement	10,459*	1,884,842*	NS	Complications	8

Notes: *The values are for the whole study population. Values for each subgroup were not reported.
Abbreviations: **ASES, American Shoulder and Elbow Surgeons; BME, breast, melanoma, and endocrine surgery; CABG, coronary artery bypass grafting; ESS, endoscopic sinus surgery; EQ-5D, quality of life via the Euro-Qol; GI, gastro-intestinal; HPB, hepatopancreatic biliary; NOS, Newcastle-Ottawa Scale for assessing risk of bias of cohort studies; NS, not stated, the number is not given and most likely greater than one.

Of the papers that reported fixed effects, 15 recorded exceptional performers after taking account of all known variables, including demographic variables of the practitioners, such as experience, volume of patients/procedures, and hospital effects (which themselves can be substantial).[55,59,61–66,68,71,73–76,91] Other studies (n=22) published a random effect, worded many different ways, that showed the Intra-Class Correlation (ICC) effect.[34,44,45,53,57,58,77–91,103] The random effects reported ranged from zero (ICC of 0.0%) to substantial (ICC of 10% or higher). (Tables 2 and 3, and Figures 4 and 5).

Only for a. complications after colectomy and b. mortality after cardiac surgery was there more than one study included that reported an ICC. As these are the only outcomes with multiple ICCs, a more detailed analysis follows:

For colectomy, Shih et al[85] reported an ICC of 14.0% and Udyavar et al[34] an ICC of 2.3%. Udyavar defined complications as any of "*pulmonary embolism, sepsis, myocardial infarction, acute renal failure, and cardiac arrest*" while Shih defined a much longer list of items as complications, including surgical site infection; wound disruption; multiple types of infection; unplanned intubation; transfusion; multiple stroke or clotting diagnoses; multiple heart issues; renal complications or failure; extended coma or mechanical ventilation; nerve damage; failure of the graft or prosthesis; bowel obstruction; and anastomotic leak. For mortality after cardiac surgery three studies[44,53,90] reported an ICC of 2.8% to 5.9% (Table 2).

Results of Syntheses, Reporting Biases and Certainty of Evidence

Not applicable as there was no synthesis.

Table 2 Publications by Outcome and Numerical Results

	Outcome	Specialty	Detailed Intervention	Publication	ICC^	Outliers %	
						Negative	Positive
Complications	Any morbidity	All surgeries	All surgeries	Quinn, 2018[91]	2.2%	0.18%	0.22%
	Blood transfusion, wound infection, pneumonia, sepsis	Colorectal surgery	Upper GI cancer resection	Aquina, 2015b[61]		13.0%	28.0%
	Blood transfusion, wound infection, pneumonia, sepsis, intra-abdominal abscess	Colorectal surgery	Colorectal resection	Aquina, 2016[103]	24.3%	Other	Other
	C. difficile infection	Colorectal surgery	Colorectal resection	Aquina, 2015a[92] pg e163		Other	Other
	Capsule rupture	General surgery	Cataract surgery	Faschinger, 2011[95]		Other	Other
	Complications (postoperative)	Colorectal surgery	Colectomy	Shih, 2015[85]	14.0%		
				Udyavar, 2018a[34]	2.3%		
				Xu, 2016[104]		3.3%	NS
			Minimally invasive colectomy	Healy, 2017[71]		10.3%	7.2%
			Open colectomy	Healy, 2017[71]		9.3%	5.2%
		Gastrointestinal surgery	Peptic ulcer disease	Udyavar, 2018a[34]	0.03%		
			Small bowel resection	Udyavar, 2018a[34]	0.02%		
		General surgery	Appendectomy	Udyavar, 2018a[34]	0.2%		
			Bariatric surgery	Luan, 2019[57]		2.6%	15.8%
			Cholecystectomy	Udyavar, 2018a[34]	0.1%		
			Emergency surgery	Udyavar, 2019[86]	27.3%		
			General surgery	Hoffman, 2017[82]	6.2%		
			Laparoscopic cholecystectomy	Xu, 2019[102]		Other	Other
			Laparotomy	Udyavar, 2018a[34]	0.1%		
			Lysis of adhesions	Udyavar, 2018a[34]	0.0%		

(*Continued*)

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Table 2 (Continued).

	Outcome	Specialty	Detailed Intervention	Publication	ICC^	Outliers %	
						Negative	Positive
			Overall (Emergency general surgeries)	Udyavar, 2018a[34]	0.1%		
		Obstetrics	Hysterectomy, Abdominal	Fountain, 2004[80]	7.4%		
			Hysterectomy, Vaginal	Fountain, 2004[80]	0.5%		
		Spinal surgery	Lumbar fusion	Martin, 2013[58]	2.6%	3.7%	0.0%
		Urology	Other transurethral prostatectomy	Xu, 2019[102]		Other	Other
			Radical prostatectomy	Begg, 2002[62]		8.0%	3.0%
				Bianco, 2005[63] *		7.5%	2.5%
				Xu, 2019[102]		Other	Other
		Orthopedic/Neuro-surgery	Cervical spinal fusion	Xu, 2019[102]		Other	Other
			Lumbar spinal fusion, anterior column	Xu, 2019[102]		Other	Other
			Lumbar spinal fusion, posterior column	Xu, 2019[102]		Other	Other
			Total hip arthroplasty	Xu, 2019[102]		Other	Other
			Total knee replacement	Xu, 2019[102]		Other	Other
	Death or serious morbidity	All surgeries	All surgeries	Quinn, 2018[91]	2.0%	0.15%	0.15%
	Estimated blood loss	Urology	Partial nephrectomy	Dagenais, 2019[88] ##	14.4%	10.5%	10.5%
	Hypoparathyroidism	General surgery	Thyroid surgery	Duclos, 2012[79]	32.0%		
	Incontinence	Urology	Radical prostatectomy	Begg, 2002[62]		9.0%	3.0%
				Bianco, 2005[63] *		9.4%	2.5%
	Late urinary complications	Urology	Radical prostatectomy	Begg, 2002[62]		13.0%	14.0%
				Bianco, 2005[63] *		13.2%	14.5%
	Major complications or mortality	Cardiac surgery	Cardiac surgery	Glance, 2016[89]	1.76%	3.3%	1.7%
	Posterior capsule rupture (PCR)	Ophthalmologist	Cataract surgery	Johnston, 2010[97]		Other	Other

	Recurrent laryngeal nerve injury (RLNI)	General surgery	Primary surgery for benign thyroid disease	Hermann, 2002[96]		Other	Other
	Recurrent laryngeal nerve palsy	General surgery	Thyroid surgery	Duclos, 2012[79]	10.0%		
	Surgical site infection	All surgeries	All surgeries	Quinn, 2018[91]	4.5%	0.29%	0.07%
Length of stay		Cardiac surgery	Cardiac surgery	Papachristofi, 2017[45]	2.79%	11.8%	14.2%
		Orthopedic/Neuro-surgery	Spine surgery	Singh, 2018[76]		10.0%	7.2%
Mortality		All surgeries	All surgeries	Quinn, 2018[91]	1.4%	0.0%	0.0%
		Cardiac surgery	Aortic valve surgery	Bridgewater, 2005[66] *		0.0%	0.0%
			CABG	Huesch, 2009[56] ***		1.2%	Other
				Glance, 2006[53]	5.9%	3.3%	8.7%
				Grant, 2008[70] *		0.0%	0.0%
			Cardiac surgery	Papachristofi, 2014[90]	2.79%	16.7%	0.0%
				Papachristofi, 2016[44]	4.0%	15.0%	6.3%
			Coronary artery surgery	Bridgewater, 2003[67]		0.0%	0.0%
				Bridgewater, 2005[66] *		0.0%	16.0%
			Norwood operation	Anderson, 2016[52]		Other	Other
		Colorectal surgery	Colectomy	Udyavar, 2018a[34]	22.9%		
				Xu, 2016[104]		Other	Other
		Gastrointestinal surgery	Peptic ulcer disease	Udyavar, 2018a[34]	47.3%		
			Small bowel resection	Udyavar, 2018a[34]	23.1%		
		General surgery	Appendectomy	Udyavar, 2018a[34]	6.9%		

(*Continued*)

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Table 2 (Continued).

	Outcome	Specialty	Detailed Intervention	Publication	ICC^	Outliers %	
						Negative	Positive
			Cholecystectomy	Udyavar, 2018a[34]	3.5%		
			Laparotomy	Udyavar, 2018a[34]	33.2%		
			Lysis of adhesions	Udyavar, 2018a[34]	35.5%		
			Overall (Emergency general surgeries)	Udyavar, 2018a[34]	32.7%		
		Rectal surgery	Rectal carcinoma resection	Hermanek, 1999[72]		9.3%	16.3%
				Justiniano, 2019[98]		Other	Other
		Trauma surgery	Trauma surgery	Udyavar, 2018b[87]	8.7%		
		Urology	Radical prostatectomy	Begg, 2002[62]		0.0%	0.0%
Readmission		8 (Cardiac, GIS, Trauma, HPB, BME, Thoracic, Transplant, Vascular)	8 (Cardiac, GIS, Trauma, HPB, BME, Thoracic, Transplant, Vascular)	Gani, 2015[81]	2.8%		
		All surgeries	All surgeries	Quinn, 2018[91]	0.7%	0.0%	0.0%
		Colorectal surgery	Colectomy	Udyavar, 2018a[34]	3.1%		
		Gastrointestinal surgery	Pancreatoduodenectomy	Hyder, 2013[83]	0.3%		
			Peptic ulcer disease	Udyavar, 2018a[34]	6.8%		
			Small bowel resection	Udyavar, 2018a[34]	2.9%		
		General surgery	Appendectomy	Udyavar, 2018a[34]	3.5%		
			Cholecystectomy	Udyavar, 2018a[34]	3.0%		
			Laparotomy	Udyavar, 2018a[34]	6.0%		
			Lysis of adhesions	Udyavar, 2018a[34]	4.9%		

			Overall (Emergency general surgeries)	Udyavar, 2018a[34]	2.3%		
Reoperation	Reoperation	All surgeries	All surgeries	Quinn, 2018[91]	3.8%	0.04%	0.0%
		Breast surgery	Breast-conserving surgery	Kaczmarski, 2019[73]		17.5%	3.7%
				Landercasper, 2019[74]		5.7%	4.3%
				McCahill, 2012[59]		13.0%	31.5%
				Schumacher, 2017[101]		Other	Other
		Colorectal surgery	Colorectal surgery	Burns, 2011[68] **		0.7%	4.5%
		General surgery	Hernia operation	Arvidsson, 2005[93]		Other	Other
			Inguinal hernia operation	Aquina, 2017[77]	40.5%		
			Ventral hernia operation	Aquina, 2017[77]	14.0%		
		Spinal surgery	Lumbar fusion	Martin, 2013[58]	9.0%	#	#
		Urology	Urinary-genital tract fistula	Cromwell, 2013[69] **		0.0%	0.0%
Suboptimal care		Colorectal surgery	Lymph node examination in colectomy	Becerra, 2017[78]	7.9%		
Success or failure	ASES score	Orthopedic surgery	Rotator cuff repair	Thigpen, 2018[55]		5.9%	8.8%
	Cancer recurrence	Urology	Radical prostatectomy	Bianco, 2010[64]		8.3%	36.1%
	ESS revision rate	ENT surgery	Endoscopic sinus surgery	Rudmik, 2017[75]		16.3%	4.7%
	Mitral valve repair rates	Cardiac surgery	Mitral valve repair/replacement	Bolling, 2010[65]		6.6%	7.4%
				LaPar, 2014[99]		Other	Other
	Positive surgical margins	Urology	Radical prostatectomy	Eastham, 2003[94]		Other	Other

(*Continued*)

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Table 2 (Continued).

	Outcome	Specialty	Detailed Intervention	Publication	ICC^	Outliers %	
						Negative	Positive
	Postoperative low-output failure	Cardiac surgery	CABG	Likosky, 2012[100]		Other	Other
	Readmission	Orthopedic/Neuro-surgery	Spine surgery	Singh, 2018[76]		0.1%	0.03%
	Recurrence	General surgery	Inguinal hernia repair surgery	Eklund, 2009[37]		2.1%	
Score	ASES^ score	Orthopedic surgery	Rotator cuff repair	Thigpen, 2018[55]		5.9%	8.8%
	Single Assessment Numeric Evaluation (SANE) score	Orthopedic surgery	Rotator cuff repair	Kissenberth, 2018[84]	44.0%		

Notes: ^ASES score is American Shoulder and Elbow Surgeons (ASES) performance score; ICC is intra-class correlation coefficient and shows percentage of variance due to practitioner as percentage of total variance after accounting for all known variables. Outliers are listed for papers where the surgeons were ordered in their effect on patients' physical health from best to worst or vice versa. The percentages listed are those practitioners whose 95% confidence interval is wholly below or above the mean. Outliers listed as "Other" sorted their surgeons by physical patient effect but used a different way to present their data. Common examples are a caterpillar plot without confidence intervals or a bar chart. *99% confidence interval to define outliers used. **99.8% confidence interval to define outliers used. ***90% confidence interval to define outliers used. #Graph too small to calculate positive or negative outliers. ##Dagenais et al[88] also shows precisely 0.00 between-surgeon variance for length of stay, glomerular filtration rate (GFR) preservation, positive margins, chronic kidney disease (CKD) upstaging, Clavien grade ≥ I complications, and 30-day readmission. Operative time had an ICC of 33.4%.

Table 3 ICC Summary Statistics

ICC n=53 Outcomes	
Minimum	0.001%
Maximum	47.3%
Average	10.2%
Median	4.0%
IQR	2.2–14.0%
Standard deviation	0.13

Discussion

In this review, the objective was to determine whether there is a surgeons' effect on patients' physical health that is apparent even after accounting for all known variables, such as level of experience. Included studies graded surgeons in order of performance or listed the proportion of variation that is due to practitioners after taking account of all known variables. All but three studies were cohort studies. The other three studies were randomized controlled trials. Findings showed substantial heterogeneity that may be related to type of surgery and type of outcome. After accounting for surgeons' experience, patients' risk, and all other known variables, there remained at times substantial differences in patients' physical health outcomes between surgeons. More than a quarter of all studies (15 out of 55) showed high-volume outliers whose performance is well above the average. In contrast, there were types of surgery/intervention/outcome combinations that showed little evidence of a surgeons' effect on patients' physical health. These findings are somewhat consistent with the substantial body of research on a therapist effect in psychotherapy showing a wide variation in patient outcomes.

With two exceptions the authors only found one study per combination of surgical specialty, intervention and patient outcome. The first exception was two studies covering complications after colectomy and they had very different ICCs of 14.0%[85] and 2.3%.[34] It seems the much wider definition of "complication" in Shih led to a bigger influence of surgeons

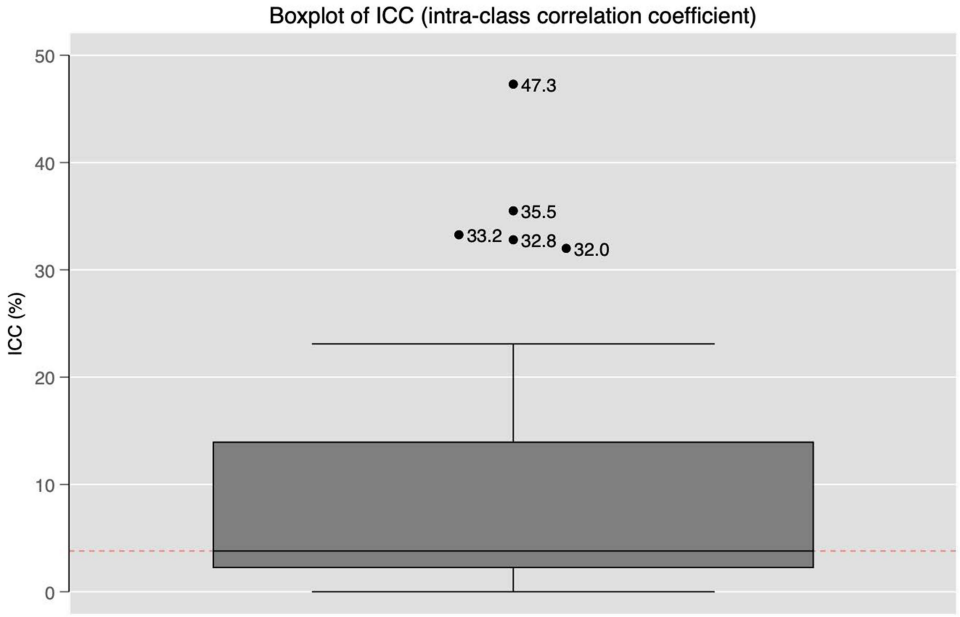

Figure 4 Boxplot of ICC (intra-class correlation coefficient).

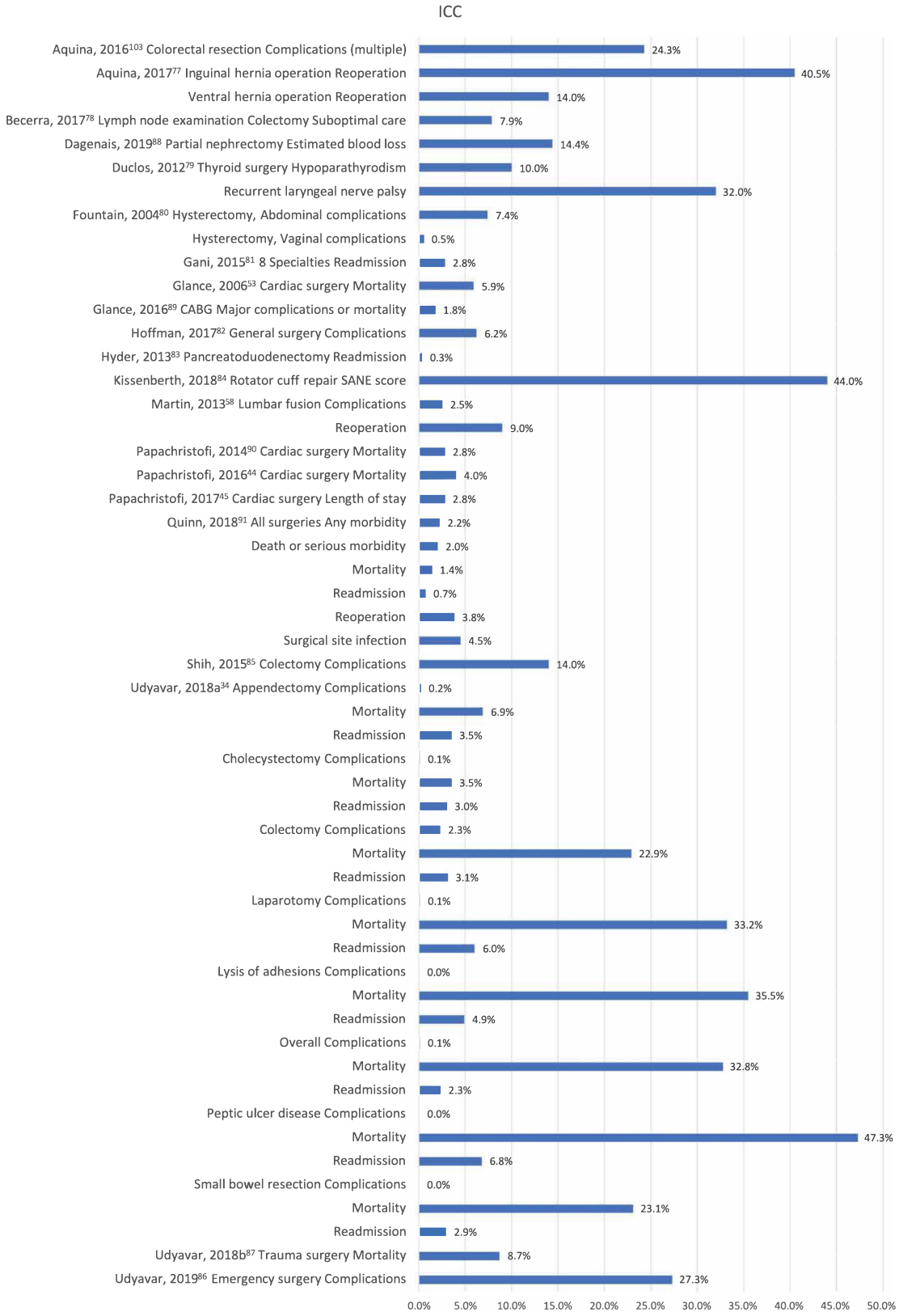

Figure 5 Intra-class correlation coefficients (ICCs) by paper, intervention, and patient outcome.

on the outcome and therefore a higher ICC. The second exception was for mortality after cardiac surgery with three studies[44,53,90] reporting an ICC of 2.8% to 5.9%. Clearly, standardized definitions of physical patient outcomes would assist comparisons across studies.

A major limitation of the evidence identified in this review is that there is currently no standard way to report surgeons' performance on patient's physical health. What does get reported can be divided into either grading individual surgeons by performance or calculating the percentage of variation in patients' outcome that is due to the surgeon after all known variables have been taken into account. Both types of reporting are worded in many different ways, making discovery of such research difficult as can be seen in that more than 10,000 publications had to be reviewed.

A further limitation is that only for very few papers the primary purpose was to report surgeons' performance after taking account of all known variables. Much of the time the reviewed publications' authors emphasized other aspects of healthcare.

Summary

In terms of this systematic review, it was revealed that surgeons' performance data on physical patient health is available to the authors of many published research studies. However, this data is in most cases either not at all reported or only in a limited way. This data could easily be included in an article prepared for publication as the data is already available and often requires minimal or no extra analysis to provide it in the format recommended in the methodological review that is reviewed for publishing. Publishing this data will also allow these studies to be part of future meta-analyses, gaining further dissemination of the work.

It seems that the possibility that surgeons are an intervention in their own right, an intervention that can be more or less effective and an intervention whose effect can be measured, is an area where there has been little systematic research. This is despite the fact that in psychotherapy it is well established that doctors (therapists) constitute an intervention in their own right, independent of the actual intervention they use.[24,25]

Furthermore, if the intervention is held constant, then surgeons are an effect modifier whose strength varies substantially depending on the intervention and the patients' physical health outcome measured.

If it can be established when and how much surgeons constitute an intervention or a substantial effect modifier in their own right, independent of the intervention they use, then this opens up the possibility that this intervention (surgeons) can be systematically managed and improved to the benefit of patients, the surgeons themselves, and the entire health system.

None of the studies that identified outstanding surgeons[61,64–66,68,71,74–76,89,91] made any recommendations on how to use this potential quality improvement resource. So far, we see little or no evidence in the literature that even when exceptional performers have been quantitatively identified, these exceptional performers are used as role models or as research subjects for qualitative research in order to find out what makes them exceptional.

A key point of this systematic review is that the authors specifically looked for studies that showed a surgeons' effect for which there was no explanation, ie a residual effect after all known information had been included in the statistical analysis. Therefore, the cause of the surgeons' effect measured is, by the definition of the research question for this systematic review, not known. This leaves open the question whether the cause is unknowable, or if there are one or more causes that could be identified in future research.

If we want to know what makes a good surgeon beyond the well-founded opinions of surgeons[12] or those who work with surgeons – and how to train surgeons to be good surgeons – then the first step beyond all the current measures taken to train surgeons could be to reliably identify outstanding surgeons. Consequently, we can find out if their ability can be passed on to others and, if yes, to lift the overall standard of healthcare by transferring their exceptional ability to other surgeons. This is especially so as identifying data is already available in the many datasets consisting of medical records, some of which were accessed in the cohort studies covered here.

Exceptional performances may be due to personality characteristics that may be hard or impossible to emulate, or we may find out that the surgeons employ easy to emulate techniques like connecting with patients, or simply have higher expectations of patient outcomes,[26] or we may find that they live stress-resistant lives, or that they are rarely exhausted, or any other of a myriad of possibilities. If research that investigates exceptional performers identifies simple techniques or choices made at work, or out of work, that could be emulated relatively easily by many other surgeons, then this could

lead to fewer complications and more successful surgeries, and there could be large beneficial effects on healthcare costs and patient health.

However, the misuse of identifying supposed underperformers, for example by disciplining or evicting practitioners whose performance appears substandard but who are not statistical outliers or whose performance appears substandard due to a small number of high-risk patients, or due to other confounders like incomplete case-mix or risk score data, is a danger that can cause substantial harm to the surgeons. Further, an old saying is that what gets measured gets managed.[105] If more data is available for each surgeon, then this data can be misused to disempower practitioners by adding more and more rules and regulations, and by giving practitioners less opportunity to use their experience and ability. Such data can also be misused in being available online, especially with insufficient explanations of proper usage; or being very much out of date, as is the case for two publicly available databases of surgeons whose data in 2021 only went until 2013[106] and 2014.[6] Moreover, giving surgeons key performance indicators of patient outcomes could be an unwarranted intrusion into the doctor/patient relationship and lead to surgeons avoiding high-risk patients, as even a few such patients can skew an individual surgeon's patient outcome statistics, confirmed anecdotally here.[66] However, this fact is denied if patients' risk was accounted for.[107] Hence crude performance data should not be published.[67]

Strengths and Limitations of This Study

The strength of this work lies in the broad search of the literature, the condensed and clear reporting of effect size, and the importance behind the finding that the surgeons' effect at times has a significant effect size, as big as many non-surgical interventions themselves. The search term strategy used to identify studies was a complex and complete combination of terms that should have identified most of the relevant published studies. Furthermore, the references list of relevant articles and studies citing these articles were screened. This review was not limited by language or by timeframe.

On the other hand, there are at least three broad limitations. First, the Newcastle-Ottawa Scale (NOS) was used for quality assessment with the majority of studies scoring between 8–9 (9 being the maximum total); however, the NOS has been critiqued for being "difficult to use and [having] vague decision rules"[1] which derived from poor or fair inter-rater reliability between reviewers. However, it is important to note that associations between individual quality domains or overall quality score and effect estimates were not found. Moreover, the NOS has been endorsed by The Cochrane Collaboration[2] for its implementation in systematic reviews of non-randomized studies.

Second, as all of the review's studies were conducted in North America and Europe, it is unclear whether the findings can be generalized to other regions, particularly in developing nations.

Finally, while the outcome data was heterogeneous and did not enable a meta-analysis, there was also heterogeneity regarding surgical specialty, type of intervention, and type of outcome. Thereby, it is difficult to draw conclusions and synthesize studies with inconsistent outcome measures, and these characteristics have often been found attributable to a lack of a high level of evidence on the specific research subject.

Conclusions and Implications

Even after accounting for surgeons' experience, patients' risk and all other known variables there remain sometimes substantial differences in patients' physical health outcomes between surgeons. Therefore it can matter which surgeon is chosen. At times it is possible to identify high-volume outliers whose performance is well above the average, and it could be worthwhile to study these surgeons to see whether their excellence can be passed on to their peers. It is evident that there are currently no well-established standards on how to assess surgeons as an intervention in their own right, thus systematic approaches to establishing standardized measures are needed, and researching the surgeons' effect on patients' physical health is still in its early stages.

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Lead Author Statement

The lead author affirms that the manuscript is an honest, accurate and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and if relevant, registered) have been explained.

Data Sharing Statement

No additional data available.

Ethical Approval

As this is a systematic review of published studies, no ethical approval was required.

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References

1. Hartling L, Milne A, Hamm MP, et al. Testing the Newcastle Ottawa Scale showed low reliability between individual reviewers. *J Clin Epidemiol*. 2013;66(9):982–993. doi:10.1016/j.jclinepi.2013.03.003
2. Higgins JPT, Chandler J, Cumpston M, Li T, Page MJ, Welch VA. Cochrane Handbook for Systematic Reviews of Interventions version 6.1 (updated September 2020). Cochrane; 2020 [updated September, 2020]. Available from: https://training.cochrane.org/cochrane-handbook-systematic-reviews-interventions https://training.cochrane.org/cochrane-handbook-systematic-reviews-interventionshttps://training.cochrane.org/handbook. Accessed April 20, 2022.
3. Gordon M Do you need that surgery? How to decide, and how to pick a surgeon if you do. NPR; 2019. Available from: https://www.npr.org/sections/health-shots/2019/07/19/743248074/do-you-need-that-surgery-how-to-decide-and-how-to-pick-a-surgeon-if-you-do. Accessed January 23, 2021.
4. Whitlock J Tips for choosing a surgeon. Verywellhealth; 2020. Available from: https://www.verywellhealth.com/how-to-find-a-great-surgeon-3156937. Accessed January 23, 2021.
5. Marsa L How to pick the right surgeon. AARP; 2017. Available from: https://www.aarp.org/health/conditions-treatments/info-2017/choose-a-surgeon-doctor-surgeries.html. Accessed January 23, 2021.
6. Search for the Best (Surgeon, Doctor, Hospital, Dentist). Consumers' Checkbook; 2021. Available from: https://www.checkbook.org/surgeonratings/. Accessed April 14, 2022.
7. Simpson L. What makes a good surgeon? *J Natl Med Assoc*. 2008;100(2):261–264. doi:10.1016/s0027-9684(15)31216-5
8. Crile GW. The most important factor in the treatment of war wounds and the most important factor in civilian surgery-The Good Surgeon. *Ann Surg*. 1919;70(4):385–387. doi:10.1097/00000658-191910000-00001
9. Darzi A, Smith S, Taffinder N. Assessing operative skill. *Needs to become more objective*. *BMJ*. 1999;318(7188):887–888.
10. Gandhi J. Making of a surgeon. *Al Ameen J Med Sci*. 2019;12(2):54–55.
11. Arora S, Sevdalis N, Suliman I, Athanasiou T, Kneebone R, Darzi A. What makes a competent surgeon?: Experts' and trainees' perceptions of the roles of a surgeon. *Am J Surg*. 2009;198(5):726–732. doi:10.1016/j.amjsurg.2009.01.015
12. Jackson B. What makes an excellent surgeon? *Obes Surg*. 2019;29(4):1087–1089. doi:10.1007/s11695-019-03778-8
13. Wilt TJ, Shamliyan TA, Taylor BC, MacDonald R, Kane RL. Association between hospital and surgeon radical prostatectomy volume and patient outcomes: a systematic review. *J Urol*. 2008;180(3):820–829. doi:10.1016/j.juro.2008.05.010
14. Maruthappu M, Gilbert BJ, El-Harasis MA, et al. The influence of volume and experience on individual surgical performance: a systematic review. *Ann Surg*. 2015;261(4):642–647. doi:10.1097/SLA.0000000000000852
15. Churchill LR, Schenck D. Healing skills for medical practice. *Ann Intern Med*. 2008;149(10):720–724. doi:10.7326/0003-4819-149-10-200811180-00006
16. Schenck D, Churchill L. *Healers: Extraordinary Clinicians at Work*. Oxford University Press; 2011.

17. Hanyok LA, Hellmann DB, Rand C, Ziegelstein RC. Practicing patient-centered care: the questions clinically excellent physicians use to get to know their patients as individuals. *Patient*. 2012;5(3):141–145. doi:10.1007/BF03262487
18. De Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care*. 2008;17(3):216–223. doi:10.1136/qshc.2007.023622
19. Tam VC, Knowles SR, Cornish PL, Fine N, Marchesano R, Etchells EE. Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. *CMAJ*. 2005;173(5):510–515. doi:10.1503/cmaj.045311
20. Van Walraven C, Bennett C, Jennings A, Austin PC, Forster AJ. Proportion of hospital readmissions deemed avoidable: a systematic review. *CMAJ*. 2011;183(7):E391–E402. doi:10.1503/cmaj.101860
21. Leppin AL, Gionfriddo MR, Kessler M, et al. Preventing 30-day hospital readmissions: a systematic review and meta-analysis of randomized trials. *JAMA Intern Med*. 2014;174(7):1095–1107. doi:10.1001/jamainternmed.2014.1608
22. Tjarda Van Heek N, Kuhlmann KFD, Scholten RJ, et al. Hospital volume and mortality after pancreatic resection: a systematic review and an evaluation of intervention in The Netherlands. *Ann Surg*. 2005;242(6):781–790. doi:10.1097/01.sla.0000188462.00249.36
23. Nilsen SM, Bjørngaard JH, Carlsen F, et al. Hospitals´ discharge tendency and risk of death-an analysis of 60,000 Norwegian hip fracture patients. *Clin Epidemiol*. 2020;12:173–182. doi:10.2147/CLEP.S237060
24. Wampold BE, Imel ZE. *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work: Second Edition*. Taylor and Francis Inc.; 2015.
25. Baldwin SA, Imel Z. Therapist effects: findings and methods. In: *Bergin and Garfield's Handbook of Psychotherapy and Behavior Change*. Vol. 6; 2013:258–297.
26. Chen P-HA, Cheong JH, Jolly E, Elhence H, Wager TD, Chang LJ. Socially transmitted placebo effects. *Nat Hum Behav*. 2019;3(12):1295–1305. doi:10.1038/s41562-019-0749-5
27. Howick J, Friedemann C, Tsakok M, et al. Are treatments more effective than placebos? A systematic review and meta-analysis. *PLoS One*. 2013;8(5):e62599. doi:10.1371/journal.pone.0062599
28. Wartolowska K, Judge A, Hopewell S, et al. Use of placebo controls in the evaluation of surgery: systematic review. *BMJ*. 2014;348:g3253. doi:10.1136/bmj.g3253
29. Probst P, Grummich K, Harnoss JC, et al. Placebo-controlled trials in surgery: a systematic review and meta-analysis. *Medicine (Baltimore)*. 2016;95(17):e3516. doi:10.1097/MD.0000000000003516
30. Wartolowska K, Collins GS, Hopewell S, et al. Feasibility of surgical randomised controlled trials with a placebo arm: a systematic review. *BMJ Open*. 2016;6(3):e010194. doi:10.1136/bmjopen-2015-010194
31. Jonas WB, Crawford C, Colloca L, et al. To what extent are surgery and invasive procedures effective beyond a placebo response? A systematic review with meta-analysis of randomised, sham controlled trials. *BMJ Open*. 2015;5(12):e009655. doi:10.1136/bmjopen-2015-009655
32. Sochacki KR, Mather RC, Nwachukwu BU, et al. Sham surgery studies in orthopaedic surgery may just be a Sham: a systematic review of randomized placebo-controlled trials. *Arthroscopy*. 2020;36(10):2750–2762.e2752. doi:10.1016/j.arthro.2020.05.001
33. Cook JA, Bruckner T, MacLennan GS, Seiler CM. Clustering in surgical trials - database of intracluster correlations. *Trials*. 2012;13. doi:10.1186/1745-6215-13-2
34. Udyavar R, Cornwell EE, Havens JM, et al. Surgeon-driven variability in emergency general surgery outcomes: does it matter who is on call? *Surgery*. 2018;164(5):1109–1116. doi:10.1016/j.surg.2018.07.008
35. Campbell M, McKenzie JE, Sowden A, et al. Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline. *BMJ*. 2020;368:l6890. doi:10.1136/bmj.l6890
36. Gill L, White L. A critical review of patient satisfaction. *Leadersh Health Serv*. 2009;22(1):8–19. doi:10.1108/17511870910927994
37. Eklund AS, Montgomery AK, Rasmussen IC, Sandbue RP, Bergkvist LÅ, Rudberg CR. Low recurrence rate after laparoscopic (TEP) and open (Lichtenstein) Inguinal Hernia repair: a randomized, multicenter trial with 5-year follow-up. *Ann Surg*. 2009;249(1):33–38. doi:10.1097/SLA.0b013e31819255d0
38. Murphy WS, Cheng T, Lin B, Terry D, Murphy SB. Higher volume surgeons have lower medicare payments, readmissions, and mortality after THA [Hip]. *Clin Orthop Relat Res*. 2019;477(2):334–341. doi:10.1097/CORR.0000000000000370
39. Sivaganesan A, Asher AL, Bydon M, et al. A strategy for risk-adjusted ranking of surgeons and practices based on patient-reported outcomes after elective lumbar surgery. *Spine*. 2019;44(9):670–677. doi:10.1097/BRS.0000000000002894
40. Wells GA, Shea B, O'Connell D, et al. *The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Nonrandomised Studies in Meta-Analyses*. University of Eastern Piedmont . http://www3.med.unipmn.it/dispense_ebm/2009-2010/Corso%20Perfezionamento%20EBM_Faggiano/NOS_oxford.pdfAccessed April 20, 2000.
41. Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur J Epidemiol*. 2010;25(9):603–605. doi:10.1007/s10654-010-9491-z
42. Rasbash J, Goldstein H. Efficient analysis of mixed hierarchical and cross-classified random structures using a multilevel model. *J Educ Behav Stat*. 1994;19(4):337–350. doi:10.3102/10769986019004337
43. Goldstein H, McDonald RP. A general model for the analysis of multilevel data. *Psychometrika*. 1988;53(4):455–467. doi:10.1007/BF02294400
44. Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. *Anaesthesia*. 2016;71(2):138–146. doi:10.1111/anae.13291
45. Papachristofi O, Klein AA, Mackay J, Nashef S, Fletcher N, Sharples LD. Effect of individual patient risk, centre, surgeon and anaesthetist on length of stay in hospital after cardiac surgery: Association of Cardiothoracic Anaesthesia and Critical Care (ACTACC) consecutive cases series study of 10 UK specialist centres. *BMJ Open*. 2017;7(9):e016947. doi:10.1136/bmjopen-2017-016947
46. Gulliford MC, Adams G, Ukoumunne OC, Latinovic R, Chinn S, Campbell MJ. Intraclass correlation coefficient and outcome prevalence are associated in clustered binary data. *J Clin Epidemiol*. 2005;58(3):246–251. doi:10.1016/j.jclinepi.2004.08.012
47. Chakraborty H, Hossain A. R package to estimate intracluster correlation coefficient with confidence interval for binary data. *Comput Methods Programs Biomed*. 2018;155:85–92. doi:10.1016/j.cmpb.2017.10.023
48. Adams G, Gulliford MC, Ukoumunne OC, Eldridge S, Chinn S, Campbell MJ. Patterns of intra-cluster correlation from primary care research to inform study design and analysis. *J Clin Epidemiol*. 2004;57(8):785–794. doi:10.1016/j.jclinepi.2003.12.013

49. Turner RM, Omar RZ, Thompson SG. Constructing intervals for the intracluster correlation coefficient using Bayesian modelling, and application in cluster randomized trials. *Stat Med*. 2006;25(9):1443–1456. doi:10.1002/sim.2304
50. Donner A. A review of inference procedures for the intraclass correlation coefficient in the one-way random effects model. *Int Stat Rev*. 1986;54 (1):67–82.
51. Eldridge SM, Ukoumunne OC, Carlin JB. The intra-cluster correlation coefficient in cluster randomized trials: a review of definitions. *Int Stat Rev*. 2009;77(3):378–394. doi:10.1111/j.1751-5823.2009.00092.x
52. Anderson BR, Ciarleglio AJ, Cohen DJ, et al. The Norwood operation: relative effects of surgeon and institutional volumes on outcomes and resource utilization. *Cardiol Young*. 2016;26(4):683–692. doi:10.1017/S1047951115001031
53. Glance LG, Dick A, Osler TM, Li Y, Mukamel DB. Impact of changing the statistical methodology on hospital and surgeon ranking: the case of the New York State cardiac surgery report card. *Med Care*. 2006;44(4):311–319. doi:10.1097/01.mlr.0000204106.64619.2a
54. Singh S, Goodwin JS, Zhou J, Kuo YF, Nattinger AB. Variation among primary care physicians in 30-day readmissions. *Ann Intern Med*. 2019;170(11):749–755. doi:10.7326/M18-2526
55. Thigpen CA, Floyd SB, Chapman C, et al. Comparison of surgeon performance of rotator cuff repair: risk adjustment toward a more accurate performance measure. *J Bone Joint Surg Am*. 2018;100(24):2110–2117. doi:10.2106/JBJS.18.00211
56. Huesch MD. Can managed care plans reliably infer the quality of cardiac surgeons' outcomes? *Am J Manag Care*. 2009;15(12):890–896.
57. Luan WP, Leroux TC, Olsen C, Robb D, Skinner JS, Richard P. Variation in bariatric surgery costs and complication rates in the military health system. *Mil Med*. 2019;185(7–8):e1057–e1064.
58. Martin BI, Mirza SK, Franklin GM, Lurie JD, MacKenzie TA, Deyo RA. Hospital and surgeon variation in complications and repeat surgery following incident lumbar fusion for common degenerative diagnoses. *Health Serv Res*. 2013;48(1):1–25. doi:10.1111/j.1475-6773.2012.01434.x
59. McCahill LE, Single RM, Aiello Bowles EJ, et al. Variability in reexcision following breast conservation surgery. *JAMA*. 2012;307(5):467–475. doi:10.1001/jama.2012.43
60. Fernández-Castilla B, Declercq L, Jamshidi L, Beretvas N, Onghena P, Van den Noortgate W. Visual representations of meta-analyses of multiple outcomes: extensions to forest plots, funnel plots, and caterpillar plots. *Methodology*. 2020;16(4):299–315. doi:10.5964/meth.4013
61. Aquina CT, Blumberg N, Probst CP, et al. Significant variation in blood transfusion practice persists following upper GI cancer resection. *J Gastrointest Surg*. 2015;19(11):1927–1937. doi:10.1007/s11605-015-2903-3
62. Begg CB, Riedel ER, Bach PB, et al. Variations in morbidity after radical prostatectomy. *New Engl J Med*. 2002;346(15):1138–1144. doi:10.1056/NEJMsa011788
63. Bianco FJ Jr, Riedel ER, Begg CB, Kattan MW, Scardino PT. Variations among high volume surgeons in the rate of complications after radical prostatectomy: further evidence that technique matters. *J Urol*. 2005;173(6):2099–2103. doi:10.1097/01.ju.0000158163.21079.66
64. Bianco JFJ, Vickers AJ, Cronin AM, et al. Variations among experienced surgeons in cancer control after open radical prostatectomy. *J Urol*. 2010;183(3):977–983. doi:10.1016/j.juro.2009.11.015
65. Bolling SF, Li S, O'Brien SM, Brennan JM, Prager RL, Gammie JS. Predictors of mitral valve repair: clinical and surgeon factors. *Ann Thorac Surg*. 2010;90(6):1904–1911. doi:10.1016/j.athoracsur.2010.07.062
66. Bridgewater B. Mortality data in adult cardiac surgery for named surgeons: retrospective examination of prospectively collected data on coronary artery surgery and aortic valve replacement. *Br Med J*. 2005;330(7490):506–510. doi:10.1136/bmj.330.7490.506
67. Bridgewater B, Grayson AD, Jackson M, et al. Surgeon specific mortality in adult cardiac surgery: comparison between crude and risk stratified data. *BMJ*. 2003;327(7405):13–17. doi:10.1136/bmj.327.7405.13
68. Burns EM, Bottle A, Aylin P, Darzi A, John Nicholls R, Faiz O. Variation in reoperation after colorectal surgery in England as an indicator of surgical performance: retrospective analysis of hospital episode statistics. *BMJ (Online)*. 2011;343(7820):d4836.
69. Cromwell D, Hilton P. Retrospective cohort study on patterns of care and outcomes of surgical treatment for lower urinary-genital tract fistula among English National Health Service hospitals between 2000 and 2009. *BJU Int*. 2013;111(4 B):E257–E262. doi:10.1111/j.1464-410X.2012.11483.x
70. Grant SW, Grayson AD, Jackson M, et al. Does the choice of risk-adjustment model influence the outcome of surgeon-specific mortality analysis? A retrospective analysis of 14 637 patients under 31 surgeons. *Heart*. 2008;94(8):1044–1049. doi:10.1136/hrt.2006.110478
71. Healy MA, Regenbogen SE, Kanters AE, et al. Surgeon variation in complications with minimally invasive and open colectomy: results from the Michigan Surgical Quality Collaborative. *JAMA Surg*. 2017;152(9):860–867. doi:10.1001/jamasurg.2017.1527
72. Hermanek P. Impact of surgeon's technique on outcome after treatment of rectal carcinoma. *Dis Colon Rectum*. 1999;42(5):559–562. doi:10.1007/BF02234128
73. Kaczmarski K, Wang P, Gilmore R, et al. Surgeon re-excision rates after breast-conserving surgery: a measure of low-value care. *J Am Coll Surg*. 2019;228(4):504–512.e502. doi:10.1016/j.jamcollsurg.2018.12.043
74. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors associated with reoperation in breast-conserving surgery for cancer: a prospective study of American Society of Breast Surgeon Members. *Ann Surg Oncol*. 2019;26(10):3321–3336. doi:10.1245/s10434-019-07547-w
75. Rudmik L, Xu Y, Alt JA, et al. Evaluating surgeon-specific performance for endoscopic sinus surgery. *JAMA Otolaryngol Head Neck Surg*. 2017;143(9):891–898. doi:10.1001/jamaoto.2017.0752
76. Singh S, Sparapani R, Wang MC. Variations in 30-day readmissions and length of stay among spine surgeons: a national study of elective spine surgery among US Medicare beneficiaries. *J Neurosurg Spine*. 2018;29(3):286–291. doi:10.3171/2018.1.SPINE171064
77. Aquina CT, Fleming FJ, Becerra AZ, et al. Explaining variation in ventral and inguinal hernia repair outcomes: a population-based analysis. *Surgery*. 2017;162(3):628–639. doi:10.1016/j.surg.2017.03.013
78. Becerra AZ, Aquina CT, Berho M, et al. Surgeon-, pathologist-, and hospital-level variation in suboptimal lymph node examination after colectomy: compartmentalizing quality improvement strategies. *Surgery (United States)*. 2017;161(5):1299–1306.
79. Duclos A, Peix JL, Colin C, et al. Influence of experience on performance of individual surgeons in thyroid surgery: prospective cross sectional multicentre study. *BMJ (Online)*. 2012;344(7843):d8041.
80. Fountain J, Gallagher J, Brown J. A practical approach to a multi-level analysis with a sparse binary outcome within a large surgical trial. *J Eval Clin Pract*. 2004;10(2):323–327. doi:10.1111/j.1365-2753.2003.00462.x
81. Gani F, Lucas DJ, Kim Y, Schneider EB, Pawlik TM. Understanding variation in 30-day surgical readmission in the era of accountable care: effect of the patient, surgeon, and surgical subspecialties. *JAMA Surg*. 2015;150(11):1042–1049. doi:10.1001/jamasurg.2015.2215

82. Hoffman RL, Kelz RR, Wirtalla CJ, et al. Variations in surgical outcomes: is it the residency program, the surgeon or the practice venue? *J Am Coll Surg*. 2017;225(4):S185. doi:10.1016/j.jamcollsurg.2017.07.421
83. Hyder O, Dodson RM, Nathan H, et al. Influence of patient, physician, and hospital factors on 30-day readmission following pancreatoduodenectomy in the United States. *JAMA Surg*. 2013;148(12):1095–1102. doi:10.1001/jamasurg.2013.2509
84. Kissenberth M, Thigpen C, Brooks J, Floyd S, Hawkins RJ, Tokish JM. Comparing surgeon performance of rotator cuff repair: risk adjustment toward a fair performance measure. *Arthroscopy*. 2018;34(12):e3. doi:10.1016/j.arthro.2018.10.022
85. Shih T, Cole AI, Al-Attar PM, et al. Reliability of surgeon-specific reporting of complications after colectomy. *Ann Surg*. 2015;261(5):920–925. doi:10.1097/SLA.0000000000001032
86. Udyavar NR, Salim A, Cornwell EE, et al. Racial differences in complication risk following emergency general surgery: who your surgeon is may matter. *J Surg Res*. 2019;235:424–431. doi:10.1016/j.jss.2018.05.086
87. Udyavar NR, Salim A, Havens JM, et al. The impact of individual physicians on outcomes after trauma: is it the system or the surgeon? *J Surg Res*. 2018;229:51–57. doi:10.1016/j.jss.2018.02.051
88. Dagenais J, Bertolo R, Garisto J, et al. Variability in partial nephrectomy outcomes: does your surgeon matter? *Eur Urol*. 2019;75(4):628–634. doi:10.1016/j.eururo.2018.10.046
89. Glance LG, Hannan EL, Fleisher LA, et al. Feasibility of report cards for measuring anesthesiologist quality for cardiac surgery. *Anesth Analg*. 2016;122(5):1603–1613. doi:10.1213/ANE.0000000000001252
90. Papachristofi O, Mackay JH, Powell SJ, Nashef SAM, Sharples L. Impact of the anesthesiologist and surgeon on cardiac surgical outcomes. *J Cardiothorac Vasc Anesth*. 2014;28(1):103–109. doi:10.1053/j.jvca.2013.07.004
91. Quinn CM, Bilimoria KY, Chung JW, Ko CY, Cohen ME, Stulberg JJ. Creating individual surgeon performance assessments in a statewide hospital surgical quality improvement collaborative. *J Am Coll Surg*. 2018;227(3):303–312.e303. doi:10.1016/j.jamcollsurg.2018.06.002
92. Aquina C, Probst C, Hensley B, et al. High variability in nosocomial clostridium difficile infection rates among both surgeons and hospitals following colorectal resection. *Dis Colon Rectum*. 2015;58(5):e163.
93. Arvidsson D, Berndsen FH, Larsson LG, et al. Randomized clinical trial comparing 5-year recurrence rate after laparoscopic versus Shouldice repair of primary inguinal hernia. *Br J Surg*. 2005;92(9):1085–1091. doi:10.1002/bjs.5137
94. Eastham JA, Kattan MW, Riedel E, et al. Variations among individual surgeons in the rate of positive surgical margins in radical prostatectomy specimens. *J Urol*. 2003;170(6 I):2292–2295. doi:10.1097/01.ju.0000091100.83725.51
95. Faschinger C. Quality assessment of cataract surgery of the Department of Ophthalmology, Medical University of Graz. *Spektrum Augenheilkd*. 2011;25(3):215–219. doi:10.1007/s00717-011-0013-5
96. Hermann M, Alk G, Roka R, Glaser K, Freissmuth M. Laryngeal recurrent nerve injury in surgery for benign thyroid diseases: effect of nerve dissection and impact of individual surgeon in more than 27,000 nerves at risk. *Ann Surg*. 2002;235(2):261–268. doi:10.1097/00000658-200202000-00015
97. Johnston RL, Taylor H, Smith R, Sparrow JM. The Cataract National Dataset electronic multi-centre audit of 55,567 operations: variation in posterior capsule rupture rates between surgeons. *Eye (Lond)*. 2010;24(5):888–893. doi:10.1038/eye.2009.195
98. Justiniano CF, Aquina CT, Fleming FJ, et al. Hospital and surgeon variation in positive circumferential resection margin among rectal cancer patients. *Am J Surg*. 2019;218(5):881–886. doi:10.1016/j.amjsurg.2019.02.029
99. LaPar DJ, Ailawadi G, Isbell JM, et al. Mitral valve repair rates correlate with surgeon and institutional experience. *J Thorac Cardiovasc Surg*. 2014;148(3):995–1003; discussion 1003–1004. doi:10.1016/j.jtcvs.2014.06.039
100. Likosky DS, Goldberg JB, DiScipio AW, et al. Variability in surgeons' perioperative practices may influence the incidence of low-output failure after coronary artery bypass grafting surgery. *Circ Cardiovasc Qual Outcomes*. 2012;5(5):638–644. doi:10.1161/CIRCOUTCOMES.112.967091
101. Schumacher J, Neuman H, Landercasper J, Wilke L, Steiman J, Greenberg C. Assessing variation in provider and institution-level re-excision rates: opportunity for a statewide surgical collaborative to improve breast cancer care. *Ann Surg Oncol*. 2017;24(2):224–225.
102. Xu T, Mehta A, Park A, Makary MA, Price DW. Association between board certification, maintenance of certification, and surgical complications in the United States. *Am J Med Qual*. 2019;34(6):545–552. doi:10.1177/1062860618822752
103. Aquina CT, Blumberg N, Probst CP, et al. Large variation in blood transfusion use after colorectal resection: a call to action. *Dis Colon Rectum*. 2016;59(5):411–418. doi:10.1097/DCR.0000000000000588
104. Xu T, Makary MA, Al Kazzi E, Zhou M, Pawlik TM, Hutfless SM. Surgeon-level variation in postoperative complications. *J Gastrointest Surg*. 2016;20(7):1393–1399. doi:10.1007/s11605-016-3139-6
105. Catasús B, Ersson S, Gröjer JE, Yang Wallentin F. What gets measured gets … on indicating, mobilizing and acting. *Account Audit Account J*. 2007;20(4):505–521. doi:10.1108/09513570710762566
106. Surgeon Scorecard. ProPublica; 2021. Available from: https://projects.propublica.org/surgeons. Accessed April 14, 2022.
107. Hannan EL, Siu AL, Kumar D, Racz M, Pryor DB, Chassin MR. Assessment of coronary artery bypass graft surgery performance in New York: is there a bias against taking HIGH-RISK PAtients? *Med Care*. 1997;35(1):49–56. doi:10.1097/00005650-199701000-00004

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REVIEW

Is There a Doctors' Effect on Patients' Physical Health, Beyond the Intervention and All Known Factors? A Systematic Review

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Video abstract

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Purpose: Despite billions of doctor visits worldwide each year, little is known on whether doctors themselves affect patients' physical health after accounting for intervention and confounders such as patients' and doctors' data, hospital effects, nor how strong that doctors' effect is. Knowledge of surgeons' and psychotherapists' effects exists, but not for 102 other medical specialties notwithstanding the importance of such knowledge.

Methods: Eligibility Criteria: Randomized controlled trials (RCTs), case-control, and cohort studies including medical doctors except surgeons for any intervention, reporting the proportion of variance in patients' outcomes owing to the doctors (random effects), or the fixed effects of grading doctors by outcomes, after multivariate adjustment. Exclusions: studies of <15 doctors or solely reporting doctors' effects for known variables.

Sources: Medline, Embase, PsycINFO, inception to June 2020. Manual search for papers referring/referred to by resulting studies.

Risk of Bias: Using Newcastle–Ottawa scale.

Results: Despite all medical interventions bar surgery being eligible, only thirty cohort papers were found, covering 36,239 doctors, with 10 specialties, 21 interventions, 60 outcomes (17 unique). Studies reported doctors' effects by grading doctors from best to worst, or by diversely calculating the doctor-attributed percentage of patients' outcome variation, ie the intra-class correlation coefficient (ICC). Sixteen studies presented fixed effects, 18 random effects, and 3 another approach. No RCTs found. Thirteen studies reported exceptionally good and/or poor performers with confidence intervals wholly outside the average performance. ICC range 0 to 33%, mean 3.9%. Highly diverse reporting, meta-analysis therefore not applicable.

Conclusion: Doctors, on their own, can affect patients' physical health for many interventions and outcomes. Effects range from negligible to substantial, even after accounting for all known variables. Many published cohorts may reveal valuable information by reanalyzing their data for doctors' effects. Positive and negative doctor outliers appear regularly. Therefore, it can matter which doctor is chosen.

Keywords: physicians' effect, practice effect, physicians' practice pattern, clinical competence, professional practice gap, delivery of health care, quality of health care, physicians

Strengths and Limitations

A strength of our review is the comprehensive literature search, using a complex and complete combination of terms for the search strategy to identify most of the relevant studies; furthermore, we screened the articles' list of references and studies citing the article for further eligible studies, with no limitations regarding the language or timeframe. In addition, it is the first systematic review providing detailed and clear reporting of the effect size, and that the doctors' effect is often substantial.

Conversely, there is a trio of limitations. First, although the scoring of the Newcastle-Ottawa Scale (NOS) for assessing the risk of bias showed that the majority of included studies scored a value of 8 or 9 (9 is the maximum total), that scale has been critiqued for being "difficult to use and [having] vague decision rules"[1] leading to poor or fair inter-rater reliability among reviewers. However, The Cochrane Collaboration[2] has endorsed its implementation in systematic reviews that

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include nonrandomized studies. Second, since all of the included studies were set in Europe and North America, our findings may not be applicable to other locations, particularly developing nations. Finally, among our included studies, data was reported too heterogeneously in content and presentation to allow meta-analysis.

1. What is already known on this topic: psychotherapists and surgeons are well known to have a substantial effect on patients' physical health. However, the scale of the influence of (non-surgical) medical doctors on patients' physical health, after accounting for all known confounders, is less understood. In other words, is there a doctors' effect which there is currently no explanation for?
2. What this study adds: this systematic review is considered to be the first to address the unexplained doctors' effect on patients' physical health, showing that medical doctors can be effect modifiers of interventions. Findings are highly variable, ranging from little effect through to large effects, where the latter can result in significant differences in patient's physical health outcomes, depending on the doctor, which means that it can matter which doctor is chosen.

Rationale

Each year, patients worldwide visit medical doctors billions of times, with 800 million visits in the United States[3] and 150 million visits in Australia[4] alone. However, apart from a classic[5] 1955 essay[6] that states "[T]he most frequently used drug in general practice was the doctor himself", there has been limited research on whether medical doctors, on their own, can represent an intervention or an effect modifier of interventions, ie whether different doctors who use the same intervention have differing patient's physical health outcomes, even after accounting for all known variables, including doctor demographics and patient risk factors. It is well-known that psychotherapists can have a significant effect on their patients' mental health, an effect that equals the strength of pharmaceutical interventions and is mentioned in training manuals.[7] It is also known that surgeons, after accounting for all known information,[8] do have a widely varying effect on patients' physical health. Therefore, it would be useful to know whether this applies to other medical doctors, as a fundamental question in medical research is what effect the medical practitioner has on patients' physical health. The doctor certainly has an effect by choosing and applying the intervention, but it is less clear whether the effect goes beyond the intervention, and whether doctors constitute an intervention in their own right.

Research on general doctors' performance has concluded that it is difficult to assess practice variation among doctors and therefore, it is often not worthwhile to direct quality improvement efforts at this level of medical services.[9,10] However, some doctors were found to be more effective than others at employing interventions, owing, for example, to a substantial volume or practice effect in many surgical specialties.[11,12] Recent evidence also proposes that patients' outcomes can be substantially affected by provider expectations.[13] In other non-surgical specialties, research conducted on doctors' effects is scarcer, with evidence limited to primary care,[14,15] obstetrics,[16] and acute care,[17] in which physicians' factors point to a sizeable effect on patients' health outcomes. Thus, a significant doctors' effect detected indicates that there are doctors who perform better than others. Many initiatives aimed at improving medical standards aim to identify underperformers to either remove them from medical practice or propose strategies to improve their standards.[18–20] However, there seems to be no systematic review that answers a more basic question: Are there differences among doctors which contribute to creating an effect on patients' physical health outcomes, even when all known factors have been accounted for?

In a kitchen, it would be obvious that cooks using the same ingredients have widely varying outcomes. In law, practitioners charge widely varying rates, with clients presumably assuming that the most expensive lawyers are so much better than the average lawyer that they are worth their higher fees. No such presumption of substantial differences between doctors seems to exist in medicine as an established research fact.

If we know whether medical doctors can differ widely in their performance, then we can find out under what circumstances the effect is large or small, important, or unimportant. In addition, we can check whether there are positive and negative outliers among doctors, allowing health care services to support the negative outliers to improve, if possible, and to learn from the positive outliers, and, if needed, make sure that they are treated with the care and respect such exceptionally good doctors deserve.

This systematic review gives the answer to precisely this question: What research has been published that shows whether doctors, on their own, have an effect on patients' physical health outcomes, after taking into account all

known information? Known information can consist of patient demographics and risk factors, intervention, doctor demographics such as age, specialization, education and experience, and hospital or area effects such as county or country effects.

This review further looks at the quality of the publications and their heterogeneity, and whether reporting on doctors' performance can be improved and prepared for meta-analysis. It may seem ambitious to cover 102 non-surgery medical specialties[21] in a single publication but such is the paucity of this material – despite the billions of interactions of medical doctors each year – that the number of publications found do fit into a single systematic review. Future reviews may be more focused, but an overarching review is the first step, due to the current lack of any review.

What is the Current State of Research?

In 2002, the British Medical Journal (BMJ) devoted an entire issue to the following question: "What's a good doctor and how do you make one?"[22] assuming that it would be useful to know what a good doctor is. In this special edition, one article presented letters from doctors and others attempting to answer these questions. One quote stated: "There is not a single piece of evidence or the means to measure whether a doctor is good or bad."[23] The editorial of that 2002 issue stated

> (…) defining a good doctor, I suggest, lies in degree of difficulty somewhere between defining a good composer and a good human being. In fact, it's impossible.

Hospitals are known to substantially influence patients' physical health outcomes and hospital performances regarding patients' physical health outcomes vary widely.[24–29] The same is true for larger entities like regions or countries where mortality rates can differ substantially.[30]

Recent research has investigated 10 surgical trials, in which the effect size of surgeons was analyzed to assess the surgeon intra-cluster correlation coefficients (ICCs), ie the percentage of the whole patient outcome variation due to the surgeon. It revealed that surgeons alone are responsible for a range of effects on patients' health outcomes, which vary between different surgical specialties.[31]

Objectives

This systematic review examines the existing literature on measuring and reporting doctors' effects on patients' physical health after adjusting for known factors for medical doctors that are not surgeons. Psychotherapists are here not considered to be medical doctors.

Methods

Eligibility Criteria

This systematic review follows the standards set for Synthesis Without Meta-analysis (SWiM).[32] Only studies that investigated actual patients' physical outcomes were included. Scientific publications that reported patients' opinions or their satisfaction levels were excluded as these are not patients' physical health outcomes and often less reliable measurements.[33] The study PICO is as follows:

Population	P	Medical Doctors That are Not Surgeons
Intervention	I	Any
Comparison	C	Not applicable
Outcome	O	Practitioners' effect on patients' physical health outcome

Information Sources and Search Strategy

We conducted a comprehensive search on the following databases: Embase, Medline via PubMed, and PsycINFO, to retrieve pertinent studies that investigate the doctors' effect on patients' physical health outcomes, from inception until June 2020. The search strategy was designed and developed for each database by JMC, a search specialist (Supplemental File 1). In addition, using the references lists of the selected articles and former reviews we manually searched for potentially related studies that may have been missed in the initial literature search. Furthermore, systematic review registries including PROSPERO and Cochrane's CENTRAL register were searched for similar reviews.

Selection Process and Further Eligibility Criteria

Two review authors independently screened the titles and abstracts of all retrieved records. Any disagreements were resolved via discussions and consultation with a third reviewer. We included any case-control study, retrospective or prospective cohort study, or randomized controlled trial (RCT) that graded individual doctors according to their performance regarding the patients' physical health outcomes, or where the percentage of the variance in patients' outcomes is explained by differences between doctors. All outcomes related to patients' physical health were eligible, for example survival/mortality rate, repair reoperations, hospitalization rates, length of post-procedure stay, readmission rate, post-operative complications, pain, infection rate, embryo transfer rate, blood pressure, cholesterol, and glycemic control. Surgeons were excluded from this review as they were reviewed in a separate paper.[8] No restrictions were placed on publication date or language.

We excluded studies that address only doctors' effects related to specific known doctor-related variables, such as the doctor's specialty or the volume of procedures performed. Studies including fewer than 15 doctors and cross-sectional studies were also excluded, due to their increased risk of bias.

No authoritative source was found to provide a reference for the smallest number of clusters required for a reliable ICC estimation. Here the number of referred-to clusters is the minimum number of practitioners to warrant inclusion. We used 15 as a minimum number but realize this is somewhat arbitrary (Figure 1).

Data Collection Process and Data Items

We used Endnote 9 for exporting the titles and abstracts of retrieved records, which were then uploaded into Rayyan for screening. Then the potentially eligible records were marked as members of a group in the original Endnote library and their full text documents added to the library for further full-text screening.

From each final included study, CS and a second extractor independently and in duplicate, extracted the relevant data into an excel sheet including the following variables:

- Study ID consisting of the first author's last name and year of publication
- Type of study (RCT, Cohort)
- Country of origin
- Medical specialty
- Type of intervention(s)
- Patients or procedures
- Number of doctors
- Number of hospitals or institutions
- Outcome type(s)
- Number of positive and negative outliers
- Authors' evaluation of significant doctors' effect Y/N
- Multivariate analysis Y/N
- ICC (intra-class correlation coefficient)

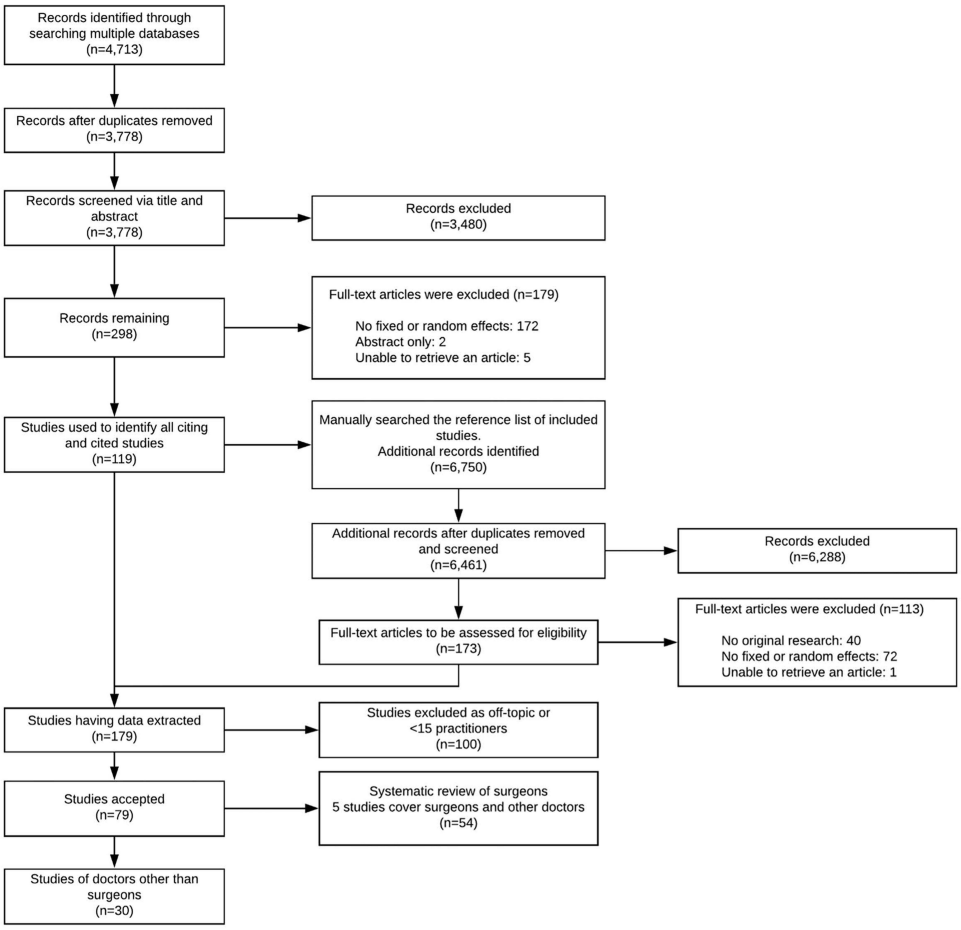

Figure 1 Flow diagram of selection of included documents.

Risk of Bias Assessment

Two review authors independently assessed the risk of bias of all included cohort studies, using the Newcastle-Ottawa Scale (NOS).[34,35]

Effect Measures

One pathway of evaluating doctors' performance is to measure fixed effects, which are covered as a statistical technique by Allison.[36] Fixed effects allow the identification of high and low outliers and give an impression of how heterogeneously doctors perform in a particular area. Grading doctors also shows whether the variation in effect is consistent with chance or bigger than that. The metric for the fixed effects in this study is the percentages of negative and positive outliers, as defined and reported per each individual study.

The other method of assessing a doctors' effect is by measuring random effects, also explained by Allison.[36] Random effects measure the variation in patient outcomes that is due to the doctor beyond known factors, such as their level of experience. Likewise, these effects cannot be explained by differences in diagnostic prowess or choosing more or less suitable interventions. Random effects allow the discernment of how much doctors may constitute an intervention in their own right. That measurement is called the intra-class correlation coefficient (ICC). Examples are mortality in intensive care,[37] or levels of uncontrolled hypertension,[38,39] or high HgA1c levels[18,38,40–42] among patients of family medicine doctors or general practitioners.

The ICC is here described as the proportion of patients' health outcomes that resulted from the doctor's effect, in the form of a percentage of the total patient outcome variation. The significance of even small ICCs is covered in the Discussion.

Synthesis Methods

The identification of doctors' effects on patients' health outcomes is presented in many different ways that can be classified into two methods. Both methods either use hierarchical regression or multilevel mixed effects regression modelling to understand both doctor and higher-level variation.[43,44]

Percentage of Variation in Patient's Health Outcome

The percentage of variation in patients' health outcome owing to the doctor is reported as the intra-class correlation coefficient (ICC). The ICC, which can be identified through post-regression estimation, is a number ranging from 0 to 1 representing the percentage of variation in a particular outcome due to each level in the regression model. Therefore, to enable the allocation of the percentage of variation owing to the doctor, random effects for doctors and occasionally for hospitals or other higher-level aggregators such as county, are included in the studies.[38,39,45–47]

The regression analyses included patient risk scores and other known confounders such as doctors' demographics as fixed effects. There was a pronounced variance in the depth and quality of the analysis between different studies, with Papachristofi et al as a high quality example.[47] In addition, further extensive literature is available addressing the ICC.[48–53]

Grading Doctors from Best to Worst

Regarding this approach, doctors are ordered according to the patients' physical health outcomes, typically with a 95% confidence interval (CI). This CI is calculated using, for example, cluster-robust standard errors,[54,55] or other means such as simulation,[16] or the delta method.[38] Doctors are considered to be outliers when their 95% CI is wholly above or below the mean rate of the patients' outcomes. Consequently, results are reported by listing the outliers in order, or as a funnel or caterpillar plot,[56] with the latter constituting an outcome-ordered forest plot.

Reporting Bias and Certainty Assessment

Since meta-analysis was not applicable, we did not assess the reporting bias nor conducted certainty assessments.

Results

Study Selection

We retrieved 4713 records from electronic searches, reduced to 3778 after removing duplicates, and 119 after screening. Manually searching the reference list of these studies yielded an additional 6750, reduced to 60 after screening. The resulting 179 studies were reviewed in full, yielding 79 accepted studies of which 30 applied to doctors other than surgeons. These 30 studies with 36,239 doctors met our pre-specified criteria for inclusion in the final synthesis (Figure 1).

Study Characteristics

The final 30 included studies either graded individual doctors from best to worst according to their performance (N=9),[16,18,57–63] or recorded a residual variation owing to doctors in a multivariate multi-level analysis yielding an ICC (N=11),[38–42,45,46,64–67] or both (N=7),[37,47,68–72] or used a different way to describe their results (N=3).[17,73,74] Jemt et al[74] used a different approach but also listed one positive and two negative outliers.

All 30 studies were observational cohort studies that included doctors from multiple specialties, such as general practitioners, family doctors, or primary care physicians (N=11),[18,38–42,45,46,59,62,65] anesthesiologists (N=4),[47,68,70,71] cardiologists (N=4),[58,60,61,67] hospitalists or residents (N=7),[17,37,62,63,66,69,72] and one each of dentistry,[74] gynaecology,[16] pathology,[64] paediatrics,[46] radiology,[73] and reproductive medicine.[57] (N=18) studies were conducted in the USA,[18,37–42,45,58,59,61,62,64,67–69,72,73] (N=7) in the UK,[16,17,47,60,66,70,71] and one each in Canada,[63] Italy,[57] Netherlands,[65] Spain,[46] and Sweden.[74] The number of included doctors ranges from 21 to 4230. Table 1 summarizes the characteristics of the included studies.

Risk of Bias Assessment

Among the 59 outcomes in the included 30 studies, (N=48) scored 9 stars, (N=10) 8 stars, and (N=1) 7 stars, with a maximum possible score of 9 stars on the Newcastle-Ottawa Scale.[34,35] Those of 7 and 8 stars scored either 0 or 1 on the aspect of

Table 1 Characteristics of Included Studies

Publication	Practitioner	Specialty	Detailed Intervention	Doctors	Patients/ Procedures	Institutions	Outcome	NOS*
Becerra, 2017[64]	Pathologist	Colorectal surgery/ Pathology	Lymph node examination after colectomy	814	12,332	187	Suboptimal care	9
Beckett, 2018[17]	Hospitalist	Acute care	Acute care	22	21,570	1	Mortality	8
							Readmission	8
Brown, 2016[18]	GP General Practitioner	Primary care	Diabetes glucose control	133	14,033	84	Avoiding uncontrolled diabetes	9
Cirillo, 2020[57]	OB-GYN doctor or senior residents	Obstetrics	Embryo transfer	32	19,824	1	Ongoing pregnancy	9
Davenport, 2020[73]	Radiologist	Radiography	Headache CT	55	25,596	1	Mortality	9
							Readmission	9
Eijkenaar, 2013[65]	GP General Practitioner	Primary care	Primary care	447	26,684		COPD**-related admissions	8
				537	37,832		Diabetes-related admissions	8
Glance, 2016[68]	Anesthesiologist	Cardiac surgery	Cardiac surgery	357	55,436	40	Major complications or mortality	9
Goodwin, 2013[69]	Hospitalist	Acute care	Acute care	1099	129,491	268	Length of stay	9
				1099	131,710	268	Mortality	9
Gossl, 2013[58]	Cardiologist	Cardiology	Percutaneous coronary intervention	21	7838	3	MACE Major adverse cardiac event inc. death	9
							Mortality	9
Gutacker, 2018[66]	Hospitalist	Emergency Care	AMI Acute myocardial infarction	1746	138,044	148	Length of stay	9
							Mortality	9
							Readmission	9
		Cardiac surgery	CABG*	212	24,505	30	Length of stay	9
							Mortality	9
							Readmission	9
		Pneumonia	Pneumonia	3760	405,671	152	Length of stay	9
							Mortality	9
							Readmission	9
		Stroke	Stroke	1214	144,114	144	Length of stay	9
							Mortality	9
							Readmission	9
		Orthopedic surgery	Hip fracture	1735	156,145	148	Length of stay	9
							Mortality	9
							Readmission	9
			Hip replacement	1325	170,678	229	Length of stay	9
							Mortality	9
							Readmission	9
Hannan, 2017[67]	Cardiologist	Cardiology	Percutaneous coronary intervention	403	27,560	60	Incomplete revascularization	9
Harley, 2005[16]	Gynecologist	Obstetrics	Gynecologists' performance	143	Not stated	Multiple	7-item composite measure	7
Hofer, 1999[45]	GP General Practitioner	Primary care	Diabetes glucose control	232	3642	3	Hospitalizations	9

(*Continued*)

Table 1 (Continued).

Publication	Practitioner	Specialty	Detailed Intervention	Doctors	Patients/ Procedures	Institutions	Outcome	NOS*
Holmboe, 2010[38]	GP General Practitioner	Primary care	Cholesterol control	236	22,526	13 states	Avoiding high cholesterol	9
			Diabetes glucose control	236	22,526	13 states	Avoiding uncontrolled diabetes	9
			Hypertension control	236	22,526	13 states	Avoiding uncontrolled Hypertension	9
Jemt, 2016[74]	Dental Surgeon	Dental Implants	Dental implants	23	8808	1	Implant failure	9
Kaplan, 2009[59]	GP General Practitioner	Primary care	Diabetes glucose control	210	7574		10 quality measures	8
			Cholesterol control	210	7574		10 quality measures	8
Krein, 2002[40]	GP General Practitioner	Primary care	Cholesterol control	258	12,110	9/13	Avoiding high cholesterol	8
			Diabetes glucose control	258	12,110	12/13	Avoiding uncontrolled diabetes	8
Kunadian, 2009[60]	Cardiologist	Cardiology	Percutaneous coronary intervention	261	149,888	48	Mortality	9
Navar-Boggan, 2012[61]	Cardiologist	Cardiology	Hypertension control	47	5979	1	Avoiding uncontrolled hypertension	9
O'Connor, 2008[41]	GP General Practitioner	Primary care	Diabetes glucose control	120	2589	18	Avoiding uncontrolled diabetes	8
Orueta, 2015[46]	GP (Family doctors)	Primary care	Avoidable hospitalization	1193	2,207,175	130	Hospitalization rates	9
	Pediatrician	Primary care	Avoidable hospitalization	286			Hospitalization rates	9
Papachristofi, 2014[70]	Anesthetist	Cardiac surgery	Cardiac surgery	24	18,426	1	Mortality	9
Papachristofi, 2016[71]	Anesthetist	Cardiac surgery	Cardiac surgery	190	110,769	10	Mortality	9
Papachristofi, 2017[47]	Anesthetist	Cardiac surgery	Cardiac surgery	190	107,038	10	Length of stay	9
Prasad-Kerlin, 2018[37]	Hospitalist	Acute care	Mechanical ventilation	345	11,268	104	Mortality	9
Selby, 2010[39]	GP General Practitioner	Primary care	Cholesterol control	1005[a]	169,156	35	Avoiding high cholesterol	9
			Hypertension control	1049[b]	232,053	35	Avoiding uncontrolled hypertension	9
Singh, 2015[72]	Hospitalist	Primary care	Primary care	525	48,883	143	Readmission	9
Singh, 2019[62]	GP General Practitioner	Primary care	Primary care	4230	565,579		Hospital readmission	9
Tuerk, 2008[42]	GP General Practitioner	Primary care	Diabetes glucose control	42	1381	1	Avoiding uncontrolled diabetes	8
Verma, 2020[63]	Hospitalist	Acute care	Emergency admissions, inpatient care	135	103,085	7	Length of stay	9
							Mortality	9
							Readmission	9

Notes: If "Institutions" is blank, then the number is not applicable (GPs, General Practitioners, for example), or not given and most likely greater than one. *CABG is coronary artery bypass graft. **COPD is chronic obstructive pulmonary disease. For cholesterol, diabetes, and hypertension management, outcomes were standardized to avoiding high cholesterol/HbA1C/blood pressure. [a]Single year numbers. Totals for 6 years are 6,832 doctors, 1,588,407 patients. [b]Single year numbers. Totals for 6 years are 6,995 doctors, 2,021,935 patients.

Abbreviation: NOS, Newcastle-Ottawa Scale for assessing risk of bias of cohort studies.

comparability, whereas the studies with 9 stars scored 2. All included studies scored the maximum points regarding the selection and the outcome criteria (Table 1).

Results of Individual Studies

Altogether 15 studies with 21 outcomes published caterpillar plots or plots that gave the same information.[17,18,37,47,57,58,61–63,65,68–72] One paper showed funnel plots.[60] Such plots represent and sort the doctors' performance for a specific patient outcome, usually showing a 95% confidence interval (CI) for each doctor and whether that CI was wholly below or above the mean performance rate. Results varied from no over- or underperformer[70,71] up to substantial numbers of both.[37,59,61,63,72]

Of the 16 studies that show fixed effects, 11 reported one or more exceptional performers after accounting for all known confounders, including doctors' demographic variables such as their years of experience and volume of procedures/patients, and the at times substantial hospital effects.[16,18,37,47,58–61,63,69,74] Two papers[57,62] found only negative outliers. Three papers found no positive or negative outliers.[68,70,71] (Table 2).

A few papers (N=18) presented a random effect, reported in many different ways, which express the intra-class correlation coefficient (ICC), ie the variation due to the doctor as a percentage of the whole variation in patient physical health outcomes, with that variation calculated while accounting for all available patient, doctor, or institution variables.[37–42,45–47,62,64–71] Reported random effects ranged from approximately zero (ICC of 0.0%) to substantial (ICC up to 33%, median of 1.9%, mean of 3.9%, inter-quartile range 1.0–4.2%) (Figures 2 and 3, Table 2).

Only cholesterol,[38–40] diabetes,[40–42] and hypertension[38,39] control outcomes had more than one study each for the same medical specialty and intervention. ICCs range from 0% to 2%, except Holmboe et al[38] who found much higher ICCs of 12% and 9%. The main difference between this and the other studies is that Holmboe's cohort consisted of doctors who volunteered to participate (Table 2). In nine instances, the ICC was between 9% and 33%.

Reporting Bias, Syntheses, and Certainty of Evidence

Not applicable since there was no statistical synthesis of the results.

Discussion

The findings from this systematic review indicate that doctors have an effect on patients' physical health, even after taking into account all known variables or confounders. This effect ranges from zero to substantial with nine instances where the doctor was associated with at least 9% of the total variation in patient health.

In terms of the effect of even small ICCs, a randomized controlled trial[75] that established the prophylactic value of aspirin was halted early as it was considered to be unethical to withhold aspirin from the control group, even though aspirin only accounted for 1% of the variability in outcomes, ie the trial was halted for a treatment with an ICC of 1%. Further, even a "small" doctors' effect makes a substantial difference in patient health as that difference is applied billions of times each year in each doctor-patient interaction. The value and importance of even small ICCs is further outlined in these three publications.[7,76,77]

At times doctors can be identified whose performance is substantially above or below the average performer. Therefore, a possible answer to the question, "What's a good doctor and how do you make one?"[78] is, "A good doctor is a doctor with significantly better patient physical health outcomes than the average doctor." In addition, a possible answer to, "and how do you make one?" could be,

> Good doctors already exist and can be identified. Unless good doctors' abilities are wholly innate, more good doctors can be made by learning from those who already are good doctors, and exceptionally good doctors also exist.

The key here is that an effect with an unknown cause has been identified. The cause could be anything unmeasured in the included cohort studies, such as doctors' communication skills, their level of care for patients, their physical or mental health, the time they give to a patient, their ability to listen to a patient, their diagnostic ability (as a more suitable intervention is more likely to yield better outcomes), their ability to perform under stress etc. This is an avenue for further research.[79,80]

It is noteworthy that no included study identifying exceptionally good doctors made recommendations on how to use this resource. The substantial number of positive outliers are at times not mentioned in the text, only shown in the graph.

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Table 2 Publications by Outcome and Numerical Results

Outcome	Practitioner	Specialty	Publication	ICC^	Outliers %	
					Negative	Positive
Avoiding high cholesterol	GP General Practitioner	Primary care	Holmboe, 2010[38]	12.0%		
			Kaplan, 2009[59]	9.0%		
			Krein, 2002[40]	1.0%		
			Selby, 2010[39]	1.9%		
Avoiding uncontrolled diabetes	GP General Practitioner	Primary care	Brown, 2016[18]		6.0%	6.8%
			Holmboe, 2010[38]	9.0%		
			Kaplan, 2009[59]	33.0%		
			Krein, 2002[40]	0.0%		
			O'Connor, 2008[41]	0.8%		
			Tuerk, 2008[42]	2.0%		
Avoiding uncontrolled hypertension	Cardiologist	Cardiology	Navar-Boggan, 2012[61]		6.4%	12.8%
	GP General Practitioner	Primary care	Holmboe, 2010[38]	9.0%		
			Selby, 2010[39]	1.9%		
Complications						
MACE Major adverse cardiac event inc. death	Cardiologist	Cardiac surgery	Gossl, 2013[58]		0.0%	4.8%
Major complications or mortality	Anesthesiologist	Cardiac surgery	Glance, 2016[68]	0.5%	0.0%	0.0%
Hospitalizations						
COPD**-related admissions	GP General Practitioner	Primary care	Eijkenaar, 2013[65]	2.5%		
Diabetes-related admissions	GP General Practitioner	Primary care	Eijkenaar, 2013[65]	0.6%		
Hospitalizations	GP General Practitioner	Primary care	Hofer, 1999[45]	1.0%		
			Orueta, 2015[46]	6.1%		
	Pediatrician	Primary care	Orueta, 2015[46]	10.3%		
Length of stay	Anesthetist	Cardiac surgery	Papachristofi, 2017[47]	0.2%	2.1%	0.5%
	Hospitalist	Acute care	Goodwin, 2013[69]	2.6%	19.5%	18.0%
			Verma, 2020[63]		18.5%	14.8%
		Cardiac surgery	Gutacker, 2018[66] (Heart attack)	6.5%		
			Gutacker, 2018[66] (CABG*)	5.2%		
		Pneumonia	Gutacker, 2018[66]	2.1%		
		Stroke	Gutacker, 2018[66]	1.5%		
		Orthopedic surgery	Gutacker, 2018[66] (Hip fracture)	3.2%		
			Gutacker, 2018[66] (Hip replacement)	12.7%		

Mortality	Anesthetist	Cardiac surgery	Papachristofi, 2014[70]	0.1%	0.0%	0.0%
			Papachristofi, 2016[71]	0.3%	0.0%	0.0%
	Cardiologist	Cardiology	Gossl, 2013[58]		0.0%	4.8%
			Kunadian, 2009[60]***	0.2%	0.0%	0.4%
	Hospitalist	Acute care	Beckett, 2018[17]* (different presentation)			
			Goodwin, 2013[69]	0.8%	1.5%	0.6%
			Prasad-Kerlin, 2018[37]	1.8%	22.6%	25.5%
			Verma, 2020[63]		1.5%	5.2%
		Cardiac surgery	Gutacker, 2018 (Heart attack)	1.4%		
			Gutacker, 2018[66] (CABG*)	0.9%		
		Pneumonia	Gutacker, 2018[66]	1.2%		
		Stroke	Gutacker, 2018[66]	1.1%		
		Orthopedic surgery	Gutacker, 2018[66] (Hip fracture)	1.2%		
			Gutacker, 2018[66] (Hip replacement)	0.3%		
	Radiologist	Radiography	Davenport, 2020[73]			
Pregnancy	Reproductive doctor	Obstetrics	Cirillo, 2020[57]		3.1%	0.0%
Readmission	Hospitalist	Acute care	Beckett, 2018[17] (different presentation)			
			Verma, 2020[63]		0.7%	3.0%
		Cardiac surgery	Gutacker, 2018[66] (Heart attack)	0.4%		
			Gutacker, 2018[66] (CABG*)	0.8%		
		Pneumonia	Gutacker, 2018[66]	0.4%		
		Primary care	Singh, 2015[72]	15.0%	12.8%	12.5%
			Singh, 2019[62]		0.02%	0.00%
		Stroke	Gutacker, 2018[66]	0.8%		
		Orthopedic surgery	Gutacker, 2018[66] (Hip fracture)	0.7%		
			Gutacker, 2018[66] (Hip replacement)	2.5%		
	Radiologist	Radiography	Davenport, 2020** (different presentation)			
Suboptimal care	Pathologist	Colorectal surgery	Becerra, 2017[64]	22.5%		
Success or failure						
Implant failure	Dental Surgeon	Dental Implants	Jemt, 2016[74]		8.7%	
Incomplete revascularization	Cardiologist	Cardiac surgery	Hannan, 2017[67]	12.0%		
Multiple measures						
10 measures	GP General Practitioner	Primary care	Kaplan, 2009[59]		27.8%	43.8%
7-item composite measure	Gynecologist	Obstetrics	Harley, 2005[16]		6.3%	2.1%

Notes: The leftmost column is by patients' physical outcome with summarized outcome bold. GP is General Practitioner or Primary Care Physician. ^ICC is Intra-class correlation coefficient that shows percentage of variance owing to the practitioner in the form of percentage of total variance after taking into account all known confounders. *CABG is coronary artery bypass graft. **COPD is chronic obstructive pulmonary disease. Outliers are listed for studies which ordered the doctors according to their effect on patient's physical health outcomes from worst to best or vice versa. The percentages listed represent those practitioners whose 95% CI is wholly below or above the mean. Beckett et al,[17] Davenport et al,[73] and Jemt et al[74] presented their data in a way that only fits partially or not at all in the table. Blank entries under ICC or Outliers mean that the Publication did not report those measures. All studies that reported Outliers except Verma et al[63] adjusted their results for other factors like patient risk. *Beckett et al[17] reported fixed effects before and after case-mix but no 95% confidence intervals. **Davenport et al[73] reported fixed effects with no effect on mortality but other, more indirect measures. ***Kunadian et al[60] did not publish the number of cardiologists or outliers directly, though Figure 2 in the paper is a funnel plot. The paper's reference 7 provides the original data https://www.health.ny.gov/statistics/diseases/cardiovascular/docs/pci_2002-2004.pdf which shows 146,775 cases with 261 cardiologists of whom 7 were underperformers and 5 outperformers. With one exception, all cardiologists with fewer than 31 cases were grouped as "all others". Cardiologists had one entry in the table for each hospital they worked in. The authors of this systematic review calculated the ICC for this dataset to be 0.17%, 95% CI 0.11%, 0.26%. Mortality is 945/146,775 or 0.64%.

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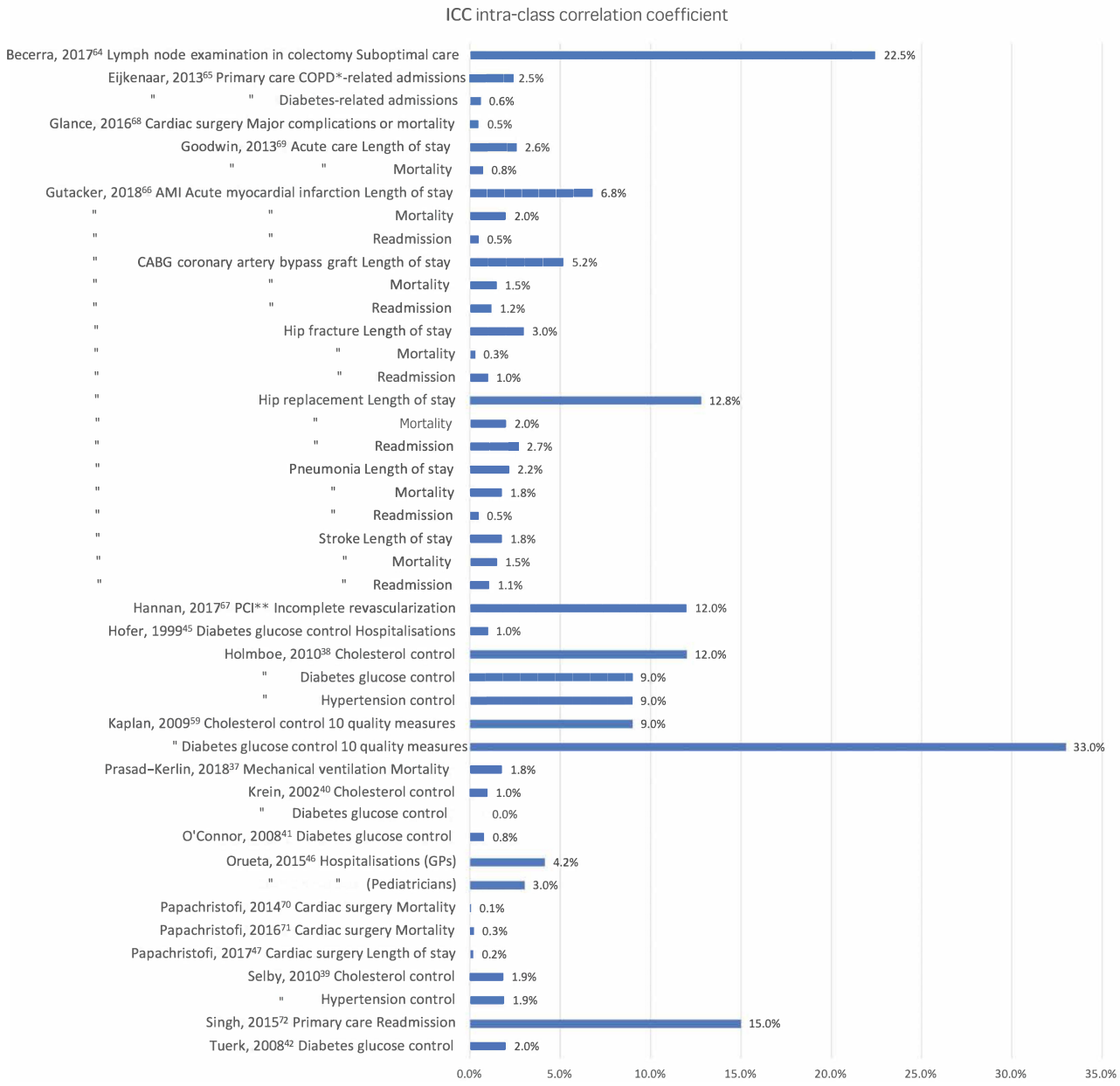

Figure 2 Intra-class correlation coefficients (ICCs) by paper, intervention, and patient outcome. *COPD is chronic obstructive pulmonary disease. **PCI is percutaneous coronary intervention.

The closest to an investigation of high performers was presented by Brown et al[18] who found that in diabetes control, high performing doctors were more likely to be female and underperforming doctors' patients were more likely to be male. Goodwin et al[69] found that hospitalists' patients' length of stay did not affect other patient outcomes. In other words, hospitalists whose patients had shorter lengths of stay in hospital had the same outcome as patients of hospitalists who were underperformers, but no further investigation was undertaken. As one contributory factor to doctors' performance, recent research has proposed that even health care provider expectations can have a substantial placebo effect on patient outcomes, ie patient outcomes can be affected through "social transmission".[13]

Many of the publications excluded for this systematic review among the approximately 10,000 studies were large-scale cohort studies where doctors' effects were attributed to one or more characteristics. However, this attribution was done without reporting the variation in patients' physical health outcomes that was due to the doctor after accounting for

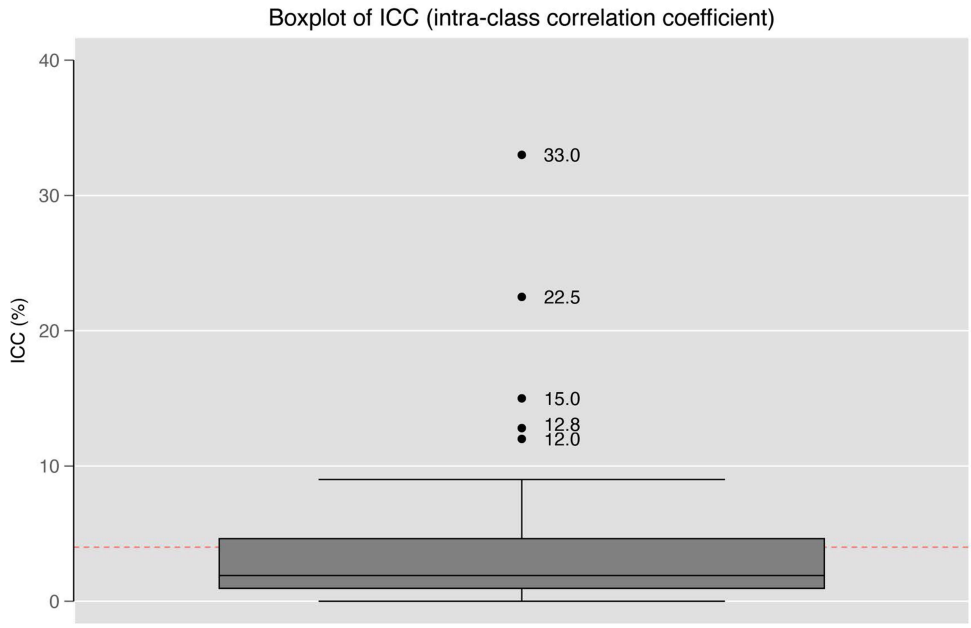

Figure 3 Boxplot of ICC (intra-class correlation coefficient).

all known risk factors. It would be relatively simple to re-analyze these and other already cleaned up and prepared datasets for such a residual effect. Publishing ICCs, ie the amount of variation due to doctors in a consistent way, will make future meta analyses possible. The authors have prepared a methodological review for this purpose.[81]

To the authors' surprise, re-analyzing existing data is not useful for many randomized controlled trials as no data register the authors contacted had any way to identify trials that showed a doctors' effect. Further, a clinical trial specialist privately told the authors that in large randomized trials, with many treatment centers, only the center identifier and not the individual doctor identifier is recorded, making it difficult or impossible to extract a doctors' effect from the data even though it would substantially affect the sample size needed for clinical trials when there are differences among medical doctors, as this would subsequently affect the RCTs statistical power.[82]

Research that addresses the doctors' effect on patients' health outcomes seems to be a form of investigation that is in its infancy. There are no established standards on how to report a doctors' effect, and results are heterogeneous indeed.

The authors found very little systematic research on the probability that doctors, in their own right, may be an intervention whose effect on patients' outcomes can be measured and be more or less effective. This is surprising since there is a well-known clustering effect with patients who have the same doctor tending to have more similar outcomes than patients of a different doctor.[31,83] Likewise, it is well established in psychotherapy that psychotherapists, in their own right, can constitute an intervention, which is independent of the actual intervention used.[7,84]

Summary

Given the increasing difficulty with identifying effective new interventions[85–87] and the increasing cost of research, it may be worth looking beyond the intervention to the other two components of a medical treatment, viz. the doctor and the patient. If there are substantial differences between doctors in patients' physical health outcomes, then identifying those doctors who perform well below or well above average could be a relatively simple way to increase the standards of healthcare. This could be done by bringing low performers closer to average and by learning from high performers, which could provide improved healthcare at a relatively low cost. It would certainly be another option for policy makers: to improve the performance in their healthcare system beyond evaluating existing and potential new interventions for suitability.

Once outstanding performers have been identified,[16,18,37,58,59,61,72] it may be possible to have them as role models, mentors, or teachers of other practitioners. Current literature considers standards to still be elusive[88] and identifies outstanding teachers of medicine by acclaim rather than any objective standards.[89] Once identified, excellent role models

have been associated by Wright et al[89] as "stressing the importance of the doctor-patient relationship in one's teaching and teaching the psychosocial aspects of medicine" – ie they stress the doctor-patient relationship aspects that go beyond identifying and applying the intervention. Other characteristics may have contributed to exceptional performances, such as their ability to employ easy-to-emulate techniques like putting the patient at ease, willingly listen to the patient to the end, a harmonious lifestyle, a strong sense of purpose, or that they are very rarely exhausted, or have higher expectations of the effectiveness of their intervention,[13] or any of a myriad of other possibilities.

The benefit of research investigating outstanding performers could be large as the differences between exceptional and average performers may be substantial, when simple choices made, or techniques used at work or out of work, that contributed to the outstanding performance then become available to other practitioners. As an exceptional performer is often no more expensive to employ than an average or below average performer, there could be very substantial beneficial effects on public health if many other doctors are given the possibility to improve.

Previous attempts at improving standards of care through profiling have run into difficulties. Krein et al[40] in 2002 argued that despite large profiling campaigns of individual healthcare providers in order to contain costs and improve quality of care, the evidence of effecting change that way has been mixed, expensive, adversely affected careers, tended to ignore the systems the healthcare providers worked in, and, when done badly, profiling can be meaningless, providing incentives that worsen the quality of care.

A word of caution is that in a number of studies the raw patient physical health outcome numbers showed very large differences between doctors but this difference was strongly reduced or even eliminated after taking into account other factors such as patient risk or patients' demographics.[57,60,63] Even after a risk assessment it may be clear that many members of the worst performing group of doctors produce substandard work but the data available lacks statistical power and precludes identifying individuals with certainty. In such a case, disciplining or evicting individual practitioners may not be justifiable without further investigation. However, the more available data there is for each practitioner, the higher the possibility to misuse such data or to disempower practitioners by limiting the opportunity to use their ability and experience or by adding more and more rules and regulations.

Conclusions and Implications

Doctors have an effect on patients' physical health for many interventions and outcomes and after accounting for all known data such as doctor demographics and patient risk. This effect ranges from negligible to substantial and therefore, it is worth investigating further whether these effects and their scale persist for other medical specialties and interventions, which at present is not clear due to the small number of studies found and the lack of consistency in their measurements. Many available RCTs and cohort studies could be reanalyzed to address and estimate the doctors' effects.[81] When grading doctors by patients' physical health outcomes, it is at times possible to identify positive and negative outliers whose confidence interval ranges wholly above or below the average performance. Therefore, it can matter greatly which doctor is chosen.

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Data Sharing Statement

No additional data available.

Ethical Approval

As this is a systematic review of published studies, no ethical approval was required.

Author Contributions

All authors made a significant contribution to the work reported, whether in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal the article has been submitted to; and

agree to be accountable for all aspects of the work. The authors thank Dr Aya Ashraf Ali and Tulia Gonzalez Flores for their excellent editorial contributions. The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

Disclosure

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

References

1. Hartling L, Milne A, Hamm MP, et al. Testing the Newcastle Ottawa Scale showed low reliability between individual reviewers. *J Clin Epidemiol*. 2013;66(9):982–993. doi:10.1016/j.jclinepi.2013.03.003
2. Higgins TJ, Chandler J, Cumpston M, Li T, Page MJ, Welch VA. Cochrane handbook for systematic reviews of interventions version 6.1 (updated September 2020). Cochrane 2020; 2020. Available from: https://training.cochrane.org/cochrane-handbook-systematic-reviews-interventions. Accessed January 17, 2021.
3. National ambulatory medical care survey: 2018 national summary tables. 2018. Available from: https://www.cdc.gov/nchs/fastats/physician-visits.htm. Accessed July 15, 2022.
4. Health AGDo. Medicare in Australia. Australians make more than 150 million visits to a GP every year. 2022.
5. Curran J. The doctor, his patient and the illness. *BMJ*. 2007;335(7626):941. doi:10.1136/bmj.39384.467928.94
6. Balint M. The doctor, his patient, and the illness. *Lancet*. 1955;265(6866):683–688. doi:10.1016/S0140-6736(55)91061-8
7. Baldwin SA, Imel Z. Therapist effects: findings and methods. *Bergin Garfields Handbook Psychother Behav Change*. 2013;6:258–297.
8. Schnelle C, Clark J, Mascord R, Jones M. Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. *Ther Clin Risk Manag*. 2022;1(18):467–490. doi:10.2147/TCRM.S357934
9. Fung V, Schmittdiel JA, Fireman B, et al. Meaningful variation in performance: a systematic literature review. *Med Care*. 2010;48(2):140–148. doi:10.1097/MLR.0b013e3181bd4dc3
10. Mercuri M, Gafni A. Medical practice variations: what the literature tells us (or does not) about what are warranted and unwarranted variations. *J Eval Clin Pract*. 2011;17(4):671–677. doi:10.1111/j.1365-2753.2011.01689.x
11. Wilt TJ, Shamliyan TA, Taylor BC, MacDonald R, Kane RL. Association between hospital and surgeon radical prostatectomy volume and patient outcomes: a systematic review. *J Urol*. 2008;180(3):820–829. doi:10.1016/j.juro.2008.05.010
12. Maruthappu M, Gilbert BJ, El-Harasis MA, et al. The influence of volume and experience on individual surgical performance: a systematic review. *Ann Surg*. 2015;261(4):642–647. doi:10.1097/SLA.0000000000000852
13. Chen P-HA, Cheong JH, Jolly E, Elhence H, Wager TD, Chang LJ. Socially transmitted placebo effects. *Nat Human Behav*. 2019;3(12):1295–1305. doi:10.1038/s41562-019-0749-5
14. Moreau A, Boussageon R, Girier P, Figon S. The "doctor" effect in primary care. *Presse Med*. 2006;35(6):967–973. doi:10.1016/S0755-4982(06)74729-7
15. Alruthia Y, Sales I, Almalag H, et al. The relationship between health-related quality of life and trust in primary care physicians among patients with diabetes. *Clin Epidemiol*. 2020;12:143–151. doi:10.2147/CLEP.S236952
16. Harley M, Mohammed MA, Hussain S, Yates J, Almasri A. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. *Br Med J*. 2005;330(7497):929–932. doi:10.1136/bmj.38377.675440.8F
17. Beckett DJ, Spears M, Thomson E. Reliable consultant level data from an Acute Medical Unit: a powerful tool for improvement. *J R Coll Physicians Edinb*. 2018;48(2):108–113. doi:10.4997/jrcpe.2018.202
18. Brown EC, Robicsek A, Billings LK, et al. Evaluating primary care physician performance in diabetes glucose control. *Am J Med Qual*. 2016;31(5):392–399. doi:10.1177/1062860615585138
19. Oomen RJ, Biesaart MC. Doorhalingen in het BIG-register [Removal from the Dutch healthcare professionals register: considerations taken into account by the disciplinary tribunal from 2006 to 2011]. *Ned Tijdschr Geneeskd*. 2012;156(49):548. Dutch.
20. Weenink J. Back on track. Addressing poor performance of healthcare professionals. 2018.
21. AAMC. Careers in medicine - specialty profiles. Available from: https://www.aamc.org/cim/explore-options/specialty-profiles. Accessed March 17, 2022.
22. Hurwitz B. What's a good doctor, and how can you make one? *BMJ*. 2002;325(7366):667–668. doi:10.1136/bmj.325.7366.667
23. Rizo CA, Jadad AR, Enkin M. What's a good doctor and how do you make one?: Doctors should be good companions for people. *BMJ*. 2002;325(7366):711. doi:10.1136/bmj.325.7366.711
24. De Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care*. 2008;17(3):216–223. doi:10.1136/qshc.2007.023622
25. Leppin AL, Gionfriddo MR, Kessler M, et al. Preventing 30-day hospital readmissions: a systematic review and meta-analysis of randomized trials. *JAMA Intern Med*. 2014;174(7):1095–1107. doi:10.1001/jamainternmed.2014.1608
26. Tam VC, Knowles SR, Cornish PL, Fine N, Marchesano R, Etchells EE. Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. *CMAJ*. 2005;173(5):510–515. doi:10.1503/cmaj.045311
27. Tjarda Van Heek N, Kuhlmann KFD, Scholten RJ, et al. Hospital volume and mortality after pancreatic resection: a systematic review and an evaluation of intervention in The Netherlands. Conference Paper. *Ann Surg*. 2005;242(6):781–790. doi:10.1097/01.sla.0000188462.00249.36
28. Van Walraven C, Bennett C, Jennings A, Austin PC, Forster AJ. Proportion of hospital readmissions deemed avoidable: a systematic review. *CMAJ*. 2011;183(7):E391–E402. doi:10.1503/cmaj.101860

29. Nilsen SM, Bjørngaard JH, Carlsen F, et al. Hospitals´ discharge tendency and risk of death-an analysis of 60,000 Norwegian Hip fracture patients. *Clin Epidemiol*. 2020;12:173–182. doi:10.2147/CLEP.S237060
30. Ferroni E, Rossi PG, Alegiani SS, et al. Survival of hospitalized COVID-19 patients in Northern Italy: a population-based cohort study by the ITA-COVID-19 network. *Clin Epidemiol*. 2020;12:1337–1346. doi:10.2147/CLEP.S271763
31. Cook JA, Bruckner T, MacLennan GS, Seiler CM. Clustering in surgical trials - database of intracluster correlations. *Trials*. 2012;13:132. doi:10.1186/1745-6215-13-2
32. Campbell M, McKenzie JE, Sowden A, et al. Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline. *BMJ*. 2020;368: l6890. doi:10.1136/bmj.l6890
33. Gill L, White L. A critical review of patient satisfaction. *Leadersh in Health Serv*. 2009;22(1):8–19. doi:10.1108/17511870910927994
34. Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur J Epidemiol*. 2010;25(9):603–605. doi:10.1007/s10654-010-9491-z
35. Wells GA, Shea B, O'Connell D, et al. *The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Nonrandomised Studies in Meta-Analyses*. Oxford; 2000.
36. Allison PD. Fixed effects regression models. In: *Quantitative Applications in the Social Sciences*. Vol. 160. SAGE publications; 2009.
37. Prasad-Kerlin MP, Epstein A, Kahn JM, et al. Physician-level variation in outcomes of mechanically ventilated patients. *Ann Am Thorac Soc*. 2018;15(3):371–379. doi:10.1513/AnnalsATS.201711-867OC
38. Holmboe ES, Weng W, Arnold GK, et al. The comprehensive care project: measuring physician performance in ambulatory practice. *Health Serv Res*. 2010;45(6 Pt 2):1912–1933. doi:10.1111/j.1475-6773.2010.01160.x
39. Selby JV, Schmittdiel JA, Lee J, et al. Meaningful variation in performance: what does variation in quality tell us about improving quality? *Med Care*. 2010;48(2):133–139. doi:10.1097/MLR.0b013e3181c15a6e
40. Krein SL, Hofer TP, Kerr EA, Hayward RA. Whom should we profile? Examining diabetes care practice variation among primary care providers, provider groups, and health care facilities. *Health Serv Res*. 2002;37(5):1159–1180. doi:10.1111/1475-6773.01102
41. O'Connor PJ, Rush WA, Davidson G, et al. Variation in quality of diabetes care at the levels of patient, physician, and clinic. *Prev Chronic Dis*. 2008;5(1):A15.
42. Tuerk PW, Mueller M, Egede LE. Estimating physician effects on glycemic control in the treatment of diabetes. *Diabetes Care*. 2008;31 (5):869–873. doi:10.2337/dc07-1662
43. Rasbash J, Goldstein H. Efficient analysis of mixed hierarchical and cross-classified random structures using a multilevel model. *J Educ Behav Stat*. 1994;19(4):337–350. doi:10.2307/1165397
44. Goldstein H, McDonald RP. A general model for the analysis of multilevel data. *Psychometrika*. 1988;53(4):455–467. doi:10.1007/BF02294400
45. Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG. The unreliability of individual physician 'report cards' for assessing the costs and quality of care of a chronic disease. *J Am Med Assoc*. 1999;281(22):2098–2105. doi:10.1001/jama.281.22.2098
46. Orueta JF, Garcia-Alvarez A, Grandes G, Nuno-Solinis R. The origin of variation in primary care process and outcome indicators: patients, professionals, centers, and health districts. *Medicine*. 2015;94(31):e1314. doi:10.1097/md.0000000000001314
47. Papachristofi O, Klein AA, Mackay J, Nashef S, Fletcher N, Sharples LD. Effect of individual patient risk, centre, surgeon and anaesthetist on length of stay in hospital after cardiac surgery: Association of Cardiothoracic Anaesthesia and Critical Care (ACTACC) consecutive cases series study of 10 UK specialist centres. *BMJ Open*. 2017;7(9):e016947. doi:10.1136/bmjopen-2017-016947
48. Gulliford MC, Adams G, Ukoumunne OC, Latinovic R, Chinn S, Campbell MJ. Intraclass correlation coefficient and outcome prevalence are associated in clustered binary data. *J Clin Epidemiol*. 2005;58(3):246–251. doi:10.1016/j.jclinepi.2004.08.012
49. Chakraborty H, Hossain A. R package to estimate intracluster correlation coefficient with confidence interval for binary data. *Comput Methods Programs Biomed*. 2018;155:85–92. doi:10.1016/j.cmpb.2017.10.023
50. Adams G, Gulliford MC, Ukoumunne OC, Eldridge S, Chinn S, Campbell MJ. Patterns of intra-cluster correlation from primary care research to inform study design and analysis. Article. *J Clin Epidemiol*. 2004;57(8):785–794. doi:10.1016/j.jclinepi.2003.12.013
51. Turner RM, Omar RZ, Thompson SG. Constructing intervals for the intracluster correlation coefficient using Bayesian modelling, and application in cluster randomized trials. *Stat Med*. 2006;25(9):1443–1456. doi:10.1002/sim.2304
52. Donner A. A review of inference procedures for the intraclass correlation coefficient in the one-way random effects model. *Int Stat Rev*. 1986;54 (1):67–82. doi:10.2307/1403259
53. Eldridge SM, Ukoumunne OC, Carlin JB. The intra-cluster correlation coefficient in cluster randomized trials: a review of definitions. *Int Stat Rev*. 2009;77(3):378–394. doi:10.1111/j.1751-5823.2009.00092.x
54. Cameron AC, Trivedi PK. *Microeconometrics Using Stata*. TX, USA: Stata press College Station; 2009.
55. Anderson BR, Ciarleglio AJ, Cohen DJ, et al. The Norwood operation: relative effects of surgeon and institutional volumes on outcomes and resource utilization. *Cardiol Young*. 2016;26(4):683–692. doi:10.1017/s1047951115001031
56. Fernández-Castilla B, Declercq L, Jamshidi L, Beretvas N, Onghena P, Van den Noortgate W. Visual representations of meta-analyses of multiple outcomes: extensions to forest plots, funnel plots, and caterpillar plots. *Methodology*. 2020;16(4):299–315. doi:10.5964/meth.4013
57. Cirillo F, Patrizio P, Baccini M, et al. The human factor: does the operator performing the embryo transfer significantly impact the cycle outcome?. *Hum Reprod*. 2020;35(2):275–282. doi:10.1093/humrep/dez290
58. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. *Mayo Clin Proc*. 2013;88(11):1250–1258. doi:10.1016/j.mayocp.2013.07.017
59. Kaplan SH, Griffith JL, Price LL, Pawlson LG, Greenfield S. Improving the reliability of physician performance assessment: identifying the "physician effect" on quality and creating composite measures. *Med Care*. 2009;47(4):378–387. doi:10.1097/MLR.0b013e31818dce07
60. Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. *Catheter Cardiovasc Interv*. 2009;73(5):589–594. doi:10.1002/ccd.21893
61. Navar-Boggan AM, Boggan JC, Stafford JA, Muhlbaier LH, McCarver C, Peterson ED. Hypertension control among patients followed by cardiologists. *Circ Cardiovasc Qual Outcomes*. 2012;5(3):352–357. doi:10.1161/circoutcomes.111.963488
62. Singh S, Goodwin JS, Zhou J, Kuo YF, Nattinger AB. Variation among primary care physicians in 30-day readmissions. *Ann Intern Med*. 2019;170 (11):749–755. doi:10.7326/m18-2526

63. Verma AA, Guo Y, Jung HY, et al. Physician-level variation in clinical outcomes and resource use in inpatient general internal medicine: an observational study. *BMJ Qual Saf*. 2020. doi:10.1136/bmjqs-2019-010425
64. Becerra AZ, Aquina CT, Berho M, et al. Surgeon-, pathologist-, and hospital-level variation in suboptimal lymph node examination after colectomy: compartmentalizing quality improvement strategies. *Surgery*. 2017;161(5):1299–1306. doi:10.1016/j.surg.2016.11.029
65. Eijkenaar F, van Vliet RC. Profiling individual physicians using administrative data from a single insurer: variance components, reliability, and implications for performance improvement efforts. *Med Care*. 2013;51(8):731–739. doi:10.1097/MLR.0b013e3182992bc1
66. Gutacker N, Bloor K, Bojke C, Walshe K. Should interventions to reduce variation in care quality target doctors or hospitals? *Health Policy*. 2018;122(6):660–666. doi:10.1016/j.healthpol.2018.04.004
67. Hannan EL, Zhong Y, Jacobs AK, et al. Incomplete revascularization for percutaneous coronary interventions: variation among operators, and association with operator and hospital characteristics. *Am Heart J*. 2017;186:118–126. doi:10.1016/j.ahj.2017.01.015
68. Glance LG, Hannan EL, Fleisher LA, et al. Feasibility of report cards for measuring anesthesiologist quality for cardiac surgery. *Anesth Analg*. 2016;122(5):1603–1613. doi:10.1213/ane.0000000000001252
69. Goodwin JS, Lin YL, Singh S, Kuo YF. Variation in length of stay and outcomes among hospitalized patients attributable to hospitals and hospitalists. *J Gen Intern Med*. 2013;28(3):370–376. doi:10.1007/s11606-012-2255-6
70. Papachristofi O, Mackay JH, Powell SJ, Nashef SAM, Sharples L. Impact of the anesthesiologist and surgeon on cardiac surgical outcomes. *J Cardiothorac Vasc Anesth*. 2014;28(1):103–109. doi:10.1053/j.jvca.2013.07.004
71. Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. *Anaesthesia*. 2016;71(2):138–146. doi:10.1111/anae.13291
72. Singh S, Lin YL, Nattinger AB, Kuo YF, Goodwin JS. Variation in readmission rates by emergency departments and emergency department providers caring for patients after discharge. *J Hosp Med*. 2015;10(11):705–710. doi:10.1002/jhm.2407
73. Davenport MS, Khalatbari S, Keshavarzi N, et al. Differences in outcomes associated with individual radiologists for emergency department patients with headache imaged with CT: a retrospective cohort study of 25,596 patients. *AJR Am J Roentgenol*. 2020;1–8. doi:10.2214/ajr.19.22189
74. Jemt T, Olsson M, Renouard F, Stenport V, Friberg B. Early implant failures related to individual surgeons: an analysis covering 11,074 operations performed during 28 years. *Clin Implant Dent Relat Res*. 2016;18(5):861–872. doi:10.1111/cid.12379
75. Steering Committee of the Physicians' Health Study Research Group. Final report on the aspirin component of the ongoing physicians' health study. *N Engl J Med*. 1989;321(3):129–135. doi:10.1056/nejm198907203210301
76. Wampold BE. *The Great Psychotherapy Debate: Models, Methods, and Findings*. Lawrence Erlbaum Associates, Inc; 2001.
77. Kraemer HC, Kupfer DJ. Size of treatment effects and their importance to clinical research and practice. *Biol Psychiatry*. 2006;59(11):990–996. doi:10.1016/j.biopsych.2005.09.014
78. McMullin P. What's a good doctor and how do you make one? *BMJ*. 2002;325(7366):711. doi:10.1136/bmj.325.7366.711
79. Schnelle C, Jones MA. Protocol for a qualitative study on doctors' opinions on and experiences of exceptionally good doctors. *Adv Med Educ Pract*. 2022;13:103–109. doi:10.2147/AMEP.S343554
80. Schnelle C, Jones MA. Protocol for a Qualitative Study on Doctors' Opinions on and Experiences of Exceptionally Good Doctors. *Adv Med Educ Pract*.2022;13:103–109. doi:10.2147/AMEP.S343554
81. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. *Clin Epidemiol*. 2022;18:467. doi:10.2147/CLEP.S357927
82. Walwyn R, Roberts C. Meta-analysis of absolute mean differences from randomised trials with treatment-related clustering associated with care providers. *Stat Med*. 2015;34(6):966–983. doi:10.1002/sim.6379
83. Lee KJ, Thompson SG. Clustering by health professional in individually randomised trials. *BMJ*. 2005;330(7483):142–144. doi:10.1136/bmj.330.7483.142
84. Wampold BE, Imel ZE. *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work*. Second ed. Taylor and Francis Inc; 2015:1–323.
85. Ioannidis JPA. Evidence-based medicine has been hijacked: a report to David Sackett. *J Clin Epidemiol*. 2016;73:82–86. doi:10.1016/j.jclinepi.2016.02.012
86. Smaldino PE, McElreath R. The natural selection of bad science. *Royal Soc Open Sci*. 2016;3(9):160384. doi:10.1098/rsos.160384
87. Sertkaya A, Wong -H-H, Jessup A, Beleche T. Key cost drivers of pharmaceutical clinical trials in the United States. *Clin Trials*. 2016;13(2):117–126. doi:10.1177/1740774515625964
88. Kenny NP, Mann KV, MacLeod H. Role modeling in physicians' professional formation: reconsidering an essential but untapped educational strategy. *Acad Med*. 2003;78(12):1203–1210. doi:10.1097/00001888-200312000-00002
89. Wright SM, Kern DE, Kolodner K, Howard DM, Brancati FL. Attributes of excellent attending-physician role models. *N Engl J Med*. 1998;339(27):1986–1993. doi:10.1056/NEJM199812313392706

CHAPTER 3:

METHODOLOGICAL REVIEW (STUDY 3)

Study 3: *The doctors' effect on patients' physical health outcomes beyond the intervention: A Methodological Review*
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3.1 SUMMARY

The lack of standard methods for reporting a doctors' effect on patients' physical health warranted a methodological review. The review showed that data drawn from existing cohort study datasets could be re-analysed with the intention to uncover evidence of a doctors' effect on patients' physical health after accounting for all known factors. These datasets came from cohort studies on health care records where an aspect of doctor performance, such as experience or board certification (in the United States) was measured, or interventions were compared, or any other aspect of medical care was reviewed. Adopting this research method made it possible to discover indicators of how much doctors' performances vary for different interventions and outcomes. Further, it would provide a sufficient number of studies in an adequately standardised format to allow for meta-analysis by intervention or outcome.

This approach will also be more efficient as many datasets from cohort studies had already been cleaned up. It would be relatively simple to reanalyse these datasets for doctors' performances regarding patients' physical health, leading to a deeper understanding when, where, and how individual doctors' performances have an influence on patients physical health.

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METHODOLOGY

The Doctors' Effect on Patients' Physical Health Outcomes Beyond the Intervention: A Methodological Review

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Video abstract

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Background: Previous research suggests that when a treatment is delivered, patients' outcomes may vary systematically by medical practitioner.

Objective: To conduct a methodological review of studies reporting on the effect of doctors on patients' physical health outcomes and to provide recommendations on how this effect could be measured and reported in a consistent and appropriate way.

Methods: The data source was 79 included studies and randomized controlled trials from a systematic review of doctors' effects on patients' physical health. We qualitatively assessed the studies and summarized how the doctors' effect was measured and reported.

Results: The doctors' effects on patients' physical health outcomes were reported as fixed effects, identifying high and low outliers, or random effects, which estimate the variation in patient health outcomes due to the doctor after accounting for all available variables via the intra-class correlation coefficient. Multivariable multilevel regression is commonly used to adjust for patient risk, doctor experience and other demographics, and also to account for the clustering effect of hospitals in estimating both fixed and random effects.

Conclusion: This methodological review identified inconsistencies in how the doctor's effect on patients' physical health outcomes is measured and reported. For grading doctors from worst to best performances and estimating random effects, specific recommendations are given along with the specific data points to report.

Keywords: methodological study, meta-epidemiology, meta-epidemiological review, research methods, doctors' effect

Introduction

A fundamental question in medical research is whether medical practitioners have an effect on patients' health beyond the intervention, patient risk, and hospital variables. Previous research has revealed that when a treatment is delivered by a doctor (ie surgeon or medical physician), patient outcomes may vary systematically by medical practitioner.[1,2] It is well known that hospitals can have an influence on patients' health outcomes, with wide variation between hospitals.[3–7] Such outcomes include adverse events,[4] prescribing errors,[4] hospital readmission,[5,6] and mortality.[7–9] Comparing hospitals requires a sound methodology and reliable estimates that take into account the multiple variables involved.[8,10] In contrast to the substantial research on hospital effects, there is minimal research on the effect of doctors.

The influence of doctor-patient communication has been investigated as a "doctor effect" on patients' health outcomes,[1,11,12] including symptoms,[13,14] readmission rates in the emergency department,[13,15] health-related quality of life,[16] and improved diabetes control.[17]

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Research on the therapist effect in psychotherapy has shown significant effects of therapists on patient outcomes beyond the therapy technique or modality applied.[18,19] This wide variation among practitioners has been acknowledged and incorporated into the training material for psychotherapists.[20,21] In surgery, outcomes associated with procedure volume, seniority, level of experience, or doctor specialty, include mortality rate,[22] length of hospital stay,[23,24] post-operative complications,[25] and readmission.[26,27] While research on the doctors' effect in non-surgical specialties is limited, there is evidence from studies in primary care,[1,28] intensive care,[29] acute care,[30] and obstetrics,[31] where medical practitioners had an effect on patients' health outcomes.

Given the significant therapist effect in psychotherapy, and the known wide variation in patient outcomes across hospitals, but unclear effect of individual doctors on patient outcomes, we conducted a systematic review of the effect of doctors on patients' physical outcomes. We aimed to assess whether doctor effects vary with specificity, outcome and intervention. However, in conducting the review, we found substantial variation in the way a doctor effect is measured and reported, therefore making data synthesis challenging and meta-analysis impossible. This has led to the present study where we have conducted a methodological review of studies that measure and report on doctors' effect on physical patient outcomes. The focus of the methodological review is on the method of measurement of the doctors' effect as well as how it is reported. The data source for the review is the included studies from our systematic review.[32]

Objective

To conduct a methodological review of studies reporting on the effect of doctors on patients' physical health outcomes and to provide recommendations on how this effect could be measured and reported in a consistent and appropriate way.

Materials and Methods

Design

The present study is a methodological review where the focus is on statistical analysis and reporting.[33] The search strategy, data collection, and extraction are explained in detail in a previous report of a systematic review of the surgeons' effect on patients' physical health outcomes.[32]

Search Strategy

Three databases were searched initially: PubMed, Embase, and PsycINFO; and over 10,000 publications were screened. For each of the studies identified that met the inclusion criteria, a citation analysis on Scopus was conducted to identify further eligible studies. The full search strategy and keywords can be found in the Supplementary Material.

Study Selection and Eligibility Criteria

The studies selected in the initial electronic search and the studies added through the citation analysis were independently reviewed by two researchers with a third reviewer acting as an arbitrator if required. This process resulted in 79 included studies, all of which are included in the present study. Any physical patient health-related outcome was eligible for inclusion. Studies that fulfilled any of the following criteria were excluded: (1) studies that only described a doctors' effect on particular doctor-related variables (such as specialty of doctor), (2) studies with fewer than 15 doctors, (3) cross-sectional studies, and (4) studies that mention fixed or random effects but did not list them either graphically or in numerical form.

Data Extraction and Quality Assessment

CS extracted the relevant information for assessing doctor effects from each included study, and the extracted data was then reviewed by a second researcher. The data items extracted can be found in Table 1. For quality assessment, the Newcastle-Ottawa Scale (NOS) was used, with the majority of studies scoring between 8 and 9 (9 being the maximum total).[34–36]

Table 1 Data Items Extracted

Data Item	Comment
Publication	First author, year
Surgeon or Other Medical Specialty	Surgeon, Other
Practitioner Type	Surgeon, GP, Cardiologist, etc.
Medical Specialty of Doctor	
Detailed Intervention	
General Outcome	
Specific Outcome	Often same as General Outcome
Type of Study	Cohort or Randomized Controlled Trial
Newcastle Ottawa Scale Score	0–9
Count of Doctors in Study	
Count of Patients	
Count of Institutions	
Doctor ICC	Intra-class correlation coefficient, here a measure of the strength of the effect on patients' physical health
Multivariate Data Analysis used	Y/N
Percentage of Doctors that are Outliers	Positive and Negative Outliers
Country of dataset analyzed	

Methodological Review

We planned to describe the methods used to estimate and report the doctors' effect on patients' physical outcomes including the statistical model used, types of confounding variables adjusted for (patient variables, hospital/institution variables, doctor variables), and the method of reporting the doctor effect.

Results

Of the 79 included studies, 62 used a multivariable multilevel regression model to estimate the doctors' effect, 72 studies included patient variables in their model, 41 studies included hospital or institution variables in the model, 60 studies included doctors' volume, and 24 studies included other doctor variables. There were two different ways that the doctors' effect was reported: fixed effects and random effects,[37,38] with 54 studies reporting fixed effects and 34 studies reporting random effects.

Table 2 provides details for each included study, presenting in part the wide variety of statistical methods used.

Fixed Effects – Grading Doctors by Their Effect

Fixed effects are represented by the range of patient outcomes that doctors are responsible for after all available confounding variables have been accounted for. They are shown visually using a caterpillar plot, which ranks doctors by outcomes from lowest to highest, or a funnel plot, which shows each doctor as a dot and indicates whether doctors are outside a 95% or 99% confidence interval. For example, Papachristofi et al[39] showed caterpillar graphs with an ICC of 4.0% (surgeons) and an ICC of 0.25% (anesthetists) (Figure 1), while Kunadian et al[40] showed a funnel plot with an ICC of 6.5% (Figure 2), redone at a higher resolution by the authors (Figure 3) and the same data as a caterpillar plot (Figure 4). Measuring fixed effects allows

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Table 2 Detailed Results for Each Study

Publication	Doctors	Patients/ Procedures	Institutions	ICC %	Neg Outlier %	Pos Outlier %	Country	MLR*	MV**	Statistical Analysis	PV^	HV^^	DVo#	ODV##	Confidence Interval Calculation
Anderson, 2016[22]	NS	2880	35		Other	Other	US	Y		"Gaussian Kernel Densities were constructed to show the relative distributions of the effects of individual institutions and surgeons"	Y	Y	Y	N	None
Aquina, 2015[51] pg e163	NS	158,596	NS		Other	Other	US	Y		"Mixed Effects Multivariable Logistic Regression", conference abstract	Y	Y	Y	N	95% CI given, but not method
Aquina, 2015[52]	223	14,875	99		13.0	28.0	US	Y		"Bivariate and hierarchical logistic regression with further multivariable analysis" R 3.1 SAS 9.3	Y	Y	Y	N	95% CI given, but not method
Aquina, 2016[53]	3481	125,160	210	24.3	Other	Other	US	Y		"Three-level mixed-effects logistic regression analyses were performed" R 3.2.0 SAS 9.4	Y	Y	Y	Y	None
Aquina, 2017[54]	1572/ 2012	124,416/ 78,267	260/256	40.5/ 14			US	Y		"Mixed-effects Cox proportional hazards analyses" R 3.2.1 SAS 9.4	Y	Y	Y	Y	95% CI given, but not method
Arvidsson, 2005[55]	25	1068	7		Other	Other	Sweden	N	Y	SAS 8.2 NL Mixed model	Y	Y	N	N	None
Becerra, 2017[56]	1503/ 814	12,332	187	7.9			US	Y		"Multilevel logistic regression", "multilevel competing-risks Cox models" SAS 9.3 R	Y	Y	Y	Y	95% CI given, but not method
Beckett, 2018[30]	22	21,570	1				UK	N	N	Analysis based on r-square	N	N	Y	N	None
Begg, 2002[57]	159	10,737	72		8/13/9	3/14/3	US	Y		Correlation-adjusted and GEE logistic regression	Y	Y	Y	N	None
Bianco, 2005[58]	159	5238	NS		7.5	2.5	US	Y		Logistic regression, binomial distribution, histograms, extra-binomial variation	Y	Y	Y	N	None
Bianco, 2010[59]	54	7725	4		9.3	13.0	US	Y		"[M]ultivariable, parametric random-effects regression survival-time model, using a log-logistic survival distribution to model hazard over time" Stata 9.2	Y	N	Y	N	95% CI given, but not method

Bolling, 2010[60]	1088	28,507	639		6.6	7.4	US	Y		GEE logistic regression SAS 9.2 GENMOD	Y	N	Y	N	Funnel plot with 95% CI
Bridgewater, 2003[61]	23	8572	4		0.0	0.0	UK	Y		Unspecified, using SAS	Y	N	Y	N	95% CI given, but not method
Bridgewater, 2005[62]	25	1097/9066	4		0.0	0.0	UK	Y		Unspecified, using SAS	Y	N	Y	N	Clopper-Pearson 95% CI
Brown, 2016[63]	133	14,033	84		6.0	6.8	US	Y		Bayesian hierarchical logistic regression	Y	N	Y	Y	95% CI given, but not method, f did better
Burns, 2011[64]	1557	246,469	156		0.7	4.5	UK	N	Y	Logistic regression	Y	Y	Y	N	"We constructed funnel plots using exact Poisson control limits by means of the web tool available at www.erpho.org.uk/topics/tools/funnel.aspx."
Cirillo, 2020[65]	32	19,824	1		3.1	0.0	Italy	Y		Logistic regression, random effects meta-analysis	Y	N	Y	N	95% CI given, but not method
Cromwell, 2013[66]	490	1194	126/129		0.0	0.0	UK	N	Y	Stata Funnel plot, Wilcoxon extended by Cuzick	Y	Y	Y	N	Binomial distribution 95% CI
Dagenais, 2019[67]	19	1461	1	14.4	10.5	10.5	US	Y		Hierarchical logistic regression	Y	N	Y	Y	95% CI given, but not method
Davenport, 2020[68]	55	25,596	1				US	Y		SAS 9.4 inference testing	Y	N	Y	Y	95% CI given, but not method, though not relevant for mortality
Duclos, 2012[69]	28	2357/2904	5	10/32			France	Y		Mixed effects logistic regression	Y	Y	Y	Y	Binomial distribution 95% CI
Eastham, 2003[70]	44	4629	2		Other	Other	US	Y		Logistic mixed model	Y	Y	Y	N	None
Eijkenaar, 2013[71]	447/537	26,684/37,832	N/A	2.5/0.6			Netherlands	Y		Generalized Linear Multilevel Models using SAS 9.2 GLIMMIX	Y	N/A	Y	N	95% CI given, but not method
Eklund, 2009[72]	48	1275	>1		2.1		Sweden	N	Y	RCT Pearson Chi2, Fisher's exact, Cox regression, "Z-test for heterogeneity"	Y	N	Y	Y	None
Faschinger, 2011[73]	17	36,329	1		Other	Other	Austria	N	Not specified	Correlations calculated	Y	N/A	Y	N	None
Fountain, 2004[74]	43	876/504	28	7.4			UK	Y		SAS NLMIXED, dealing with convergence issues	Y	N	N	N	Standard error calculated

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Table 2 (Continued).

Publication	Doctors	Patients/ Procedures	Institutions	ICC %	Neg Outlier %	Pos Outlier %	Country	MLR*	MV**	Statistical Analysis	PV^	HV^^	DVo#	ODV##	Confidence Interval Calculation
Gani, 2015[26]	56	22,559	1	2.8			US	Y		"[M]ultilevel multivariable logistic regression" Stata 12.1 GLLAM	Y	N/A	Y	Y	95% CI given, but not method
Glance, 2006[75]	138	51,750	33	5.9	5.1	8.7	US	Y		Stata 8.2 SAS GLIMMIX	Y	Y	Y	Y	"Quality outliers were identified using 1) the ratio of observed-to-expected mortality rates (O/E ratio) and confidence intervals (CIs) calculated using both parametric (Poisson distribution) and nonparametric (bootstrapping) techniques; and 2) shrinkage estimators."
Glance, 2016[45]	420/241	55,436	40	0.5/ 1.8	0.0/3.3	0.0/1.7	US	Y		Hierarchical logistic regression	Y	Y	N	N	95% CI given, but not method
Goodwin, 2013[42]	1099	131,710	268	0.75	0.6	1.5	US	Y		"[H]ierarchical general linear model"	Y	Y	N	N	95% CI given, but not method
Gossl, 2013[76]	21	8187	3		0.0	4.8	US	N	Y	Logistic regression	Y	N/A	N	N	Deviation from normal distribution
Grant, 2008[77]	31	14,637	4		0.0	0.0	UK	N	Y	SAS 8.2 Logistic regression	Y	N	Y	N	95% CI given, but not method
Gutacker, 2018[43]	212–3760	24,505–405,671	30–152	0.4–12.7			UK	Y		"Three-level hierarchical generalised linear mixed models"	Y	Y	Y	N	None
Hannan, 2017[78]	403	27,560	60	12.0	18.6	12.7	US	Y		Hierarchical logistic regression	Y	N	Y	Y	95% CI given, but not method
Harley, 2005[31]	143	NS	Multiple		6.3	2.1	UK	N	Y	Multivariate Analysis	N	N	N	N	95% CI given, but not method
Healy, 2017[25]	97	3118/2078	46		10.3/9.3	7.2/4.1	US	Y		"Multi-level mixed-effects logistic regression" Stata 13	Y	N	Y	N	95% CI given, but not method
Hermanek, 1999[79]	43	1121	7		9.3	16.3	Germany	N	Y	"Multiple logistic regression analyses"	N	N	N	N	95% CI given, but not method

Hermann, 2002[80]	20	16,443	1		Other	Other	Austria	N	N	Chi-square, Brandt and Snedecor contingency tables for binomial distributions	N	N	N	N	None
Hofer, 1999[81]	232	3642	3	1.0			US	Y		"hierarchical regression for general linear models"	Y	N	N/A	N	None
Hoffman, 2017[82]	1128	183,283	601	6.2			US	Y		"Generalized linear mixed effects models"	Y	Y	Y	Y	Conference abstract ICC CI not specified how
Holmboe, 2010[83]	236	22,526	13 states	12.0			US	Y		SAS 9.1.3 NLMIXED	Y	N	Y	Y	Delta method for 95% CI
Huesch, 2009[84]	398	221,327	75		1.2	Other	US	N	Y	Using SEMA by SEMATECH	Y	Y	N	N	Binomial distribution 95% CI
Hyder, 2013[85]	575	1488	298	0.3			US	Y		Multilevel Models SAS 9.3	Y	Y	Y	N	95% CI given, but not method
Jemt, 2016[86]	23	8808	1		8.7	Other	Sweden	N	N	Chi-square	N	N/A	N	N	None
Johnston, 2010[87]	404	55,515	12		Other	Other	UK	N	N	Funnel plots	N	N	Y	N	None
Justiniano, 2019[88]	345	1251	118		Other	Other	US	Y		Bayesian hierarchical regression	Y	Y	Y	Y	95% CI given, but not method
Kaczmarski, 2019[89]	5337	291,065	NS		17.5	3.7	US	Y		Hierarchical logistic regression SAS 7.1	Y	N	Y	Y	95% CI given, but not method
Kaplan, 2009[90]	210	7574		33.0/30.6	27.6	43.8	US	Y		Binary mixed models SAS NLMIXED	Y	N	N	N	Standard error calculated
Kerlin, 2018[91]	345	11,268	104	1.8	22.9	25.2	US	Y		Bayesian hierarchical regression Stata 14.2	Y	Y	Y	Y	Bayesian 95% credible intervals of odds ratios
Kissenberth, 2018[92]	57	1703	NS	44.0			US	N	Y	Linear regression	Y	N	N	N	Conference abstract, no CI
Krein, 2002[93]	258	12,110	9	1.0			US	Y		Multilevel analysis MLwiN 2000	Y	Y	N	N	None
Kunadian, 2009[40]	261	149,888	48		1.6	1.1	US	Y		Multivariate Logistic Regression	Y	Y	Y	N	Binomial distribution 95% CI
Landercasper, 2019[94]	71	3954	NS		5.7	4.3	US	Y		Mixed effects multivariate model SAS 9.4	Y	N	Y	Y	95% CI given, but not method
LaPar, 2014[95]	93	4194	17		Other	Other	US	N	Y	[M]ultivariable, mortality risk-adjusted models with restricted cubic splines	Y	Y	Y	N	None

(*Continued*)

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Table 2 (Continued).

Publication	Doctors	Patients/ Procedures	Institutions	ICC %	Neg Outlier %	Pos Outlier %	Country	MLR*	MV**	Statistical Analysis	PV^	HV^^	DVo#	ODV##	Confidence Interval Calculation
Likosky, 2012[96]	32	11,838	8		Other	Other	US	N	Y	Multivariate Logistic Regression	Y	N	N	N	None
Luan, 2019[97]	38	1277	21		2.6	15.8	US	Y		Multivariate Mixed Effects Logistic regression Stata 15	Y	Y	Y	N	Bonferroni corrected 95% CI, no further details
Martin, 2013[98]	298	6091	43	2.5	Graph too small	Graph too small	US	Y		Logistic regression	Y	Y	Y	N	Bayesian 95% coverage intervals, surgeon performance assumed normally distributed
McCahill, 2012[99]	54	2206	4		11.1	31.5	US	Y		Logistic regression	Y	Y	Y	N	95% CI given, but not method
Navar-Boggan, 2012[100]	47	5979	1		6.4	12.8	US	Y		"Multilevel multivariable random-effects logistic regression" Stata 9	Y	N/A	Y	Y	95% CI given, but not method
O'Connor, 2008[101]	120	2589	18	0.8			US	Y		"Multivariate hierarchical models" MLwiN	Y	Y	Y	Y	None
Orueta, 2015[102]	1479	2,207,175	130	4.2			Spain	Y		"Four-level mixed effect models" inc district SAS 9.2 GLIMMIX	Y	Y	Y	Y	95% CI given, but not method
Papachristofi, 2014[103]	24/18	18,426	1	0.1/ 2.8	0.0/16.7	0.0/0.0	UK	Y		"Logistic random effects regression" with random effects	Y	N/A	Y	N	95% CI given, but not method
Papachristofi, 2016[39]	190/127	110,769	10	0.25/ 4.0	0.0/15.0	0.0/6.3	UK	Y		"[L]ogistic random-effects regression analysis" using R 3.01	Y	Y	Y	N	95% CI given, but not method for practitioners, comment why no 95% CI for ICC
Papachristofi, 2017[23]	190/127	107,038	10	0.19/ 2.8	2.1/11.8	0.5/14.2	UK	Y		"Logistic mixed effects models" using R 3.2.2	Y	Y	Y	N	95% CI given, but not method
Quinn, 2018[104]	2724	123,141	51	2.2	0.2	0.2	US	Y		"3-level crossed random effects logistic regression models" Stata MP 14.2, SAS 9.4	Y	Y	Y	N	"Ninety-five percent CIs were calculated according to Agency for Healthcare Research and Quality methods for risk-adjusted rates."
Rudmik, 2017[105]	43	2168	Multiple		16.3	4.7	Canada	Y		Logistic regression	Y	N	Y	N	Binomial distribution 95% CI

Selby, 2010[106]	1005/ 1,049	169,156/ 232,053	35	1.9/ 1.9			US	Y		"Multilevel linear and logistic regression"	Y	Y	N	N	Standard error calculated
Shih, 2015[107]	345	5033	24	14.0			US	Y		"Hierarchical logistic regression", Stata 12.0	Y	N	Y	N	None
Singh, 2015[15]	525	48,883	143	15.0	12.8	12.5	US	Y		"[M]ultilevel, multi-variable models"	Y	Y	Y	Y	95% CI given, but not method
Singh, 2018[24]	3987	39,884	NS		10.0/0.1	7.2/0.0	US	Y		Mixed models, SAS GLMM	Y	Y	Y	Y	95% CI given, but not method
Singh, 2019[28]	4230	565,579			0.0	0.1	US	Y		"Multilevel logistic regression" SAS 9.4 GENMOD, GLIMMIX, Stata 15.1 margins	Y	N	Y	N	Formula for 95% CI given and bootstrapping
Thigpen, 2018[27]	34	995	1		5.9	8.8	US	N	Y	"Linear regression model"	Y	N	Y	N	Efron's bootstrap for 95% CI
Tuerk, 2008[108]	42	1381	1	2.0			US	Y		"Hierarchical linear models" HLM6	Y	N	N	N	ICC as per Bryk Raudenbusch, 95% CI not calculated
Udyavar, 2018[109]	2149	569,767	224	2.3			US	Y		"Multilevel random effects modelling" Stata 14 MELOGIT	Y	Y	Y	Y	95% CI given, but not method
Udyavar, 2018[110]	175	65,706	31	8.7			US	Y		"[M]ultilevel random effects models" Stata 14	Y	Y	Y	Y	ICC 95% CI not calculated
Udyavar, 2019[111]	5816	215,745	198	27.3			US	Y		"[M]ultilevel mixed effects modeling"	Y	Y	Y	Y	Odds ratio 95% CI given, but not method
Verma, 2020[112]	135	103,085	7		18.5	14.8	Canada	Y		Six different multivariable regression analyses R 3.5	Y	Y	Y	N	95% CI given, but not method
Xu, 2016[113]	276	2525	44		3.3	0.0	US	Y		"Logistic regression and post-estimation"	Y	Y	Y	Y	None
Xu, 2019[114]	14,598	1,884,842			Other	Other	US	Y		"Multivariable logistic regressions" Stata MP 14	Y	N	Y	Y	95% CI given, but not method

Abbreviations: *MLR, Multi-level regression; **MV, If no MLR, was multivariate regression used? ^PV, Patient variables; ^^HV, Hospital variables; #DVo, Doctors' volume of procedures used; ##ODV, Other doctor variables than volume used.

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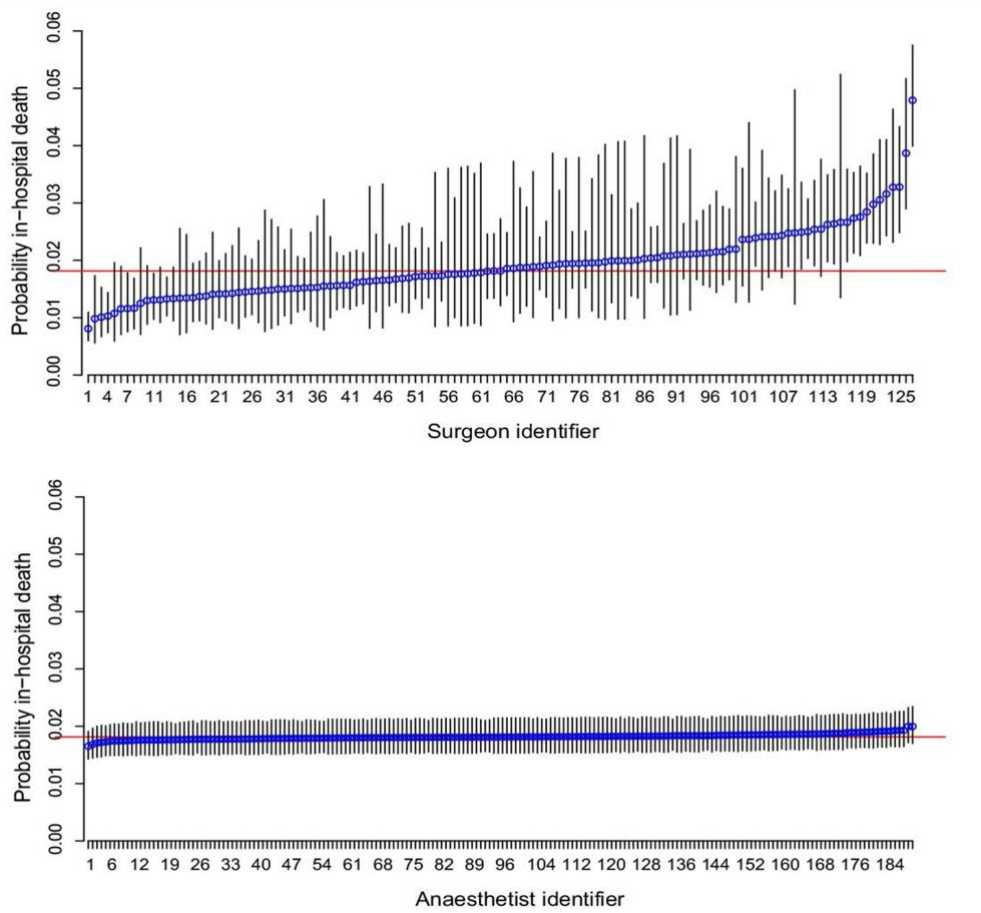

Figure 1 Estimated probability of in-hospital death within three months of surgery for a patient with average Euro-SCORE risk: (a) surgeons adjusted for centre and anaesthetist; (c) anaesthetists adjusted for centre and surgeon. The horizontal line is average probability (1.8%) for the study cohort. Error bars = 95% CI.

Notes: Reproduced from: Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. Anaesthesia. 2016;71(2):138–146. doi:10.1111/anae.13291.[39] © 2015 The Authors. Anaesthesia published by John Wiley & Sons Ltd on behalf of Association of Anaesthetists of Great Britain and Ireland. Creative Commons CC BY (https://creativecommons.org/about/cclicenses/).

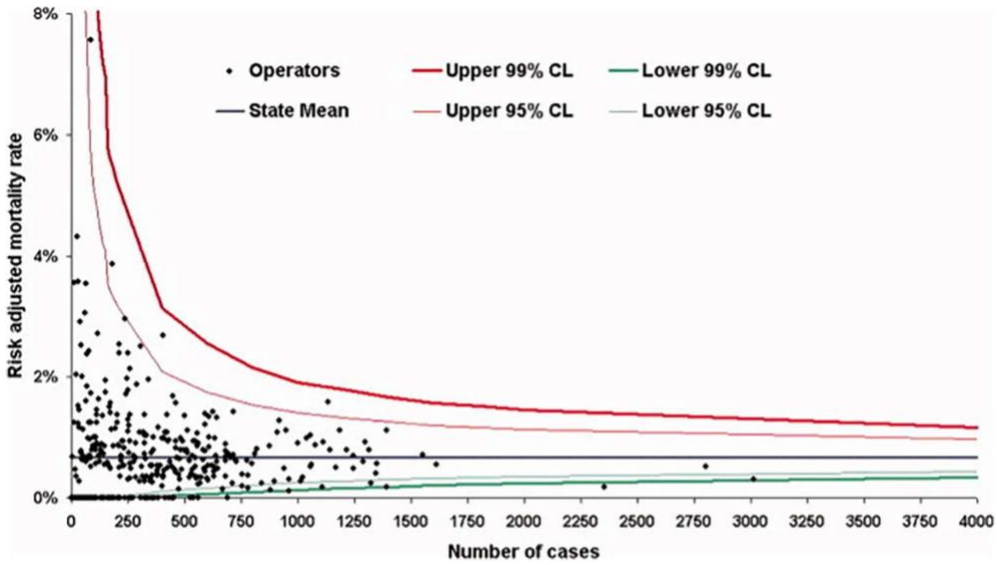

Figure 2 A funnel plot with each cardiologist represented by a black dot with 95% and 99% confidence intervals. The grey horizontal line is the average mortality for percutaneous coronary intervention (PCI) in New York State 2002–2004.

Notes: Reproduced/used with permission of John Wiley & Sons - Books, from: Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing the performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. Catheter Cardiovasc Interv. 2009;73(5):589–94. doi:10.1002/ccd.21893.[40] Copyright © 2009 Wiley-Liss, Inc. Permission conveyed through Copyright Clearance Center, Inc.

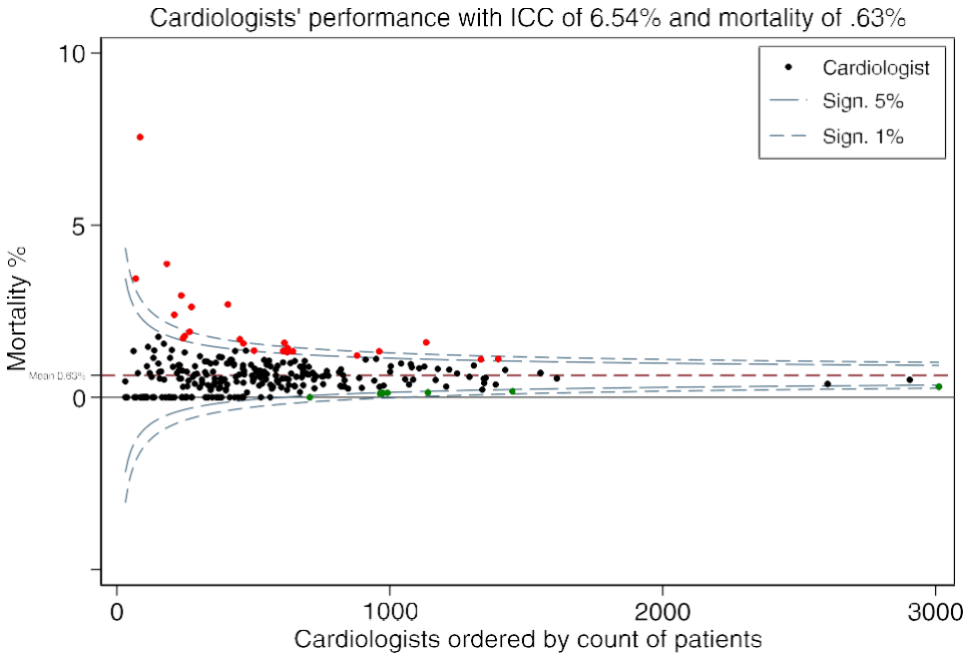

Figure 3 This figure was created by the authors and is a higher resolution version of Figure 2 using the same data. It is a funnel plot with each cardiologist represented by a dot with 95% and 99% confidence intervals. Cardiologists whose mortality confidence interval is above the 95% line are marked in red, those below marked in green.
Notes: Adapated/used with permission of John Wiley & Sons - Books, from: Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing the performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. Catheter Cardiovasc Interv. 2009;73(5):589–94. doi:10.1002/ccd.21893.[40] Copyright © 2009 Wiley-Liss, Inc. Permission conveyed through Copyright Clearance Center, Inc.

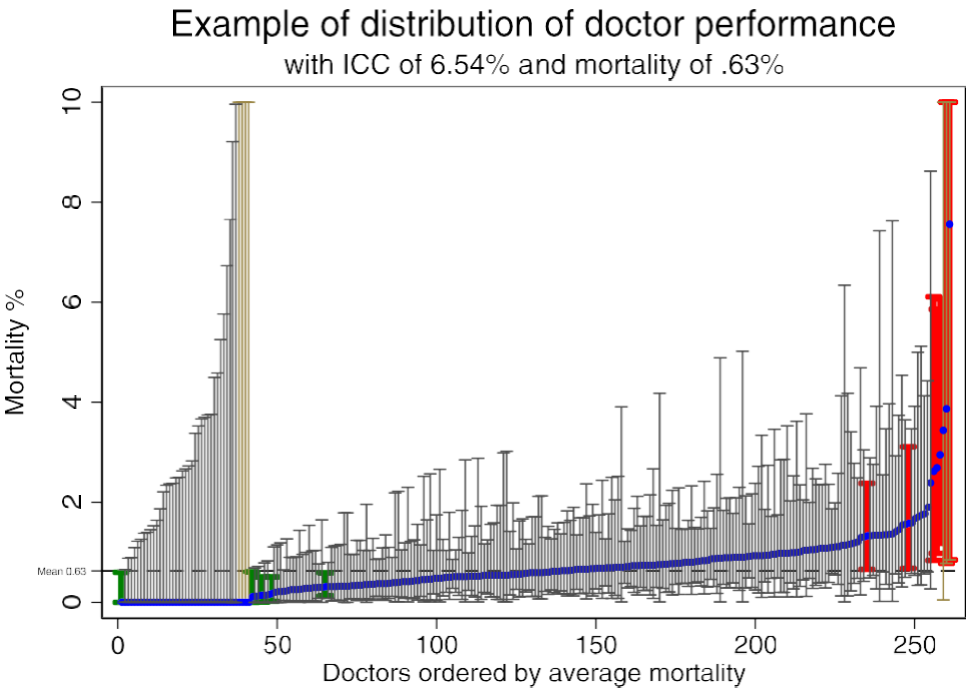

Figure 4 A caterpillar plot created by the authors. It uses the same data as Figures 2 and 3. Beige (on left) and brown (on right) confidence intervals have an upper limit above 10%. Green confidence intervals are wholly below average mortality, red confidence intervals wholly above.
Notes: Data from this publicly available source[117] which is the same one as used by Kunadian et al.[40]

identification of high and low outliers and how heterogeneously doctors perform. They also show whether variation in performance is consistent with chance or whether the variation is more significant than that. Fixed effects are calculated through "modelling fixed provider effects".[41]

Random Effects – Estimating the Variation Due to the Doctor

Random effects represent a percentage of the total variation in outcomes between patients that the doctors are responsible for. They are estimated via the intra-class correlation coefficient (ICC), which is the proportion of the total variation in the patient outcome attributed to doctors. There are many different ways to describe this effect.[37] The ICCs measured and reported in the studies ranged from 0% to 47% with a median of 3%.

Discussion

This methodological review of studies that report a doctors' effect on a patient's physical outcomes has identified wide variations in how researchers measure and report a doctors' effect. However, there were 2 broad methods identified: fixed effects that allow doctors to be ranked; and random effects where the proportion of variance attributed to unexplained differences between doctors is estimated. The most common statistical model used in the analyses was a multivariable multilevel regression where the types of confounding variables adjusted for included those assessing patient risk, known doctor attributes, and, to a lesser degree, differences between hospitals or institutions.

Glance et al[38] discuss in some detail three approaches of provider profiling for binary outcomes, namely conventional logistic regression, hierarchical logistic regression, and fixed-effects logistic regression. They conclude that hierarchical logistic regression is generally preferred, except in the case where providers have low case volume, where hierarchical logistic regression understates the provider effect. We agree that hierarchical logistic regression is an acceptable method for provider profiling as it allows measurement of the strength of the providers' effect on physical patient health.

This review identified substantial heterogeneity in how the percentage of the variation due to the doctors is reported. For example, Goodwin et al[42] reported the percentage of the variation for the null model as the "ICC" and the variation calculated after taking all available information into account as "partitioned variance". It is helpful to calculate the variation of the null model as, if there is negligible or no variation, there is no need to include additional levels in the analysis. In both cases, the null and adjusted models, the ICC was calculated. In contrast, Gutacker et al[43] referred to the random effect measure as the "variance partition coefficient".

A crucial element of reporting fixed effects is the calculation of the confidence intervals of each doctors' performance. Glance et al[38,44,45] provide a detailed technical discussion of the respective advantages of using fixed (grading doctors from worst to best) and random effects (calculating the percentage of outcome variation due to the doctor). One pertinent issue discussed is that the smaller the cluster is, ie the fewer patients the doctor has, the greater the shrinkage towards the mean,[46,47] reducing the calculated ICC, and leading to an underestimate of the difference in performance between doctors.

Interpreting the Doctor's Effect

The clinical importance of the findings from the studies assessed in this methodological review depends on how common the outcome assessed is and how varied the doctors' effect is among practitioners. The more common and the more varied, the more the finding is clinically important. The choice between a doctor with an above or below average effect will have implications for the patients' health outcomes at different levels of how common the outcome is and how strong the doctors' effect is. The stronger the doctors' effect and the more important the outcome, the more the choice of doctor matters for the individual. The more common the outcome is, the more the choice of doctor matters for population health.

Table 3 by Baldwin et al,[21] originally from Wampold et al,[48] and augmented by Kraemer et al,[49] shows effect sizes for different ICCs. The intra-class correlation coefficient (ICC) can measure the percentage of the variation in patients' physical health outcomes due to each component of a medical interaction,[21] which is typically the patient, the doctor, the hospital, and the intervention. Table 3 shows a scenario where 50% of the patients recover from an intervention when there is no doctors' effect, ie for an ICC of zero. However, an ICC of 5.9% is reported to produce a medium-sized effect

Table 3 Relationship Between ICC, Cohen's d, Success Rates and NNT

ICC	Cohen's d[50]	Proportion of Untreated Controls Below Mean of Treated Persons	Success Rate of Untreated Persons	Success Rate of Treated Persons	NNT – Numbers Needed to Treat[49]
Small					
0.0%	0.0	0.500	0.500	0.500	∞
0.2%	0.1	0.540	0.475	0.525	17.7
1.0%	0.2	0.579	0.450	0.550	8.9
Medium					
2.2%	0.3	0.618	0.426	0.574	6.0
3.8%	0.4	0.655	0.402	0.598	4.5
5.9%	0.5	0.691	0.379	0.621	3.6
8.3%	0.6	0.726	0.356	0.644	3.0
10.9%	0.7	0.758	0.335	0.665	2.6
Large					
13.8%	0.8	0.788	0.314	0.686	2.3

Notes: Cohen's d's aim is to describe the magnitude of response to treatments between two groups, for example, a treatment and a control group. More technically, "The difference between the Treatment and Control group means, divided by the within-group standard deviation".[50] The Number Needed to Treat (NNT) is defined as the number of patients one would expect to treat with Treatment to have one more success (or one less failure) than if the same number were treated with Control.[49]

(Cohen's d) with a Number Needed to Treat (NNT) of 3.6. Under such circumstances, an ICC of 5.9% can mean that doctors have a clinically significant effect that is greater than many interventions.

Recommendations

How to Report a Doctors' Effect

If researchers wish to report a doctors' effect that has been estimated, we recommend the following:

- Including "doctors" effect' or "physicians" effect' in the keywords and optionally in the title or abstract
- Using multivariable multilevel regression for the analysis with adjustments for patient risk, doctor experience, hospital effects, and any other potential confounding variable
- For describing fixed effects – grading doctors from worst to best, showing individual results for each doctor in a Table or a Figure
- For describing random effects, calculation of the intra-class correlation coefficient (ICC), describing the variation with 95% confidence interval and whether the outcome is a binary or continuous variable
- Making the dataset used for the analysis available for other researchers to conduct their own analyses.

What to Report

Observational Studies

We recommend reporting doctor effects after all available confounding variables have been taken into account, either by (a) the percentage of variation in the patient outcomes which is attributed to the doctor but unexplained by known attributes such as their experience, or (b) the ordering of doctors by their patients' physical health outcomes, or (c) ideally both.

Reporting this data offers the potential to identify both low and high outliers among doctors, as well as how much of an unexplained doctors' effect there is on patient outcomes.

Data Points to Report

Table 4 lists the data points that are recommended to report. Table 5 shows a specific example of those reported data points employing the dataset used in Kunadian et al.[40]

Table 4 Data Points to Report

Data Points to Report	Description
1. Intervention	Type of intervention
2. Type of study	We do not recommend using cross-sectional studies (surveys), as response rates can introduce a selection bias. This does not concern patient-reported data recorded by the doctor, like levels of pain or mobility.
3. Count of doctors	Count of doctors overall. For randomized controlled trials, the count of doctors for each arm.
4. Count of patients or procedures	If available, both patients and procedures.
	Randomized controlled trials: In addition to the above: number of arms to the study. If the trial is not too large, a matrix showing how many patients of each arm were served by each doctor.
5. Count of higher aggregation, if any – hospital, practices, counties, states	If there are more than two levels, ie not just patients/procedures and doctors, but also hospital, or medical practice, or county, or state, reporting their number could be useful. As there is a well-known hospital effect, distinguishing between hospital and doctors' effects will be useful.
6. Outcome type	The patients' physical health outcomes measured, for example mortality, length of stay, complications, pregnancies, blood pressure or HbA1c levels under control/ not under control. Definitions for each outcome. For example, with mortality, whether it is in-hospital, 30-days, or five years. Whether the outcome is binary, ordinal, or continuous. If feasible, all 30-days, in-hospital, and longer times, if they are available.
7. Percentage of patients/procedures with this outcome	For binary outcomes, the percentage of patients by doctor with that outcome – lowest percentage, highest, mean, and median. For ordinal or continuous outcomes, lowest, highest, average, mean, and median outcome by doctor.
8. Multivariate analysis (Y/N)	Has there been a multivariate analysis, and which variables were considered for exclusion in the analysis, and which were included in the final analysis?
9. Volume effect Y/N/NS (NS='not stated')	Was the number of patients/procedures per doctor included in the analysis? Was the effect, if any, reported as being substantial, not substantial, or not stated?
10. Observed vs expected recorded Y/N/NS	Were investigations done to identify low and high outliers among the doctors, and their count, or proportion recorded? Were funnel plot(s) provided, pointing out 95% and optionally, 90% and or 99% outliers? Alternatively, a caterpillar plot, ie a fixed effect chart showing the patient outcome for each doctor, together with the individual doctor's 95% CI, sorted by patient outcome, showing outliers among doctors.
	Confidence interval options:[115] Binomial (normal distribution in patient outcomes) Delta method – what are the details, and how is it done? Other – bootstrap, simulation[116]
11. Percentage variation number/NS	The variation due to the doctors in the patients' physical health outcome as a percentage of the total variance of all investigated levels, with 95% confidence levels. Optionally, absolute variance and total variance as well.
12. ICC calculated during multilevel, multivariate analysis	As the percentage of the total variance of all investigated levels is the definition of the ICC, reporting of the ICC (intra-class correlation coefficient) as such with 95% confidence intervals as a more detailed alternative to reporting only the variation.
13. Pre-shrinkage ICC calculated through simulation	The ICC calculated in multilevel analysis is often reported as lower than it really is due to shrinkage.[46,47] In order to find the pre-shrinkage ICC, the following approach can be taken: Simulated datasets that have the same distribution as the doctor/patient clusters in the data investigated can be generated using increasing ICCs until a generating ICC is found that has the same post-shrinkage ICC as the dataset investigated. Reporting this pre-shrinkage ICC can be valuable, as it can be much larger than the post-shrinkage ICC when, for example, the patients' physical effect is not common (under 10%).

Table 5 Data Points Reported by Kunadian et al

Data Points to Report	Kunadian et al:[40] an Example*
1. Type of intervention	Percutaneous Coronary Interventions (PCI) in New York State 2002–2004, also known as angioplasty.
2. Type of study	Cohort study from medical records.
3. Count of doctors	261
4. Count of patients or procedures	149,888 patients, procedures not stated.
5. Count of higher aggregation, if any – hospital, practices, counties, states	48 hospitals
6. Outcome type	30-day and 3-year mortality following PCI.
7. Percentage of patients/procedures with this outcome	Overall, 944 deaths out of 149,888 PCI procedures. After excluding patients listed as "All Other doctors in this hospital", 912 deaths in 146,781 procedures.
8. Multivariate analysis (Y/N)	Yes. Risk-adjusted mortality rate.
9. Volume effect Y/N/NS (NS='not stated')	Yes. Neither the downloadable paper nor Kunadian state whether there is a volume effect for cardiologists. Kunadian states there is no significant relationship between hospital volume and risk of in-hospital death from these data.
10. Observed vs expected recorded Y/N/NS	Yes.
Were funnel plot(s) provided?	Yes, provided in Kunadian as Figure 2.
Were caterpillar plots provided?	Not by Kunadian et al[40]. See Figure 4 as provided by authors.
Were confidence intervals calculated?	Neither the downloadable document nor Kunadian state how the confidence interval was calculated.
11. Percentage variation Number/NS	NS
12. ICC calculated during multilevel, multivariate analysis	ICC was calculated by the authors of this paper to be 6.54%, 95% CI (4.32%, 9.79%).
13. Pre-shrinkage ICC calculated through simulation	Using simulated data with the same number of doctors, cases per doctor, and deaths per doctor, resulted in an average ICC of 6.48%, 95% CI (4.47%, 9.32%) after 550 simulations. Therefore, there is no substantial shrinkage at work, which is not unexpected as the mean number of cases per doctor is high at 558.

Notes: *Kunadian et al's 2009 paper[40] refers to a version of the original dataset[117] that can be freely downloaded and is sufficiently detailed for our purposes.

Strengths and Limitations

This is the first methodological review on the reporting of doctors' effect on patient outcomes. The clarity and simplicity of how doctors' and surgeons' effects are described here and the suggested standardization of such reporting should allow meta-analysis to be conducted, allow robust identification of outliers, and make the re-analysis of much existing data feasible. However, a limitation is that, as all of the included studies were conducted in North America or Europe, it is unclear whether the findings can be generalized to other regions, particularly in developing nations.

Conclusion

A doctors' effect on patients' physical health can be measured and reported in two ways:

Firstly, by calculating the percentage of variation in patients' physical health outcomes due to the doctor in the form of the intra-class correlation coefficient (ICC). Secondly, by grading doctors from best to worst patients' physical health outcomes, assigning a confidence interval to those outcomes, and reporting how many doctors' confidence intervals fall wholly above or below the overall average. Ideally, both should be reported.

Ethical Approval

As this is a methodological review, no ethical approval was required.

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Author Contributions

Both authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare no support from any organization for the submitted work, no financial relationships with any organizations that might have an interest in the submitted work in the previous three years, and no other relationships or activities that could appear to have influenced the submitted work. The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported, that no important aspects of the study have been omitted, and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

References

1. Moreau A, Boussageon R, Girier P, Figon S. Efficacité thérapeutique de “l’effet médecin” en soins primaires. *Presse Med*. 2006;35(6):967–973. doi:10.1016/S0755-4982(06)74729-7
2. Cook JA, Bruckner T, MacLennan GS, Seiler CM. Clustering in surgical trials - database of intracluster correlations. *Trials*. 2012;132. doi:10.1186/1745-6215-13-2
3. De Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care*. 2008;17(3):216–223. doi:10.1136/qshc.2007.023622
4. Tam VC, Knowles SR, Cornish PL, Fine N, Marchesano R, Etchells EE. Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. *CMAJ*. 2005;173(5):510–515. doi:10.1503/cmaj.045311
5. Van Walraven C, Bennett C, Jennings A, Austin PC, Forster AJ. Proportion of hospital readmissions deemed avoidable: a systematic review. *CMAJ*. 2011;183(7):E391–E402. doi:10.1503/cmaj.101860
6. Leppin AL, Gionfriddo MR, Kessler M, et al. Preventing 30-day hospital readmissions: a systematic review and meta-analysis of randomized trials. *JAMA Intern Med*. 2014;174(7):1095–1107. doi:10.1001/jamainternmed.2014.1608
7. Tjarda Van Heek N, Kuhlmann KFD, Scholten RJ, et al. Hospital volume and mortality after pancreatic resection: a systematic review and an evaluation of intervention in The Netherlands. Conference Paper. *Ann Surg*. 2005;242(6):781–790. doi:10.1097/01.sla.0000188462.00249.36
8. Kristensen PK, Merlo J, Ghith N, Leckie G, Johnsen SP. Hospital differences in mortality rates after Hip fracture surgery in Denmark. *Clin Epidemiol*. 2019;11:605–614. doi:10.2147/CLEP.S213898
9. Nilsen SM, Bjørngaard JH, Carlsen F, et al. Hospitals´ discharge tendency and risk of death-an analysis of 60,000 Norwegian Hip fracture patients. *Clin Epidemiol*. 2020;12:173–182. doi:10.2147/CLEP.S237060
10. Krell RW, Girotti ME, Dimick JB. Extended length of stay after surgery: complications, inefficient practice, or sick patients? *JAMA Surg*. 2014;149(8):815–820. doi:10.1001/jamasurg.2014.629
11. Riedl D, Schüßler G. The influence of doctor-patient communication on health outcomes: a systematic review. *Z Psychosom Med Psychother*. 2017;63(2):131–150. doi:10.13109/zptm.2017.63.2.131
12. Di Blasi Z, Harkness E, Ernst E, Georgiou A, Kleijnen J. Influence of context effects on health outcomes: a systematic review. *Lancet*. 2001;357(9258):757–762. doi:10.1016/S0140-6736(00
13. Cabana MD, Slish KK, Evans D, et al. Impact of Physician Asthma Care Education on Patient Outcomes. *Health Educ Behav*. 2014;41(5):509–517. doi:10.1177/1090198114547510
14. Thomas KB. General practice consultations: is there any point in being positive? *Br Med J*. 1987;294(6581):1200–1202. doi:10.1136/bmj.294.6581.1200
15. Singh S, Lin YL, Nattinger AB, Kuo YF, Goodwin JS. Variation in readmission rates by emergency departments and emergency department providers caring for patients after discharge. *J Hospital Med*. 2015;10(11):705–710. doi:10.1002/jhm.2407

16. Alruthia Y, Sales I, Almalag H, et al. The relationship between health-related quality of life and trust in primary care physicians among patients with diabetes. *Clin Epidemiol*. 2020;12:143–151. doi:10.2147/CLEP.S236952
17. Sperl-Hillen J, Beaton S, Fernandes O, et al. Comparative effectiveness of patient education methods for type 2 diabetes: a randomized controlled trial. *Arch Intern Med*. 2011;171(22):2001–2010. doi:10.1001/archinternmed.2011.507
18. Walwyn R, Roberts C. Therapist variation within randomised trials of psychotherapy: implications for precision, internal and external validity. *Stat Methods Med Res*. 2010;19(3):291–315. doi:10.1177/0962280209105017
19. Walwyn R, Roberts C. Meta-analysis of absolute mean differences from randomised trials with treatment-related clustering associated with care providers. *Stat Med*. 2015;34(6):966–983. doi:10.1002/sim.6379
20. Wampold BE, Imel ZE. *The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work: Second Edition*. Taylor and Francis Inc; 2015:1–323.
21. Baldwin SA, Imel Z. Therapist effects: findings and methods. *Bergin Garfield's Handbook Psychother Behavior Change*. 2013;6:258–297.
22. Anderson BR, Ciarleglio AJ, Cohen DJ, et al. The Norwood operation: relative effects of surgeon and institutional volumes on outcomes and resource utilization. *Cardiol Young*. 2016;26(4):683–692. doi:10.1017/s1047951115001031
23. Papachristofi O, Klein AA, Mackay J, Nashef S, Fletcher N, Sharples LD. Effect of individual patient risk, centre, surgeon and anaesthetist on length of stay in hospital after cardiac surgery: association of Cardiothoracic Anaesthesia and Critical Care (ACTACC) consecutive cases series study of 10 UK specialist centres. *BMJ Open*. 2017;7(9):e016947. doi:10.1136/bmjopen-2017-016947
24. Singh S, Sparapani R, Wang MC. Variations in 30-day readmissions and length of stay among spine surgeons: a national study of elective spine surgery among US Medicare beneficiaries. *J Neurosurg Spine*. 2018;29(3):286–291. doi:10.3171/2018.1.Spine171064
25. Healy MA, Regenbogen SE, Kanters AE, et al. Surgeon variation in complications with minimally invasive and open colectomy: results from the Michigan surgical quality collaborative. *JAMA Surg*. 2017;152(9):860–867. doi:10.1001/jamasurg.2017.1527
26. Gani F, Lucas DJ, Kim Y, Schneider EB, Pawlik TM. Understanding Variation in 30-Day Surgical Readmission in the Era of Accountable Care: effect of the Patient, Surgeon, and Surgical Subspecialties. *JAMA Surg*. 2015;150(11):1042–1049. doi:10.1001/jamasurg.2015.2215
27. Thigpen CA, Floyd SB, Chapman C, et al. Comparison of surgeon performance of rotator cuff repair: risk adjustment toward a more accurate performance measure. *J Bone Joint Surg Am*. 2018;100(24):2110–2117. doi:10.2106/jbjs.18.00211
28. Singh S, Goodwin JS, Zhou J, Kuo YF, Nattinger AB. Variation among primary care physicians in 30-day readmissions. *Ann Intern Med*. 2019;170(11):749–755. doi:10.7326/m18-2526
29. Kerlin MP, Weissman GE, Wonneberger KA, et al. Validation of administrative definitions of invasive mechanical ventilation across 30 intensive care units. *Am J Respir Crit Care Med*. 2016;194(12):1548–1552. doi:10.1164/rccm.201605-0953LE
30. Beckett DJ, Spears M, Thomson E. Reliable consultant level data from an Acute Medical Unit: a powerful tool for improvement. *J R Coll Physicians Edinb*. 2018;48(2):108–113. doi:10.4997/jrcpe.2018.202
31. Harley M, Mohammed MA, Hussain S, Yates J, Almasri A. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. *Br Med J*. 2005;330(7497):929–932. doi:10.1136/bmj.38377.675440.8F
32. Schnelle C, Clark J, Mascord R, Jones M. Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation?. *Ther Clin Risk Manag*. 2022;1(18):467–490. doi:10.2147/TCRM.S357934
33. Mbuagbaw L, Lawson DO, Puljak L, Allison DB, Thabane L. A tutorial on methodological studies: the what, when, how and why. *BMC Med Res Methodol*. 2020;20(1):226. doi:10.1186/s12874-020-01107-7
34. Higgins JPT TJ, Chandler J, Cumpston M, Li T, Page MJ, Welch VA Cochrane Handbook for Systematic Reviews of Interventions version 6.1 (updated September 2020); 2020. Available from: https://training.cochrane.org/cochrane-handbook-systematic-reviews-interventions. Accessed January 17, 2021.
35. Wells GA, Shea B, O'Connell D, et al. *The Newcastle-Ottawa Scale (NOS) for Assessing the Quality of Nonrandomised Studies in Meta-Analyses*. Oxford; 2000.
36. Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur J Epidemiol*. 2010;25(9):603–605. doi:10.1007/s10654-010-9491-z
37. Allison PD. *Fixed Effects Regression Models. Vol 160. (Quantitative Applications in the Social Sciences*. SAGE publications; 2009.
38. Glance LG, Dick AW. In Response. *Anesth Analg*. 2016;122(5):1722–1727. doi:10.1213/ANE.0000000000001194
39. Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. *Anaesthesia*. 2016;71(2):138–146. doi:10.1111/anae.13291
40. Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. *Catheter Cardiovasc Interv*. 2009;73(5):589–594. doi:10.1002/ccd.21893
41. DeLong ER, Peterson ED, DeLong DM, Muhlbaier LH, Hackett S, Mark DB. Comparing risk-adjustment methods for provider profiling. *Stat Med*. 1997;16(23):2645–2664. doi:10.1002/(SICI)1097-0258(19971215)16:23<2645::
42. Goodwin JS, Lin YL, Singh S, Kuo YF. Variation in length of stay and outcomes among hospitalized patients attributable to hospitals and hospitalists. *J Gen Intern Med*. 2013;28(3):370–376. doi:10.1007/s11606-012-2255-6
43. Gutacker N, Bloor K, Bojke C, Walshe K. Should interventions to reduce variation in care quality target doctors or hospitals? *Health Policy*. 2018;122(6):660–666. doi:10.1016/j.healthpol.2018.04.004
44. Glance LG, Kellermann AL, Hannan EL, et al. RETRACTED The impact of anesthesiologists on coronary artery bypass graft surgery outcomes. *Anesth Analg*. 2015;120(3):526–533. doi:10.1213/ANE.0000000000000522
45. Glance LG, Hannan EL, Fleisher LA, et al. Feasibility of Report Cards for Measuring Anesthesiologist Quality for Cardiac Surgery. *Anesth Analg*. 2016;122(5):1603–1613. doi:10.1213/ane.0000000000001252
46. Hox JJ. *Multilevel Analysis: Techniques and Applications: Second Edition*. Routledge Taylor & Francis Group; 2010:1–382.
47. Raudenbush SW, Bryk AS. *Hierarchical Linear Models: Applications and Data Analysis Methods*. Vol. 1. sage; 2002.
48. Wampold BE. *The Great Psychotherapy Debate: Models, Methods, and Findings*. Lawrence Erlbaum Associates, Inc; 2001.
49. Kraemer HC, Kupfer DJ. Size of treatment effects and their importance to clinical research and practice. *Biol Psychiatry*. 2006;59(11):990–996. doi:10.1016/j.biopsych.2005.09.014
50. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. *2nd* ed. Hillsdale, NJ: Lawrence Earlbam Associates; 1988.

51. Aquina C, Probst C, Hensley B, et al. High variability in nosocomial clostridium difficile infection rates among both surgeons and hospitals following colorectal resection. Conference Abstract. *Dis Colon Rectum*. 2015;58(5):e163. doi:10.1097/01.dcr.0000464773.42498.34
52. Aquina CT, Blumberg N, Probst CP, et al. Significant variation in blood transfusion practice persists following upper gi cancer resection. *J Gastrointest Surg*. 2015;19(11):1927–1937. doi:10.1007/s11605-015-2903-3
53. Aquina CT, Blumberg N, Probst CP, et al. Large variation in blood transfusion use after colorectal resection: a call to action. *Dis Colon Rectum*. 2016;59(5):411–418. doi:10.1097/dcr.0000000000000588
54. Aquina CT, Fleming FJ, Becerra AZ, et al. Explaining variation in ventral and inguinal hernia repair outcomes: a population-based analysis. *Surgery*. 2017;162(3):628–639. doi:10.1016/j.surg.2017.03.013
55. Arvidsson D, Berndsen FH, Larsson LG, et al. Randomized clinical trial comparing 5-year recurrence rate after laparoscopic versus Shouldice repair of primary inguinal hernia. *Br J Surg*. 2005;92(9):1085–1091. doi:10.1002/bjs.5137
56. Becerra AZ, Aquina CT, Berho M, et al. Surgeon-, pathologist-, and hospital-level variation in suboptimal lymph node examination after colectomy: compartmentalizing quality improvement strategies. *Surgery*. 2017;161(5):1299–1306. doi:10.1016/j.surg.2016.11.029
57. Begg CB, Riedel ER, Bach PB, et al. Variations in morbidity after radical prostatectomy. *N Eng J Med*. 2002;346(15):1138–1144. doi:10.1056/NEJMsa011788
58. Bianco FJ, Riedel ER, Begg CB, Kattan MW, Scardino PT. Variations among high volume surgeons in the rate of complications after radical prostatectomy: further evidence that technique matters. *J Urol*. 2005;173(6):2099–2103. doi:10.1097/01.ju.0000158163.21079.66
59. Bianco JFJ, Vickers AJ, Cronin AM, et al. Variations among experienced surgeons in cancer control after open radical prostatectomy. *J Urol*. 2010;183(3):977–983. doi:10.1016/j.juro.2009.11.015
60. Bolling SF, Li S, O'Brien SM, Brennan JM, Prager RL, Gammie JS. Predictors of mitral valve repair: clinical and surgeon factors. *Ann Thoracic Surgery*. 2010;90(6):1904–1911. doi:10.1016/j.athoracsur.2010.07.062
61. Bridgewater B, Grayson AD, Jackson M, et al. Surgeon specific mortality in adult cardiac surgery: comparison between crude and risk stratified data. *BMJ*. 2003;327(7405):13–17. doi:10.1136/bmj.327.7405.13
62. Bridgewater B. Mortality data in adult cardiac surgery for named surgeons: retrospective examination of prospectively collected data on coronary artery surgery and aortic valve replacement. *Br Med J*. 2005;330(7490):506–510. doi:10.1136/bmj.330.7490.506
63. Brown EC, Robicsek A, Billings LK, et al. Evaluating Primary Care Physician Performance in Diabetes Glucose Control. *Am J Med Qual*. 2016;31(5):392–399. doi:10.1177/1062860615585138
64. Burns EM, Bottle A, Aylin P, Darzi A, John Nicholls R, Faiz O. Variation in reoperation after colorectal surgery in England as an indicator of surgical performance: retrospective analysis of Hospital Episode Statistics. *BMJ*. 2011;343(7820):d4836. doi:10.1136/bmj.d4836
65. Cirillo F, Patrizio P, Baccini M, et al. The human factor: does the operator performing the embryo transfer significantly impact the cycle outcome? *Human Reproduction*. 2020;35(2):275–282. doi:10.1093/humrep/dez290
66. Cromwell D, Hilton P. Retrospective cohort study on patterns of care and outcomes of surgical treatment for lower urinary-genital tract fistula among English National Health Service hospitals between 2000 and 2009. *BJU Int*. 2013;111(4 B):E257–E262. doi:10.1111/j.1464-410X.2012.11483.x
67. Dagenais J, Bertolo R, Garisto J, et al. Variability in Partial Nephrectomy Outcomes: does Your Surgeon Matter? *Eur Urol*. 2019;75 (4):628–634. doi:10.1016/j.eururo.2018.10.046
68. Davenport MS, Khalatbari S, Keshavarzi N, et al. Differences in Outcomes Associated With Individual Radiologists for Emergency Department Patients With Headache Imaged With CT: a Retrospective Cohort Study of 25,596 Patients. *AJR Am J Roentgenol*. 2020:1–8. doi:10.2214/ajr.19.22189
69. Duclos A, Peix JL, Colin C, et al. Influence of experience on performance of individual surgeons in thyroid surgery: prospective cross sectional multicentre study. *BMJ*. 2012;344(7843):d8041. doi:10.1136/bmj.d8041
70. Eastham JA, Kattan MW, Riedel E, et al. Variations among individual surgeons in the rate of positive surgical margins in radical prostatectomy specimens. *J Urol*. 2003;170(6):I):2292–2295. doi:10.1097/01.ju.0000091100.83725.51
71. Eijkenaar F, van Vliet RC. Profiling individual physicians using administrative data from a single insurer: variance components, reliability, and implications for performance improvement efforts. *Med Care*. 2013;51(8):731–739. doi:10.1097/MLR.0b013e3182992bc1
72. Eklund AS, Montgomery AK, Rasmussen IC, Sandbue RP, Bergkvist LÅ, Rudberg CR. Low Recurrence Rate After Laparoscopic (TEP) and Open (Lichtenstein) Inguinal Hernia Repair: a Randomized, Multicenter Trial With 5-Year Follow-Up. *Ann Surg*. 2009;249(1):33–38. doi:10.1097/SLA.0b013e31819255d0
73. Faschinger C. Quality assessment of cataract surgery of the Department of Ophthalmology, Medical University of Graz. *Spektrum Augenheilkd*. 2011;25(3):215–219. doi:10.1007/s00717-011-0013-5
74. Fountain J, Gallagher J, Brown J. A practical approach to a multi-level analysis with a sparse binary outcome within a large surgical trial. *J Eval Clin Pract*. 2004;10(2):323–327. doi:10.1111/j.1365-2753.2003.00462.x
75. Glance LG, Dick A, Osler TM, Li Y, Mukamel DB. Impact of changing the statistical methodology on hospital and surgeon ranking: the case of the New York State cardiac surgery report card. *Med Care*. 2006;44(4):311–319. doi:10.1097/01.mlr.0000204106.64619.2a
76. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. *Mayo Clin Proc*. 2013;88(11):1250–1258. doi:10.1016/j.mayocp.2013.07.017
77. Grant SW, Grayson AD, Jackson M, et al. Does the choice of risk-adjustment model influence the outcome of surgeon-specific mortality analysis? A retrospective analysis of 14 637 patients under 31 surgeons. *Heart*. 2008;94(8):1044–1049. doi:10.1136/hrt.2006.110478
78. Hannan EL, Zhong Y, Jacobs AK, et al. Incomplete revascularization for percutaneous coronary interventions: variation among operators, and association with operator and hospital characteristics. *Am Heart J*. 2017;186:118–126. doi:10.1016/j.ahj.2017.01.015
79. Hermanek P. Impact of surgeon's technique on outcome after treatment of rectal carcinoma. *Dis Colon Rectum*. 1999;42(5):559–562. doi:10.1007/bf02234128
80. Hermann M, Alk G, Roka R, Glaser K, Freissmuth M. Laryngeal recurrent nerve injury in surgery for benign thyroid diseases: effect of nerve dissection and impact of individual surgeon in more than 27,000 nerves at risk. *Ann Surg*. 2002;235(2):261–268. doi:10.1097/00000658-200202000-00015
81. Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG. The unreliability of individual physician 'report cards' for assessing the costs and quality of care of a chronic disease. *J Am Med Assoc*. 1999;281(22):2098–2105. doi:10.1001/jama.281.22.2098

82. Hoffman RL, Kelz RR, Wirtalla CJ, et al. Variations in surgical outcomes: is it the residency program, the surgeon or the practice venue? Conference Abstract. *J Am Coll Surg*. 2017;225(4):S185.
83. Holmboe ES, Weng W, Arnold GK, et al. The comprehensive care project: measuring physician performance in ambulatory practice. *Health Serv Res*. 2010;45(6 Pt 2):1912–1933. doi:10.1111/j.1475-6773.2010.01160.x
84. Huesch MD. Can managed care plans reliably infer the quality of cardiac surgeons' outcomes? *Am J Manag Care*. *Dec*. 2009;15(12):890–896.
85. Hyder O, Dodson RM, Nathan H, et al. Influence of patient, physician, and hospital factors on 30-day readmission following pancreatoduodenectomy in the United States. *JAMA Surg*. 2013;148(12):1095–1102. doi:10.1001/jamasurg.2013.2509
86. Jemt T, Olsson M, Renouard F, Stenport V, Friberg B. Early Implant Failures Related to Individual Surgeons: an Analysis Covering 11,074 Operations Performed during 28 Years. *Clin Implant Dent Relat Res*. 2016;18(5):861–872. doi:10.1111/cid.12379
87. Johnston RL, Taylor H, Smith R, Sparrow JM. The Cataract National Dataset electronic multi-centre audit of 55,567 operations: variation in posterior capsule rupture rates between surgeons. *Eye*. 2010;24(5):888–893. doi:10.1038/eye.2009.195
88. Justiniano CF, Aquina CT, Fleming FJ, et al. Hospital and surgeon variation in positive circumferential resection margin among rectal cancer patients. *Am J Surg*. 2019;218(5):881–886. doi:10.1016/j.amjsurg.2019.02.029
89. Kaczmarski K, Wang P, Gilmore R, et al. Surgeon re-excision rates after breast-conserving surgery: a measure of low-value care. *J Am Coll Surg*. 2019;228(4):504–512.e2. doi:10.1016/j.jamcollsurg.2018.12.043
90. Kaplan SH, Griffith JL, Price LL, Pawlson LG, Greenfield S. Improving the reliability of physician performance assessment: identifying the "physician effect" on quality and creating composite measures. *Med Care*. 2009;47(4):378–387. doi:10.1097/MLR.0b013e31818dce07
91. Prasad-Kerlin MP, Epstein A, Kahn JM, et al. Physician-level variation in outcomes of mechanically ventilated patients. *Ann Am Thorac Soc*. 2018;15(3):371–379. doi:10.1513/AnnalsATS.201711-867OC
92. Kissenberth M, Thigpen C, Brooks J, Floyd S, Hawkins RJ, Tokish JM. Comparing surgeon performance of rotator cuff repair: risk adjustment toward a fair performance measure. *Arthroscopy J Arthroscopic Related Surgery*. 2018;34(12):e3. doi:10.1016/j.arthro.2018.10.022
93. Krein SL, Hofer TP, Kerr EA, Hayward RA. Whom should we profile? Examining diabetes care practice variation among primary care providers, provider groups, and health care facilities. *Health Serv Res*. 2002;37(5):1159–1180. doi:10.1111/1475-6773.01102
94. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors associated with reoperation in breast-conserving surgery for cancer: a prospective study of American society of breast surgeon members. *Ann Surg Oncol*. 2019;26(10):3321–3336. doi:10.1245/s10434-019-07547-w
95. LaPar DJ, Ailawadi G, Isbell JM, et al. Mitral valve repair rates correlate with surgeon and institutional experience. *J Thorac Cardiovasc Surg*. 2014;148(3):995–1003. doi:10.1016/j.jtcvs.2014.06.039
96. Likosky DS, Goldberg JB, DiScipio AW, et al. Variability in surgeons' perioperative practices may influence the incidence of low-output failure after coronary artery bypass grafting surgery. *Circ Cardiovasc Qual Outcomes*. 2012;5(5):638–644. doi:10.1161/circoutcomes.112.967091
97. Luan WP, Leroux TC, Olsen C, Robb D, Skinner JS, Richard P. Variation in bariatric surgery costs and complication rates in the military health system. *Mil Med*. 2019. doi:10.1093/milmed/usz454
98. Martin BI, Mirza SK, Franklin GM, Lurie JD, MacKenzie TA, Deyo RA. Hospital and surgeon variation in complications and repeat surgery following incident lumbar fusion for common degenerative diagnoses. *Health Serv Res*. 2013;48(1):1–25. doi:10.1111/j.1475-6773.2012.01434.x
99. McCahill LE, Single RM, Aiello Bowles EJ, et al. Variability in reexcision following breast conservation surgery. *JAMA*. 2012;307(5):467–475. doi:10.1001/jama.2012.43
100. Navar-Boggan AM, Boggan JC, Stafford JA, Muhlbaier LH, McCarver C, Peterson ED. Hypertension control among patients followed by cardiologists. *Circ Cardiovasc Qual Outcomes*. 2012;5(3):352–357. doi:10.1161/circoutcomes.111.963488
101. O'Connor PJ, Rush WA, Davidson G, et al. Variation in quality of diabetes care at the levels of patient, physician, and clinic. *Prev Chronic Dis*. 2008;5(1):A15.
102. Orueta JF, Garcia-Alvarez A, Grandes G, Nuno-Solinis R. The origin of variation in primary care process and outcome indicators: patients, professionals, centers, and health districts. *Medicine*. 2015;94(31):e1314. doi:10.1097/md.0000000000001314
103. Papachristofi O, Mackay JH, Powell SJ, Nashef SAM, Sharples L. Impact of the anesthesiologist and surgeon on cardiac surgical outcomes. *J Cardiothorac Vasc Anesth*. 2014;28(1):103–109. doi:10.1053/j.jvca.2013.07.004
104. Quinn CM, Bilimoria KY, Chung JW, Ko CY, Cohen ME, Stulberg JJ. Creating individual surgeon performance assessments in a statewide hospital surgical quality improvement collaborative. *J Am Coll Surg*. 2018;227(3):303–312.e3. doi:10.1016/j.jamcollsurg.2018.06.002
105. Rudmik L, Xu Y, Alt JA, et al. Evaluating surgeon-specific performance for endoscopic sinus surgery. *JAMA Otolaryngol Head Neck Surg*. 2017;143(9):891–898. doi:10.1001/jamaoto.2017.0752
106. Selby JV, Schmittdiel JA, Lee J, et al. Meaningful variation in performance: what does variation in quality tell us about improving quality? *Med Care*. 2010;48(2):133–139. doi:10.1097/MLR.0b013e3181c15a6e
107. Shih T, Cole AI, Al-Attar PM, et al. Reliability of surgeon-specific reporting of complications after colectomy. *Ann Surg*. 2015;261(5):920–925. doi:10.1097/sla.0000000000001032
108. Tuerk PW, Mueller M, Egede LE. Estimating physician effects on glycemic control in the treatment of diabetes. *Diabetes Care*. 2008;31(5):869–873. doi:10.2337/dc07-1662
109. Udyavar R, Cornwell EE, Havens JM, et al. Surgeon-driven variability in emergency general surgery outcomes: does it matter who is on call? *Surgery*. 2018;164(5):1109–1116. doi:10.1016/j.surg.2018.07.008
110. Udyavar NR, Salim A, Havens JM, et al. The impact of individual physicians on outcomes after trauma: is it the system or the surgeon? *J Surg Res*. 2018;229:51–57. doi:10.1016/j.jss.2018.02.051
111. Udyavar NR, Salim A, Cornwell EE, et al. Racial differences in complication risk following emergency general surgery: who your surgeon is may matter. *J Surg Res*. 2019;235:424–431. doi:10.1016/j.jss.2018.05.086
112. Verma AA, Guo Y, Jung HY, et al. Physician-level variation in clinical outcomes and resource use in inpatient general internal medicine: an observational study. *BMJ Qual Saf*. 2020. doi:10.1136/bmjqs-2019-010425
113. Xu T, Makary MA, Al Kazzi E, Zhou M, Pawlik TM, Hutfless SM. Surgeon-level variation in postoperative complications. *J Gastrointest Surg*. 2016;20(7):1393–1399. doi:10.1007/s11605-016-3139-6

114. Xu T, Mehta A, Park A, Makary MA, Price DW. Association Between Board Certification, Maintenance of Certification, and Surgical Complications in the United States. *Am J Med Qual*. 2019;34(6):545–552. doi:10.1177/1062860618822752
115. Ukoumunne OC. A comparison of confidence interval methods for the intraclass correlation coefficient in cluster randomized trials. *Stat Med*. 2002;21(24):3757–3774. doi:10.1002/sim.1330
116. Carpenter J, Bithell J. Bootstrap confidence intervals: when, which, what? A practical guide for medical statisticians. *Stat Med*. 2000;19 (9):1141–1164. doi:10.1002/(SICI)1097-0258(20000515)19:9<1141::
117. KI Shine. *Percutaneous Coronary Interventions (PCI) in New York State 2002-2004*. New York State Department of Health; 2006.

CHAPTER 4:

QUALITATIVE REVIEW AND PROTOCOL PAPER (STUDY 4)

Study 4: *Exceptional doctors exist but may not always be appreciated by their peers. Qualitative study of medical doctors on their experiences and opinions of the characteristics of exceptionally good doctors.*
https://doi.org/10.2147/AMEP.S370980
The protocol paper is in Appendix 1.

4.1 SUMMARY

The two systematic reviews covered in this thesis identified a number of doctors who had patients with substantially superior physical health outcomes,[46-55] which made the doctors outliers. None of the papers that identified positive outliers made recommendations for further research on those positive outliers.

This section explores another simple question with little or no existing research: What makes an exceptionally good doctor and what is it like meeting such a doctor? We have established that one way to identify exceptionally good doctors is by their patients' physical health outcomes, however, that requires an analysis of large cohort studies. In many cases this information is not available and, in even more cases, where the data is available, the positive outliers cannot be personally identified as the data is anonymised. The next logical question is, are there other ways to identify exceptionally good doctors?

The hypothesis for this section is that medical professionals may be a good source for identifying exceptionally good doctors. Medical doctors often work and interact with one another, refer patients to each other and may receive feedback from those patients, they are trained by other doctors, are at times knowledgeable patients themselves, or have family and friends who are patients, or report to other doctors, or have other doctors reporting to them. In other words, many medical doctors know a substantial number of other doctors and know them well enough to form an opinion of their ability.

To find out whether there are other characteristics that make an exceptionally good doctor and what those other characteristics are, we designed and conducted a qualitative study consisting of interviews with medical doctors. Drawing on the literature, we decided to adopt Braun and Clarke's thematic analysis approach as it had the benefit of allowing me to do the research with few pre-conceptions, unlike other qualitative frameworks that investigate research subjects within a particular intellectual framework.

The 13 interviews of medical doctors produced a large number of interesting quotes and a substantial level of consensus among the interviewees, despite the deliberate lack of prompting from the interviewer. All 13 of the doctors interviewed had met exceptionally good doctors, held them in high regard and had learnt a lot from them. All 13 doctors had clear ideas of what made an exceptionally good doctor, ideas that

shared substantial similarities across all interviews. In other words, the doctors were familiar with the concept of an exceptionally good peer and could describe this concept in detail.

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ORIGINAL RESEARCH

Qualitative Study of Medical Doctors on Their Experiences and Opinions of the Characteristics of Exceptionally Good Doctors

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Background: It is generally accepted that there is a therapist effect in psychotherapy, with master therapists being studied using qualitative methods. There are surgeons with exceptionally positive patients' physical health outcomes, and qualitative research on what makes good doctors. However, characteristics of exceptionally good doctors are less studied and understood.

Objective: To qualitatively study the opinions of physicians on exceptionally good doctors.

Methods: Thirteen semi-structured interviews of English-speaking medical doctors of any specialty were conducted. Recruitment was achieved through the authors' network; contacting authors of relevant research papers; and Bond University's General Practitioner recruitment program. Their opinion was sought on what makes an exceptionally good doctor, whether they have met such a person, what was their experience of that person, and whether they consider themselves as exceptionally good doctors.

Analysis: A six-phase thematic analysis in an experiential framework, as per Braun and Clarke, was implemented to identify themes and their details in an inductive approach with a realist epistemological position, ie, assuming truthful knowledge on what makes exceptionally good doctors can be obtained.

Results: Each interviewee had met and been inspired by exceptionally good doctors. Descriptions covered six themes: character traits; other characteristics; patient relationships; peer and health care system relations; education; and treatment examples. Exceptionally good doctors were found to have up-to-date extensive medical knowledge and skills, relate well with patients, and have excellent diagnostic abilities. They tend to be humble, approachable, inspiring, and are long-remembered role models. However, they may not always be appreciated by their peers and their health care system because of their exceptional abilities.

Discussion and Conclusion: Exceptional doctors are beneficial for their peers, their patients, and their health care system. Identifying, acknowledging, and making such doctors more accessible to medical students and junior doctors could have a positive impact on medical practice.

Keywords: qualitative study, thematic analysis, doctors' performance

Plain Language Summary

Given there are billions of doctor-patient interactions every year, it could be impactful to study whether some doctors are exceptionally good and if so, why they are exceptionally good. However, to date, there has been little research on this topic. Previous research has reported that good doctors deal well with people, are competent, and ethical. This study report outlines the results of interviews with medical doctors on their opinions of what makes an exceptionally good doctor. Analysis of their responses suggest exceptionally good doctors have up-to-date extensive medical knowledge and skills, relate well with patients and are excellent at diagnosing diseases and conditions. They are humble, approachable, inspiring, and are long-remembered role models for other doctors. However, they may not always be appreciated by their peers and their health care system. Exceptional doctors, if they can be identified, could be a potentially important resource in terms of mentoring junior doctors.

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Background

In 2018, there were over 800 million visits to doctors of medicine in the United States,[1] and in the countries that are part of the Organization for Economic Co-operation and Development (OECD), the annual number of doctor visits per capita ranged from 2.3 in Mexico to 17.2 in South Korea. It has been reported that the most frequently used "drug" in general practice is the doctor himself.[2,3] Taking such billions of medical doctor visits each year into consideration, there is a surprisingly limited amount of research on what makes a good doctor, and much less on exceptionally good doctors, or even whether a doctor, on his or her own, makes a difference in patients' physical health after all known factors are accounted for.

In 2002, the British Medical Journal (BMJ) due to popular demand[4] published a special edition titled "What's a good doctor and how do you make one?" with the lead article written by Hurwitz and Vass,[4] summarizing the confusion on the issue as "The varieties of good, poor, and bad doctors are diverse and may sometimes coexist in the same individual", and an unnamed editor, considering the articles published in that volume, suggested that defining a good doctor is impossible.[5]

In the same edition, two senior administrators of medical schools, McCrorie and Cumming, were optimistic that they can train medical students to be good doctors; however, they did not define such doctors in any detail beyond requiring clinical and interpersonal abilities,[6,7] while Pringle et al[8] in the same issue argued that the public and managers need to know which are the good doctors so they can protect themselves from the bad ones. They also reported that data on effectiveness, safety, acceptability, and efficiency can identify good doctors better than the anecdotal approach, and provided 12 attributes of quality measures, in addition to the benefits and dangers of using them; however, such data only enables one to measure aspects of performance. The citation gap for Balint's 1955 paper[2] of 86 Scopus[9] but 4800 Google Scholar citations suggests that doctors' performance may be more important to the general public than researchers. Jeremy Holmes[10] has described the good doctors as the ones who can bring their good and bad parts together to be good enough doctors, for which they should be content, whereas Paice et al[11] stated that "excellent role models will always inspire, teach by example, and excite admiration and emulation." Still, this does not add to the evidence about what a good doctor is, since they also stated that "being a role model is serendipitous; there is no training program, appointment panel, or certificate".

More recently, it has been recognized that doctors can at least be described in terms of patients' physical health outcomes, which subsequently represents some of the doctors as positive outliers, ie, they have substantially better patient health outcomes than the average doctor, even after accounting for all known variables such as patient's and doctor's demographics, hospital factors, or patient risk.[12–21] In other words, there are exceptionally good doctors in terms of patient outcomes.

However, there may be other characteristics or criteria for exceptionally good doctors besides patient outcomes. This was investigated by Steiner-Hofbauer et al[22] who performed a systematic review of stakeholders' opinions on what makes a good doctor, adding interpersonal skills, ethics, medical management, teaching, and research to medical skills. In their systematic review, there were 6 studies on what makes a good doctor from the peers' perspective (other medical doctors), but none that addressed exceptionally good doctors.

Herzig et al[23] analyzed a set of 83 general interviews called "life pictures" ("Lebensbilder"), published in the German medical weekly journal (DMW), of doctors who, in the majority, were in academic leadership positions. Each doctor was asked "When is a doctor a good doctor?". The responses were assigned into nine categories, from which, the most common responses were having sufficient knowledge and empathy, though these attributes were only mentioned by 23% and 21% participants, respectively. Other related characteristics such as sufficient practical ability and caring for patients were mentioned by 9% and 12% participants. Except for life-long learning (10%), no other characteristics had a double-digit percentage, showing that there was little agreement among participants.

Lambe and Bristow,[24] in a Delphi survey of 10 clinicians, asked participants to rank, in three rounds, 20 characteristics of good doctors on a 5-point Likert scale. The 10 most important were: patient care; probity; communication and listening skills; recognizing own and others' limits; empathy and being non-judgmental; adaptability; lifelong improvement; compassion; commitment and motivation; and being a team player. However, the study is limited by having only 9 males and one

female participant, and by the participants' inability to add or modify any of the proposed characteristics. Yazdi et al[25] conducted a qualitative study asking patients open-ended questions about a "good physician", from which they obtained a similar list of characteristics but with the addition of the physician's appearance, grooming and personal characteristics. Such responses were then used to construct a questionnaire for 150 Iranian physicians, of which 100 responded, who largely agreed with the patients' point of view, except that they put a much lower value on appearance and personal characteristics. Fones et al[26] compiled a list of characteristics of a good doctor from a Medline search and three focus groups, then developed Likert questions for a survey of 274 doctors and 400 members of the public in Singapore. Good general agreement in ranking the characteristics between doctors and members of the public was achieved, with the public rating cognitive qualities and communication abilities more highly, while doctors rating ethics more highly.

Schenck and Churchill[27,44] interviewed 40 doctors, and 10 complementary and alternative practitioners, for a book on how to become an "expert healer", summarized as: 1) do the little things, ie, good manners; 2) take time and listen; 3) be open (be vulnerable, brave, face the pain, observant); 4) find something to like, to love about the patient; 5) remove barriers, ie, practise humility; 6) let the patient explain; 7) share authority; and 8) be committed and trustworthy. There was no mention of medical, organizational, or other competences. Apart from Schenck and Churchill's work, there is little research on the relationship between medical doctors and healing. However, there are systematic reviews and meta-analyses exploring the relationship between medical doctors and patients' physical or mental health outcomes.[29–32]

Summarizing, the editor of the BMJ reflected in 2002 that defining what a good doctor could be is nearly impossible. And after twenty years, there is still limited research approaching this subject. In terms of quantitative measures, previous systematic reviews and meta-analyses indicate that patients' physical health outcomes and other performance indicators can be used to determine good doctors and exceptionally good doctors. However, looking from a qualitative approach, previous literature can be divided into reported qualities by patients, other health care workers, and medical doctors (peers). For the context of this study, the following qualities encompass what other medical doctors have considered that a "good doctor" should have, based on the reviewed literature:

1. Personal characteristics (empathy, manners, be open, non-judgmental, compassion, adaptability, motivation, humility, team player).
2. Good physician-patient relationships and caring for patients as people.
3. Communication and listening abilities (taking time for listening, letting the patient explain).
4. Medical competence and knowledge in diagnosis and interventions to apply.
5. Ethics.
6. Life-long learning (continuous education, research).
7. Ability to liaise with others in the treatment of their patients, ie, management capability.

The qualitative characteristics of a good doctor were heterogeneous, particularly in how each author labelled them, though there were similarities. For example, Steiner-Hofbauer et al,[22] used the term "Medical competence", which may have similar meanings to what Herzig et al,[23] named "sufficient knowledge and sufficient practical ability", and Fones et al[26] "cognitive domain." While empathy[23,24] could be part of the "general interpersonal qualities",[22] "physician-patient relationship",[25] or refer to "find something to like, to love about the patient."[27]

The Present Study

The authors of this study have previously systematically reviewed studies reporting doctors' effects on patients' physical health outcomes beyond those explained by known factors such as doctor experience.[33,47,48] Results showed there are doctors that have exceptional patient outcomes that are not explained by known factors, suggesting exceptional doctors exist. The aim of the present study is to qualitatively study the opinions of medical doctors on their experiences of exceptional doctors and what made these doctors exceptionally good.

Methods and Study Design

Study Design

The present study design is a qualitative approach involving an in-depth, exploratory data collection and thematic analysis. We conducted semi-structured interviews with medical doctors that spoke English. The study design is further explained in detail in the published protocol.[34]

Each of the interviewees was asked three questions:

- What, in your opinion, makes an exceptionally good doctor?
- Do you have an experience with such a doctor, and how was that experience?
- Do you consider yourself to be an exceptionally good doctor?

The interviewer summarized at times during the interviews what had been said and asked the interviewee whether the summary was accurate, in addition to asking for more details to answers already given, if further clarification was needed. All interviews took place via zoom,[35] by distance, apart from one case where the interviewer and interviewee were in the same room. Zoom was used for recording in the single same-room interview due to its integration with otter.ai,[36] which was used for live transcription, from which the transcript was then revised and edited by a transcription typist, according to the saved audio recording. For accuracy, the interviewer re-reviewed the transcripts for any errors. NVivo software[37] was used to mark up the transcripts with codes that later were used to identify themes, as per the procedures outlined for thematic analysis. The interviewees received a copy of their transcript and were offered to freely edit it.

Participants and Recruitment

The participant inclusion criteria were medical doctors of any specialty, currently working in the public or private sectors, who speak English. Participants were recruited through professional acquaintances of the authors, contacting 216 authors of relevant research papers, and the GP recruitment program of the Institute of Evidence-based Healthcare of Bond University.

The sample size was determined by data saturation[38] which was achieved with 10 interviews, with the next three interviewees confirming and repeating concepts and characteristics of exceptionally good doctors that were already introduced by earlier interviewees. The sample size was also guided by the concept of information power[39] which indicates that when the aim of the study is broad, as in our case, the selection of participants should be specific, to help keeping the information relevant for the actual study topic.

Taking into consideration that the participants are medical doctors who had an opinion and experience of exceptionally good doctors, the quality of the dialogue was expected to be high. In addition, the interviewer was experienced, and the analysis strategy required sufficient variation among the answers. Thereby, the estimate of interviewees needed was 10–25 doctors, with saturation expected once no new themes were introduced in three successive interviews, which was the case after 13 interviews.

As there is no established theory on what makes an exceptionally good doctor or what their impact is, this study also has a strong exploratory element.[39]

Bias

According to Braun and Clarke, “Bias as a concept does not apply as a valid critique of qualitative research”[40] as the researchers’ personal history, assumptions and perspectives do affect the research, making it subjective. This subjectivity, according to Braun and Clarke, is seen as a strength by most qualitative researchers. However, to reduce bias, the interviews were done by a non-clinician (CS) who is experienced in interviews as a part of his profession as a financial adviser. CS limited his interviewing to only asking what the interviewees’ opinions and experiences of exceptionally good doctors are, whether the interviewee considers him or herself to be an exceptionally good doctor, and to summarize points or ask for clarification or expansion of anything unclear.

Analysis

The analytical approach used consisted of thematic analysis as an experiential framework, inspired by Braun and Clarke,[40–42] described in detail in the published protocol.[34]

To summarize, this is a qualitative study of semi-structured interviews that seeks to understand doctors' thinking and experiences of exceptionally good doctors. The approach is inductive without a prior coding frame or the authors' "analytical preconceptions".[43] From the transcript, a number of themes emerged, together with relevant quotations from the interviews in an inductive process using a realist epistemological perspective, a perspective which assumes that truthful knowledge about exceptionally good doctors can be obtained.

Results

Thirteen medical doctors were eligible and consented to be interviewed and have their anonymized responses published. Six were recruited through professional acquaintances of the authors, three (out of 216 contacted) were authors of relevant research papers, and four were from the GP recruitment program of the Institute of Evidence-based Healthcare of Bond University. Five of the 13 participants were females; age groups ranged from the 30s to the 80s.

Four doctors were primary care specialists, four were other specialists, three served as primary care specialists and medical researchers, one was a specialist and medical researcher, and one was a clinician and medical educator. Eight interviewed doctors have practiced in Australia, two in the US and UK, and one each in Egypt, The Netherlands and South Africa. Seven considered themselves as exceptionally good doctors, while the other six did not. All interviewed doctors have practiced as clinicians and, except for three, are still currently practicing. Demographic details are provided in Table 1.

A very commonly expressed opinion, explicitly mentioned by 11 of the 13 interviewees, was that it takes multiple traits to be an exceptionally good doctor, most importantly to have both in-depth medical knowledge and the ability to communicate with patients. This requirement was expressed in different ways, with the common thread being that you cannot be an exceptionally good doctor unless you have excellent medical knowledge, ability, and understanding, however, this needs to be accompanied by the ability to speak and listen to the patient so that they feel taken care of and looked after. Some interviewees mentioned an exception to those dual requirements, with regards to surgeons with very outstanding surgical skills but not necessarily great communication skills. Otherwise, the consensus was that it takes multiple skills to be an exceptionally good doctor.

We generated six themes from the transcribed data (Table 2):

1. Character traits, ie, what type of personality do exceptionally good doctors have?
2. Characteristics other than character traits: how do exceptionally good doctors act?
3. Patients, how do exceptionally good doctors treat patients and do their outcomes differ?
4. Their relationships with their peers and the health care system they work in.
5. Education and exceptionally good doctors.
6. Treatment examples of exceptionally good doctors.

Table 2 "Themes and Illustrative Quotes of 'What makes an exceptionally good doctor?" is also a table of thematic analysis.

Character Traits

All the respondents mentioned character traits of exceptionally good doctors by painting a picture of a humble person who is a good communicator, adaptable, personable, with self-awareness and honesty. Three doctors each also mentioned confidence, being incorruptible, having integrity, being open minded, and having will, and drive or determination.

Nine of the doctors mentioned humility, which manifested itself in many ways, eg, "they don't have ownership over that particular diagnosis" (Doctor 1), or an exchange reported by a GP (Doctor 2) where a cardiologist treated him as an

Table 1 Descriptive Details of Interviewees

ID	Sex	Age	Specialty	Practicing Clinician	Country	EGD? *	Years of Service	Work
1	F	30–39	GP	Full time	Australia	No	5+	Private practice
2	M	60–69	GP	Full time	Australia	Yes	30+	Private practice
3	M	60–69	Neurologist	Recently stopped, administrator only	US	Yes	30+	Hospital
4	M	60–69	Cardiac surgeon, researcher	Full time	UK	Yes	30+	Hospital
5	M	80–89	Internal medicine specialist	Part time	US	Yes	50+	Primary care
6	M	60–69	GP, researcher	Researcher, part time clinician	Australia	No	30+	Primary care
7	M	50–59	Pulmonary specialist	Full time	Australia	Yes	30+	Private practice
8	F	50–59	GP	Full time	Australia	Yes	20+	Institution
9	F	40–49	GP, researcher	Researcher, part time clinician	Australia	No	15+	Primary care
10	F	60–69	Hematologist	Full time	Australia	No	30+	Public hospital
11	M	30–39	GP, researcher	Full time researcher, previously full time GP	Egypt	No	3	Primary care, Hospital
12	M	60–69	GP	Retired	UK, Netherlands	Yes	30+	Private practice
13	F	40–49	Clinician	Medical Educator, part time clinician	Australia, South Africa	No	20+	Hospital

Note: *EGD: Does the interviewee consider him or herself to be an exceptionally good doctor?

equal. Similarly, Doctor 6 stated: "So they're basically perfectly ready to be wrong multiple times with a patient until everything actually fits" and "they are happy to be wrong".

Humility was also quoted in ways beyond patient diagnostics, in terms of how they relate to their colleagues, as Doctor 7 relates:

> F. (…), for example, was a head of a major hospital in Hong Kong and US. But you know what; when you chat to him, he's like a next-door neighbor, a brother. And he was amazingly humble - although super qualified. And the other two were the same. Super qualified, father of medicine, father of respiratory medicine, but you can have a barbecue with him … and say, 'Paul, Doctor 7, Tom' - by first name basis. I mean, where do you find that? Amazing, isn't it?

Another aspect of humility, as per Doctor 10, is of these doctors doing things "Where they are outside of their comfort zone", as she stated: "So that they are experiencing what it's like to not be the best" and proceeded

> the ability to see the humanity in another person no matter how broken or scarred that humanity may look and recognize that I am no better. … So, I have no right to judge that person or to put them down.

Such humility reflects the description of Schenck and Churchill,[27,44] though none of the interviewees mentioned any religious aspect to that humility but considered it more of a trait rather than something to "practice". The only other report we have found regarding humility was in a qualitative study of medical students on the "good doctor".[45]

Congruent with previous qualitative studies, eight interviewees mentioned that being a good communicator is necessary.

In terms of being adaptable, Doctor 4 reports:

> But, more important than all of the technical aspects is the ability to make good decisions. So, I think that is much more important in order to make a good surgeon that gets good outcomes for their patients than technical skills.

Table 2 Themes and Illustrative Quotes of "What Makes an Exceptionally Good Doctor?"

Theme	Illustrative Quotes
Character traits	● …the surgeons who produce the best outcomes are not the typical surgeon personality. Not the typical, outgoing, forceful, confident ones, it tends to be the quiet mice, the ones that are a little bit, those who self-examine, who are introverted. They get better outcomes than the typical surgeons. [Doctor 4] ● now when that happens, the operation has moved from a straightforward elective planned, carefully executed procedure to absolute life-saving disaster area, you know, where you have to salvage the patient. And how people deal with that is very, very interesting. I have done quite a lot of study of this. And it's fascinating how some people deal better with the process of decision making that needs to be done, and get the patient out and others panic and fall apart. [Doctor 4] ● …the ability of the physician or medical practitioner to establish a meaningful connection with the patient is really important. … that means that, I guess they respect each other, they trust each other. They - you know, value each other's kind of input. [Doctor 10] ● so, if you have humility, and empathy and you have shown that you are open to correction, people are more likely to speak up and to question - including the patients. [Doctor 9]
Characteristics (other than character)	● [w]illing to try to seek the best outcomes for not only their patients but the system in which they work. So, I think they need to care about the next generation, so be prepared to spend time with students and - and to think that that's part of what they do, to be interested in research and participate in research. [Doctor 6] ● we choose doctors of the highest level, to be on our committees, through a vetting process. … if you listened in to any of those meetings, you would see how engaged and how careful these doctors are to make sure that … the worker will have a good outcome, not a bad outcome. (…) there's also the fact that your hair is on fire to solve a certain problem. [Doctor 3]
Patients	● …that means genuinely having the interest of their patients at heart. So, but doing the best that you can for the patient is not enough. You also have to make sure that the best that you can do for the patient is the best it can be. [Doctor 4] ● [h]e was famous. … his humanity was a very big part of it. He had very clear values about patient care and about - that it should always be exceptional quality but also very personal and - people's - The suffering that they are experiencing, and that experience needed to be paid attention to. And he somehow always seemed to have time for people. [Doctor 6] ● I found while I am practicing [in Egypt] - few - I mean, I cannot say the majority but lots of people are not able – are not able to communicate with their patients in a clear, informative way and the patients would come out just doing what they were told to in a paternalistic way, compared to the exceptionally good ones who were able to actually inform their patients, have a nice chat, acknowledge their values and then provide them with the best available evidence. … So they do not listen. They just diagnose - and they are very good doctors, but they are not exceptional. They just try the diagnosis, treatment, which works - but yeah … [Doctor 11]
Relationships with peers and the health care system	● [w]e are asked to - defend is not the right term, to state the evidence behind the treatment that you offer. And the regulatory body understands the quality of your care. They do actually, even in our practice, they understand what the quality is, what your standard is, what you are exceptional in. And often, restriction is imposed upon because it's not a norm that a lot of people do - exceptionality stands out amongst the mainstream. [Doctor 7] ● … so, all these exceptionally good doctors are communicating with their computer and in their own mind with the legal department, making sure that they are not making any mistakes and yeah, the patient is becoming more like an add on. [Doctor 12]
Education	● I found that whenever I was thinking about how I would do things; I would actually think about how would he do things? [Doctor 9]

(*Continued*)

Table 2 (Continued).

Theme	Illustrative Quotes
Treatment examples	• I said - Professor, how do you know so much and get the diagnosis so astutely correct each time? I asked him. And he said - he looked in my eyes and said - observe me for the next three years. … They actually spent time - listened. They did not even interrupt for the first 10 minutes. They listened. They observe their movements. They clocked everything between the spoken words. They are reading their body languages, they are reading the emotions, they are reading - basically imprints I call it, of their life - what's written and not written through the body actually. And F. was brilliant at it. He was amazing at gallbladder surgery and gut surgery, taking out cancers and stuff. But when he felt with his hand, he was feeling on these hands, the movement of the whole organ - The pathology, and he said to me – Doctor 7, can you feel the tissue there? That's a knot. And I felt it, – I cannot feel any. He said, feel deeply. Oh, yeah. So, it's a realization that they listen. [Doctor 7] • "So, during an operation, probably a surgeon makes about between 500 and 1000 micro decisions, you know really, really small things. Does a stitch go there or is there as good? A millimeter to one side? and do I pull on this this tight or that tight? or all of these things are happening all the time and some people make these micro decisions much better than others", [Doctor 4]

An example of adaptability, humility, listening to the patient and thoroughness is given by Doctor 7:

> Every patient, every person, every being is different. Every person has a different reading. So how can you be generalized into a sample or whatever, a random whatever. So that makes exceptional physicians more humble because you can't let go - be complacent. … I got books everywhere. … But when I'm with a patient, I'm totally dedicated to listening - by listening I don't know - something comes up, an impress is given, the whole package of treatment comes through - more and more than ever before. And that's what [three famous and exceptionally good doctors] did all the time.

Finally, Doctor 9 argued on the effects of the personality of exceptional doctors:

> [I]t's actually the doctors that do get listened to are the ones who shout the loudest and complain the most, not necessarily - which is almost the opposite of what we've been discussing. You know, the importance of humility and patience and almost by definition, an exceptional doctor is not going to be pushy and demanding and insist on change the way that they want it because that's not really within their - their personality or this - The way that they've developed their skill sets.

Characteristics Other Than Character Traits

All respondents mentioned characteristics with regard to how exceptionally good doctors act. The most mentioned was having up-to-date and in-depth knowledge, the ability to understand evidence, and the commitment to good medical practice. Further characteristics were the ability to minimize errors and, if necessary, go beyond the guidelines. Six of the doctors mentioned time management and being able to network, ie, build good personal and professional relationships. Five mentioned the ability to not over-diagnose, over-prescribe, or to use drugs and medicines as a last resort. Four participants have experienced exceptionally good doctors as being excellent teachers; excellent diagnosticians; doctors with excellent technical skills; such doctors not being defined by their work; and having patience with people. In addition, wisdom, charitable or volunteer work, compassion, and perfectionism were independently mentioned three times. These characteristics are consistent with studies cited earlier,[24,27,44] however, the interviewees in this study have provided further details.

With regard to commitment to good medical practice, Doctor 1 spoke about going beyond the individual

> But the bigger picture focus as well, I think, also support some doctors to have that focus because they really care about, you know - Yeah, people on a broader scale.

In addition, Doctor 3 considered that a commitment to good medicine takes resilience:

> They're able to recognize the perverse incentives in the system in the health system they work in among his colleagues, among the doctors, he's referring patients to, the drug and device companies which are out there constantly. The drug companies are sending drug reps into their offices all the time. You have to be able to recognize all this stuff and basically say, that's not good medicine. I'm not going to do that.

Patients

Exceptionally good doctors relate well with patients and work on those relationships; care for patients and respect them; see them as a whole person, not just a lesion, illness, or collection of symptoms; ask patients to do their part; know them well and comprehensively assess and investigate them. All these items were mentioned by at least eight out of the 13 interviewed doctors. Moreover, seven mentioned doctors being good listeners, trusted by their patients, and giving patients sufficient time irrespective of the time pressure on the doctors. Empathy was mentioned by four doctors.

Caring was described by Doctor 1:

> it was really the baseline for this particular doctor to really delve into everything to see where there might be some sort of nook or cranny where there could be pathology coming from or, you know, some way to support the person.

Furthermore, Doctor 5 explained caring in the form of the doctors who make themselves available:

> a good doctor, an exceptional doctor will say, you know, I'm a busy person. But here's my number. Here's my card. Here's my email. Here's my text. … So, get in touch with me if you need to. Not many doctors are like that.

Doctor 1 had received feedback from multiple patients about exceptional colleagues who described their caring:

> [P]eople have really raved about them. So, they've sort of experiences - and one of them [exceptionally good doctors] I think, she allows people a lot of time to sort of, you know, do what they need to do and provides really good follow up of care as well. I think that might sometimes be to her detriment, but, you know, for her patients, that's, that's, you know, everything.

Doctor 6, considered a wider view of care:

> You might be an exceptionally talented technician, but you won't be an exceptional doctor unless you can translate that into the way you practice medicine, and in the way you show care for your patients and the way you are - also interact with your colleagues and with other staff.

Doctor 13 described caring in the same way but worded it slightly differently " … it was more than just doing her job. She had sensitivity and a skill that I think was pretty, you know, unusual and exceptional". Doctor 9 also agreed with the other interviewed doctors:

> [T]he most exceptional doctors that I have seen are doctors who genuinely appreciate and listen to their patients in a humble way that validates the patient's perspective.

Relationships with Peers and the Health Care System

Here the differences between doctors that range from acceptable or good to exceptionally good are most pronounced. Those who spoke about their experiences or the experiences of exceptional doctors that they observed, reported that exceptionally good doctors can be celebrated and supported but just as likely are being attacked by their peers and by the health care system in which they work, with little difference to how the poorest doctors are treated. Doctor 7 provides several points on this theme: "[Y]ou don't really accept yourself as an exceptional physician until there's enough collegial support", and

> When you keep getting constantly attacked and complained about, as one of my colleagues said to me - a surgeon, top surgeon - retired - while saying you must be doing okay, because I had the same thing, and we're doing amazing work and they keep

> going after you, because really - when you're at the forefront of medicine, or science or whatever, you brush off a lot of jealousy and comparison - all that. And so, when you're leading forefront, you attract attention, that's the way it is.

Doctor 7′s message in a further quote (Table 2) is both hopeful and sobering in that regulatory bodies do know when a doctor is exceptionally good but may impose restrictions anyway because the doctor is different from the standard. Doctor 8 talking about a colleague described the exceptional as "he was very courageous in this kind of world of medical legal fear". Doctor 9 contrasts private and public practice:

> "So as a general practitioner, if you are exceptional - because we are private practitioners, you're going to do well because it's essentially like having an exceptional business. … So, it will mean that you have no problems having or sourcing patients", versus

> [W]hen it comes to then working within a system like the public healthcare system, I think that I have seen exceptional doctors really struggle there and interesting that you point that out, because I think what I have seen is that bureaucracy kind of leans towards mediocrity. … And exceptional doctors are not always necessarily appreciated by their peers either because they can show what can be done. So, depending on how ambitious their peers are - as their peers, rather than seeing them as a mentor, see them as a threat. I have certainly seen doctors undermine the exceptional amongst them because they feel they don't want to be shown up. That's within the public health system.

In contrast, Doctor 12 (Table 2) and Doctor 2, respectively, have a bleak view, and a significant concern:

> Yeah, I think most of the angst in my life comes from those two things. The risk of litigation because I work outside the current prevailing paradigm, as flawed as it is and two, Medicare looks at algorithms. Medicare, persecutes the very bad and the very good … Once Medicare highlights you as being a problem, when you go to the tribunal, no matter how much evidence you've put in to the contrary, no one's won.

Education and Exceptionally Good Doctors

Only one of the previously published qualitative studies considered education in the context of good doctors[44] advocating teaching interpersonal skills to improve the healing ability of practitioners, while the editors of the BMJ special edition on what makes a good doctor[4–8,10,11] were aware that doctors could be trained to a certain, unspecified standard but did not expect to do better than that.

Doctor 7 was very clear about the importance of education:

> So, the thing about exceptional doctors is that the exceptional doctors are trained by exceptional teachers, who are also doctors and teachers, … for example, in my case, I was mentored by three exceptional professors of medicine and surgery, and they were renowned … So, you will find that exceptional physicians actually have this lineage of exceptionality of teachers who are also equally exceptional. There are exceptions of course, there are people who come out of nowhere, become exceptional, but they're uncommon. Because to be exceptional, you need a role model, you need reflection, you need inspiration.

Doctor 5 similarly reported: "Why shouldn't exceptional doctors, the experts on being exceptional, why shouldn't they share their expertise?".

Treatment Examples

The interviewees provided more than 50 quotes on examples of exceptionally good doctors in action. It seems that there is a strong offer of learning from such doctors when another doctor observes an exceptionally good doctor in action.

Doctor 3 commented on medication prescribing:

> So, if you're, if you have somebody on opioids, or a potentially dangerous drug, do you track their pain and function to see if they're getting better, or not getting better from using those medications or documenting any improvement in function and not just using them you know, to feel better? … [T]hey use other best practices like they stay away from more dangerous practices like high opioid doses. You know, they much more carefully use potentially dangerous substances. … they could also be characterized by what they don't do.

Doctor 4 gives a treatment example at the bottom of Table 2 on the difference between surgeons in the quality of their work stated, and speaks about responding to patients, coupled with humility:

> [Surgery] patients will have been extremely anxious and very jumpy and threatening to go out of the hospital and not wanting to be treated. All I need to do is to speak to them for two minutes. And I can see the reassurance in that my voice carries gravitas, but that doesn't necessarily mean that I have gravitas.

Doctor 6 described a truly exceptional surgeon:

> [T]here was a surgeon there, who came from Africa … He was so fast and so little bleeding - so accurate, he made it all just easy. Like - how is he doing this, it's like magic – and I think he just had so much experience cause he had been a surgeon for this hospital, he did orthopedics, he did neurosurgery, he did - while he was in Africa, he even did obstetrics. He just did all the surgery for this hospital. For whatever thousand population. And so just the degree of surgical experience he had was vast, a lot more than most of the British surgeons - who had a lot of experience but they just weren't in the same league. Seemed to me and you can see it, he just moves right. You can see it. And the consultants could too. Yeah, you could see it - so that was a technical expertise. And he could sort of come and solve problems when things went wrong. Occasionally did some stitches - he would come in and he would just sort it out. … [in a vulvectomy] the consultants were doing one side and he was doing the other, and he was doing his side much faster and much better, with minimal bleeding, compared to the consultant. You could see these two surgeons - you don't often see that, both doing basically the same procedure just on one side of the body versus the other side, and how much better that one was than that. … [H]e would have had such a big case load that you would need to go fast as well. Not hurry, but fast. And I think exceptional technicians manage to do things with minimal movements. There's not - there's a real economy of movements. They don't do - they don't fluff around. They actually just do things in a - everything is done, that's necessary to be done. There are not lots of extra stuff.

Doctor 13 considered that the doctor does well when the work matches their skillset:

> I think you can be a good doctor and be very different beings. It's more about, you know - The skill set matching the job and the situation that you're working in. So, I think when there's a good match, it's amazing.

She gave two specific examples of exceptionally good doctors:

> "She made it about people and understanding each other and she focused on resolving the distress and the conflict, which is what was better for everybody in that situation. It was better for the staff and for the family. And it's - it took a lot of the stress out of it and it resolved things in a way that seemed a lot healthier to me, and it was very compassionate. There was a lot of compassion and caring and understanding within that.",
>
> And so the situation tends to escalate quite quickly and when this particular anesthetist - just as soon as he walked in the room, it's like everything kind of calmed down, and he - he was in charge.

Doctor 12 mentioned a seemingly small change using solution focused conversation technique or solution focused brief therapy (SFBT) that has made him, as a GP, much more effective, which also shows the importance of communication:

> Because, at first if a person came in very stressed, I was really doing my best - so why don't you go do some fishing or so or go play some golf and then they said - ah! I don't like fishing or don't like - but if you ask, again, what sort of things helped you in the past and they may say, well, in the past I just went for fishing and whatever. So, they provide the answers. So, you need to have a good, good way of asking things. And so that's I think, an essential part that needs to get into general practice training.

Doctor 11 describing an exceptional good doctor in Egypt, stated:

> What made him very exceptional is that he dedicates one day per week for the poor, free of charge, free consultation and he is specialized in kidney diseases - and this is - like, giving one day per week, that's - if you transfer it in money - that's lots of money to do. Like he's not getting any money out of it, which is amazing. He continues to publish lots of research articles along with his clinical work. He does work in a hospital for free as well beside his other day outside the hospital and he has his own private clinic where he sees patients and he always accepts referral from like communities whenever someone is not able to pay, he always provides a consultation.

Additionally, two personal examples from doctor 10:

> My mom's orthopedic surgeon that did her shoulder replacements for her. He was technically like, he's probably the best surgeon in [an Australian state] for that, but he was just so humble and kind of, you know, just connected sort of with mom and treated her so well.

> And ultimately, the palliative care team was really the main team that actually truly sat down with us and listened to what dad wanted, and I thought that was - you know, their care was exceptional and was so like, we just felt it so valuable because they allowed him to have some control over what was happening to you.

Strengths and Limitations of This Study

- One strength of this work is that the concept and design were informed by the recent experience of the authors in systematically reviewing over 10,000 studies on doctors' or surgeons' effect on patients' physical health.
- A limitation is that this is a survey of respondents who speak English and was limited to doctors who have worked in Australia, the US, UK, South Africa, the Netherlands, and Egypt, hence this survey may not be representative of medical doctors worldwide.
- A further limitation is the small sample size of the study and therefore further studies need to potentially interview a larger sample of doctors with different backgrounds and characteristics to make the results more generalizable.
- Another limitation is that only three interviewees have a background outside the Anglo-American culture, ie, Egypt, The Netherlands, and South Africa and none of the three is still living in those countries. The concept of an exceptionally good doctor may differ substantially in other cultures and patient well-being might also differ in its definition.
- Finally, due to the heterogeneity regarding medical/surgical specialties, types of interventions, and types of outcomes relevant to different interventions, there may be differing criteria on what makes an exceptionally good doctor for different medical/surgical specialties.

Discussion

Each of the 13 interviewed medical doctors had an opinion on what makes an exceptionally good doctor and experienced at least one such doctor. All considered their encounter with such a doctor to be a valuable and inspirational experience, especially when they met them during their studies or early in their careers. Twelve of the 13 interviewed doctors associated being an exceptionally good doctor with better patient health outcomes, while the 13th associated it with better patient care. In addition, exceptionally good doctors, according to our sample, are valuable to patients, other doctors, medical education, and medicine overall.

This study is providing two types of characteristics that have previously not been mentioned in the literature or only in a limited way: The education of exceptionally good doctors, ie, how they can be made, and their relationships with their peers and the health care system. Further, we are not aware of treatment examples by such doctors, nor a distinction between good and exceptionally good doctors in the existing literature.

Despite the ubiquity of having experienced exceptionally good doctors, there is little research investigating this topic. The available literature is mostly about good doctors, or how to improve doctor performance.[22–28]

Surprisingly, when reviewing the transcripts, there were many exceptionally good doctors who had been undermined by their peers or the health care system, even when their peers were fully aware that their targets were exceptionally good doctors. Such a cultural trait may be worth further scrutiny and research on how to change this culture, especially since there seem to be very substantial benefits for fellow doctors or medical students encountering exceptionally good doctors and being trained by them. Another concern is that the current culture provides an incentive towards doctors being average rather than exceptional. Presumably, this culture comes with a high cost for patients and health care providers and doctors themselves, who then may not practice medicine to their true potential.

Previous research has shown that there are psychotherapists who have exceptionally good patients' mental health outcomes[46] and surgeons who have exceptionally good patients' physical health outcomes,[33] but none of the studies that

identified such surgeons even considered whether it may be worthwhile to study exceptionally good doctors in more detail. In the current study, there was a strong overlap between the opinions expressed: that an exceptionally good doctor needs to have multiple traits to be considered exceptionally good, with the exemption of some surgeons with primarily exceptional surgical skills. However, it was agreed that, at the minimum, such doctors need to have both substantial up-to-date medical knowledge and a high level of communication abilities in dealing with patients. Further, in addition to their high abilities, exceptionally good doctors were humble in accepting that they may need help, or be wrong at any given moment, which means that they are often adaptable, being able to react to the unexpected and therefore, ready, if necessary, to go beyond the guidelines, while giving patients the time they need. A simple example of how exceptionally good doctors differ from other doctors, is that such doctors listen very carefully to the patient and rarely interrupt them in the beginning of the consultation. Such a quality of listening seems eminently able to be developed through practice, or to be passed on as a skill to doctors through teaching, along with many other such transferable skills.

All interviewees admiringly spoke about their encounters with exceptionally good doctors and how they were inspired by them or took them on as role models, with one interviewed doctor unambiguously stating that most exceptionally good doctors are exceptional because they were trained by equally good doctors. Considering this, if such role models could be more accessible to medical students, junior doctors, and perhaps even experienced doctors, then, this would introduce the potential to inspire such students and junior doctors by showing them what is possible despite the constraints they are working under.

Recommendations

We thank one of the anonymous reviewers for the following insights:

- The results can help in the design, implementation or reformulation of curricula aimed at training physicians, towards training exceptionally good doctors.
- The topic discussed in this manuscript is relevant in medical education as well as on the training of other health professionals. Though it might be differences in perceptions about what are exceptionally good doctors across the world due to multiple factors, it will inspire other medical educators in cultivating and on the definition of such exceptionally good doctors.

Further research on exceptionally good doctors that acknowledges cultural differences and sample sizes is needed in order to develop a conceptualization model proposal. Identifying exceptionally good doctors, how to learn from them, increase their number, and change the culture to accept them is recommended. Researching other stakeholders such as patients and administrators on their opinions on and experiences of exceptionally good doctors is also recommended.

Conclusion

Many doctors have met exceptionally good doctors and have learnt from them and were inspired by them. Despite that, there has been little research on exceptionally good doctors and such doctors regularly, though not always, are undermined by their peers and their health care system precisely because of the quality of medicine they practice.

Disclaimer

The views expressed are those of the authors and not necessarily those of Bond University.

Data Storage

Data will be stored in a secured location at Bond University for a period of 5 years after the end of this project as per 601.3/C150 of the Qld Government University Sector Retention and Disposal Schedule in accordance with the guidelines set out by the Bond University Human Research Ethics Committee.

Ethics Approval

Ethical approval Number CS03393 has been received from the Bond University Human Research Ethics Committee on September 27th, 2021.

Consent

All participants have provided their informed consent, including consent for publication of anonymized responses.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation of data, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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References

1. National Ambulatory Medical Care Survey. 2018 National Summary Tables; 2018.
2. Balint M. THE DOCTOR, HIS PATIENT, AND THE ILLNESS. *Lancet*. 1955;265(6866):683–688. doi:10.1016/S0140-6736(55)91061-8
3. Curran J. The doctor, his patient and the illness. *BMJ*. 2007;335(7626):941. doi:10.1136/bmj.39384.467928.94
4. Hurwitz B. What's a good doctor, and how can you make one? *BMJ*. 2002;325(7366):667–668. doi:10.1136/bmj.325.7366.667
5. BMJ. The BMJ's wild goose chase. *Br Med J*. 2002;325(7366).
6. Cumming A. Good communication skills can mask deficiencies. *Br Med J*. 2002;325(7366):676. doi:10.1136/bmj.325.7366.676/a
7. McCrorie P. Graduate students are more challenging, demanding, and questioning. *Br Med J*. 2002;325(7366):676. doi:10.1136/bmj.325.7366.676
8. Pringle M, Wilson T, Grol R. Measuring "goodness" in individuals and healthcare systems. *Br Med J*. 2002;325(7366):704. doi:10.1136/bmj.325.7366.704
9. Elsevier. Scopus. Elsevier; 2021.
10. Holmes J. Good doctor, bad doctor-a psychodynamic approach. *Br Med J*. 2002;325(7366):722. doi:10.1136/bmj.325.7366.722
11. Paice E, Heard S, Moss F. How important are role models in making good doctors? *Br Med J*. 2002;325(7366):707. doi:10.1136/bmj.325.7366.707
12. Begg CB, Riedel ER, Bach PB, et al. Variations in morbidity after radical prostatectomy. *New Engl J Med*. 2002;346(15):1138–1144. doi:10.1056/NEJMsa011788
13. Bianco FJ Jr, Riedel ER, Begg CB, Kattan MW, Scardino PT. Variations among high volume surgeons in the rate of complications after radical prostatectomy: further evidence that technique matters. *J Urol*. 2005;173(6):2099–2103. doi:10.1097/01.ju.0000158163.21079.66
14. Bianco JFJ, Vickers AJ, Cronin AM, et al. Variations among experienced surgeons in cancer control after open radical prostatectomy. *J Urol*. 2010;183(3):977–983. doi:10.1016/j.juro.2009.11.015
15. Brown EC, Robicsek A, Billings LK, et al. Evaluating primary care physician performance in diabetes glucose control. *Am J Med Qual*. 2016;31(5):392–399. doi:10.1177/1062860615585138
16. Glance LG, Dick A, Osler TM, Li Y, Mukamel DB. Impact of changing the statistical methodology on hospital and surgeon ranking: the case of the New York State cardiac surgery report card. *Med Care*. 2006;44(4):311–319. doi:10.1097/01.mlr.0000204106.64619.2a
17. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. *Mayo Clin Proc*. 2013;88(11):1250–1258. doi:10.1016/j.mayocp.2013.07.017
18. Harley M, Mohammed MA, Hussain S, Yates J, Almasri A. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. *Br Med J*. 2005;330(7497):929–932. doi:10.1136/bmj.38377.675440.8F
19. Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. *Catheter Cardiovasc Interv*. 2009;73(5):589–594. doi:10.1002/ccd.21893
20. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors associated with reoperation in breast-conserving surgery for cancer: a prospective study of American society of breast surgeon members. *Ann Surg Oncol*. 2019;26(10):3321–3336. doi:10.1245/s10434-019-07547-w
21. Rudmik L, Xu Y, Alt JA, et al. Evaluating surgeon-specific performance for endoscopic sinus surgery. *JAMA Otolaryngol Head Neck Surg*. 2017;143(9):891–898. doi:10.1001/jamaoto.2017.0752

22. Steiner-Hofbauer V, Schrank B, Holzinger A. What is a good doctor? *Wien Med Wochenschr*. 2018;168(15–16):398–405. doi:10.1007/s10354-017-0597-8
23. Herzig S, Biehl L, Stelberg H, Hick C, Schmeißer N, Koerfer A. What makes a doctor a good doctor? A content analysis of assessments by a sample of doctors. *Dtsch Med Wochenschr*. 2006;131(51–52):2883–2888. doi:10.1055/s-2006-957216
24. Lambe P, Bristow D. What are the most important non-academic attributes of good doctors a Delphi survey of clinicians. *Med Teach*. 2010;32(8): e347–e354. doi:10.3109/0142159X.2010.490603
25. Miratashi Yazdi SN, Nedjat S, Majdzadeh R, Arbabi M. Who is a good doctor? Patients & physicians' perspectives. Letter. *Iran J Public Health*. 2015;44(1):150–152.
26. Fones CSL, Kua EH, Goh LG. 'what makes a good doctor?' - views of the medical profession and the public in setting priorities for medical education. Article. *Singapore Med J*. 1998;39(12):537–542.
27. Churchill LR, Schenck D. Healing skills for medical practice. *Ann Intern Med*. 2008;149(10):720–724. doi:10.7326/0003-4819-149-10-200811180-00006
28. Hanyok LA, Hellmann DB, Rand C, Ziegelstein RC. Practicing patient-centered care: the questions clinically excellent physicians use to get to know their patients as individuals. *Patient*. 2012;5(3):141–145. doi:10.2165/11599530
29. Holt PJE, Poloniecki JD, Gerrard D, Loftus IM, Thompson MM. Meta-analysis and systematic review of the relationship between volume and outcome in abdominal aortic aneurysm surgery. *Br J Surg*. 2007;94(4):395–403. doi:10.1002/bjs.5710
30. Huo YR, Phan K, Morris DL, Liauw W. Systematic review and a meta-analysis of hospital and surgeon volume/outcome relationships in colorectal cancer surgery. *J Gastrointest Oncol*. 2017;8(3):534–546. doi:10.21037/jgo.2017.01.25
31. Leow JJ, Leong EK, Serrell EC, et al. Systematic review of the volume–outcome relationship for radical prostatectomy. *Eur Urol Focus*. 2018;4 (6):775–789. doi:10.1016/j.euf.2017.03.008
32. Meagher AP. Colorectal cancer: is the surgeon a prognostic factor? A systematic review. *Med J Aust*. 1999;171(6):308–310. doi:10.5694/j.1326-5377.1999.tb123665.x
33. Schnelle C, Clark J, Mascord R, Jones MA. Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. *Ther Clin Risk Manag*. 2022;Volume 18:467–490. doi:10.2147/TCRM.S357934
34. Schnelle C, Jones MA. Protocol for a qualitative study on doctors' opinions on and experiences of exceptionally good doctors. *Adv Med Educ Pract*. 2022;13:103–109. doi:10.2147/AMEP.S343554
35. Inc Z. Zoom Videoconferencing; 2022. Available from: https://zoom.us/. Accessed February 20th, 2022.
36. Otter.ai. Record and review in real time. Search, play, edit, organize, and share your conversations from any device; 2022. Available from: https://otter.ai/. Accessed February 20th, 2022.
37. NVivo (Version 12); 2018. https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home?_ga=2.258719299.835966230.1648946019-1691335512.1648946019. Accessed June 22, 2022.
38. Braun V, Clarke V. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qual Res Sport Exerc Health*. 2021;13(2):201–216. doi:10.1080/2159676X.2019.1704846
39. Malterud K, Siersma VD, Guassora AD. Sample size in qualitative interview studies: guided by information power. *Qual Health Res*. 2016;26 (13):1753–1760. doi:10.1177/1049732315617444
40. Braun V, Clarke V. *Successful Qualitative Research: A Practical Guide for Beginners*. sage; 2013.
41. Braun V, Clarke V. What can "thematic analysis" offer health and wellbeing researchers? *Int J Qual Stud Health Well-Being*. 2014;926152. doi:10.3402/qhw.v9.26152
42. Clarke V, Braun V. Thematic analysis in "Encyclopedia of critical psychology". In: *Encyclopedia of Critical Psychology*. Springer; 2014:1947–1952.
43. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77–101. doi:10.1191/1478088706qp063oa
44. Schenck D, Churchill L. *Healers: Extraordinary Clinicians at Work*. Oxford University Press; 2011.
45. Cuesta-Briand B, Auret K, Johnson P, Playford D. 'A world of difference': a qualitative study of medical students' views on professionalism and the 'good doctor'. *BMC Med Educ*. 2014;14(1):77. doi:10.1186/1472-6920-14-77
46. Lambert MJ. *Bergin and Garfield's Handbook of Psychotherapy and Behavior Change*. John Wiley & Sons; 2013.
47. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. *Clinical Epidemiology*. In Press 2022.
48. Schnelle C, Clark J, Mascord R, Jones MA. Is there a doctors' effect on patients' physical health, beyond the intervention and all known factors? A systematic review. *Ther Clin Risk Manag*. In Press 2022. doi:10.2147/TCRM.S372464

CHAPTER 5:

CROSS-SECTIONAL SURVEY OF THE GENERAL PUBLIC. PROTOCOL PAPER AND RESULTS PAPER (STUDY 5)

Study 5: *Characteristics of exceptionally good doctors: A cross-sectional survey of adults. The protocol paper is in Appendix 2.*

5.1 Summary

To produce a more well-rounded idea of the exceptionally good doctor, we then turned to patients as a source of information. Drawing on data from study five regarding what makes an exceptionally good doctor from the perspective of other medical doctors, I developed a largely quantitative survey with three main options to comment and ran a pilot survey. The results from the pilot survey allowed for further refinement of the questions to be asked of members of the public.

A 15-20-minute comprehensive survey was designed to cover as many aspects of doctor characteristics and patient experiences as possible. The survey was kept short to try and mitigate the issue of respondents taking shortcuts to finish the survey as quickly as possible to collect the US$3 financial reward. Additionally, three free-text questions were included which gave respondents the opportunity to provide more details should they choose to.

The heart of the survey was 34 Likert questions where we asked respondents how strongly they feel that the exceptional doctor they nominated has that particular positive quality. We then asked the same questions about average doctors, which gave us opportunities to distinguish between characteristics shared by the majority of doctors (average doctors) and those shared by exceptionally good doctors. The survey also included many quantitative questions regarding doctor and respondent demographics, including, how the respondents had met the doctor, why they nominated that particular doctor and what their physical and emotional experience of meeting that doctor was.

Some results were unsurprising, such as respondents aged 55 and older having a more positive attitude towards an exceptional doctor, as they are more likely to have experienced a major health event where a particular doctor made a difference to the outcome. Similarly, female respondents tended to be more positive towards all doctors. Other minor results were similarly unremarkable, such as specialists receiving slightly higher evaluations, and respondents who nominated a doctor with whom they had a long-term relationship, expressed a high level of positivity towards that doctor.

A more significant result was the strength of the association between respondents (154 out of 505) agreeing with the statement; ‘the doctor listens to them willingly to the end’ and how positive those respondents were towards their exceptionally good doctor,

and not solely for their communication or empathy but also for the doctor's knowledge, integrity, and honesty. Not interrupting patients made those doctors stand out even among exceptionally good doctors.

The second significant result was that those who were especially positive towards their nominated exceptionally good doctor, i.e., those 55 or older and those who were listened to, were nearly as negative about average doctors as they were positive about their exceptionally good doctor. This confirms the numerous testimonials and impressions from the 13 medical doctors interviewed in the previous qualitative study, that exceptionally good doctors may receive accolades and praise but are as likely to be attacked by their presumably average peers and the health system they work in, as their patients become more critical and negative towards the average doctor in comparison to the service the patients receive from the exceptionally good doctor.

5.2 Characteristics of Exceptionally Good Doctors: A Cross-sectional Survey of Adults [not yet published]

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BACKGROUND: Systematic reviews have found that doctors can have a substantial effect on patients' physical health, beyond what can be explained by known factors. In a previous qualitative study, 13 medical doctors were interviewed on their experiences of exceptionally good doctors, and all had met at least one such doctor.

OBJECTIVE: To determine how common it is for exceptionally good doctors to be encountered by patients and what are the characteristics of exceptionally good doctors.

DESIGN: Mixed methods cross-sectional survey of 580 Amazon Mechanical Turk participants. Questions included doctor and participant demographics, and 34 Likert questions on characteristics of exceptionally good and average doctors. Free-text questions allowed participants to describe exceptional doctors, record their experience, and provide survey feedback. Stratified sampling ensured gender parity and 33% of participants aged ≥55 years. Analysis included descriptive statistics, statistical modelling of associations between Likert scale scores and patient demographics, and factor analysis.

RESULTS: Of 580 responses, 505 (86%) were included in the analysis. Factor analysis confirmed internal validity. Most respondents (86%) had met at least two exceptionally good doctors, of whom 55% were specialists. 58% of respondents regarded doctors as exceptional based on an overall impression with multiple reasons. Doctors were most commonly considered exceptional based on one or more of their personality, diagnostic, or intervention ability. Respondents who reported the doctors "willingly listened to them to the end" scored their doctors higher on 33 of 34 Likert questions, except for popularity. They also rated average doctors lower throughout.

CONCLUSIONS: Exceptionally good doctors appear to be commonly encountered by the adult public. Listening to patients willingly to the end is a highly rated and influential characteristic, suggesting that listening could be targeted for quality improvement.

Keywords: Medical practice, Good doctors, Doctors' performance, Patients' opinion, Survey

INTRODUCTION

Medical doctors are known to have a clustering effect in clinical trials, (1-4) i.e. patients of a particular doctor tend to have similar outcomes, which is likely due to confounding factors such as differences in patient demographics across practices, but could also be due to doctors having different levels of ability in treating patients.

Medical doctors are known to have a clustering effect in clinical trials,[1-4] i.e. patients of a particular doctor tend to have similar outcomes, which is likely due to confounding factors such as differences in patient demographics across practices, but could also be due to doctors having different levels of ability in treating patients.

To discern whether doctors' have varying ability in treating patients, the authors conducted a systematic review[5-7] screening over 10,000 studies and found that doctors have an effect on patients' physical health, varying from the negligible to substantial, depending on the intervention and outcome measured. This effect persists after all known variables, such as doctor demographics and experience, hospital effects, patient demographics, and risk factors have been accounted for.[8,9] Some of the doctors had substantially better patient health outcomes, and the authors chose to label these doctors as "exceptionally good doctors". However, there are few studies on exceptionally good doctors[10-12] or even good doctors.[13-17]

None of the studies that identified exceptionally good doctors provided recommendations for further research or published further details of such exceptionally good doctors.[18-22] In a recent qualitative study, [23] [13] medical doctors stated their thoughts on what are the characteristics of exceptionally good doctors, with being both exceptionally skilled and very good at patient communication considered important. The doctor experiences and definitions from the qualitative study were used to design the present cross-sectional survey of the general public on their opinions on what makes an exceptionally good

doctor, and their experiences of such doctors.[24] The survey objective was to determine how commonly exceptionally good doctors are encountered by patients and what are the characteristics of exceptionally good doctors.

METHODS

The survey reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[25] All details are presented in a previously published protocol.[24]

STUDY DESIGN

This is an observational convergent design[26] cross-sectional survey including three qualitative, 19 quantitative (Table 1 and 2), and 68 5-point Likert questions (Table 3). The full survey is in Supplementary Appendix 7.

Participants were recruited through Amazon Mechanical Turk (Mturk).[27] The Mturk worker population is a suitable proxy for the general population[28-30] and has been used extensively by social scientists[31], allowing stratification by gender and age

Initially all questions were derived from a qualitative study that interviewed 13 medical doctors on their experiences of exceptionally good doctors[23]. The authors conducted a pilot study with 210 respondents and employed a survey specialist with extensive consumer survey experience to improve the quality of the questions. The pilot study showed that respondents understood the term ‘exceptionally good doctors’ and factor analysis showed that this term was distinct from the term ‘doctor’.

The authors investigated alternatives to the term ‘doctor’, but such attempts were confusing and discouraging for respondents and were not used in the survey. The consent form and questions 5, 8, and 27 clarifie that a doctor is a physician by using the term “doctor (physician)”.

Ethical approval (#CS03416) was granted by the Bond University Human Research Ethics Committee on 27 April 2022.

SURVEY SAMPLE

Adult Mturk workers were recruited as participants. The sample size was identified based on the results of a pilot study of 210 participants showing 400-450 participants were required to reduce the Likert question margin of error to ~4%. A sample of 580 ensured 500 completed and valid responses.

DATA COLLECTION

Demographic information collected included the respondents' age in decades; gender; education level; and previous 12 months count of doctor visits. Their IP address identified their country. Additional questions included the number of exceptionally good doctors and total number of doctors the participants had previously encountered.

The respondents provided details on an exceptionally good doctor, including their estimated age, gender, specialty, and the reason why they nominated that doctor.

The participants were also asked 34 Likert questions, each listing a characteristic, derived from the previous qualitative study[23] – rating both the exceptionally good doctor and the average doctor on this characteristic using a scale from 1.0 (completely disagree) to 5.0 (completely agree) (Table 3). All respondents were asked all 34 Likert questions for both types of doctors rather than random allocation to either Likert questions type to allow within person comparison of exceptional and average doctors.

A subsequent question displayed the subset of Likert questions, if any, where the respondent rated a characteristic of an exceptionally good doctor as 4.5 out of 5 or higher and asked the respondent to nominate the top three of the listed characteristics in order.

Three free-text questions were asked: one at the beginning to nominate 3-5 characteristics of exceptionally good doctors; another mid-way through the survey to optionally write about their experience of the exceptionally good doctor in their own words, and one at the end of the survey to provide feedback.

Bias due to question order was minimized by, where possible, randomizing the order of multi-item questions such as the Likert questions. All quantitative questions were mandatory. Respondents who provided either logically impossible answers or highly

uniform answers, i.e. satisficers, 32 were excluded.

STATISTICAL ANALYSIS

The analysis includes descriptive statistics on the respondents' and doctors' demographics, how the respondents met their nominated doctor, and why they considered that doctor exceptional. The results from the 34 Likert questions for exceptionally good doctors and the average doctors are shown in graphic form as kernel density plots (a smoothed form of histogram)[33]. Factor analysis assessed internal validation of the Likert questions. A linear regression each was run for the mean of the 34 Likert scores for the exceptionally good and the average doctor as factor analysis showed that there were only two factors with Eigenvalues above 1, one for exceptionally good and one for average doctors. Linear regression models were also used to explore the explanatory variables association with the individual Likert scores to identify Likert questions whose associations differed from the other Likert questions. T-values with absolute values ≥2.5 ($p \leq 0.01$) were used to confirm evidence of association. As answers to Likert questions were not always normally distributed, we also conducted non-parametric and ordered logistic regression. We compared regression results between respondents who were patients of their nominated doctor and those who knew the doctor in other ways. In addition, we compared regression results for those who had an outstanding health event and those who didn't.

RESULTS

FACTOR ANALYSIS

Each Likert question is substantially correlated with the other 33 as shown in the factor analysis in supplementary appendix 6, i.e. all 34 measure a similar quality. Factor analysis identified two substantial factors with one constituting being a doctor and the second being an exceptionally good doctor. After varimax rotation both factors were near equal in size with Eigenvalues of 23.1 and 21.1 and all other Eigenvalues 0.78 or smaller. Therefore this survey measures two substantial separate factors only, one on which all Likert questions about exceptionally good doctors load and one on which all for average doctors load. The only question with a negative loading after rotation is "The doctor listens to me willingly to the end" which is negative for the average doctor,

implying that listened-to respondents give average doctors lower Likert scores than other respondents.

RESPONDENTS' AND REPORTED DOCTORS' DEMOGRAPHICS

Respondents' demographics are presented in Table 1. Of 587 respondents, 505 (86%) completed and provided valid answers. Thirty-five respondents (6%) did not know any exceptionally good doctors. Another 35 respondents were satisficers, 34 and 12 respondents did not finish the survey. 53% of respondents were female, 42% were 25-34 years old, 33% were aged over 55 years, 55% had a bachelor's degree, 19% had a masters' degree, and 91% were from the US. 86% of respondents had met at least two exceptionally good doctors in their life.

Table 2 provides details on the exceptional doctors with 55% being specialists, 15% cardiologists, 10% surgeons, and 9% emergency physicians. 37% of doctors had an estimated age below 35 years, with 11% aged over 55 years. Most respondents (87%) had visited the exceptionally good doctor in the previous 12 months.

RESPONDENTS' PERSPECTIVES ON EXCEPTIONALLY GOOD DOCTORS

No consensus was shown in how many items a doctor had to fulfill to be considered exceptional. Qualities of exceptionally good doctors nominated by respondents are shown in Figure 1a as a word cloud. Approximately 150 participants quoted verbatim from the highest-ranked google results on exceptionally good doctors and were excluded from the word cloud analysis.[35,36] Participants' experiences with an exceptionally good doctor are summarized in a word cloud (Figure 1b) and shown as raw data in Supplementary Appendix 2. A total of 468 respondents provided a response and 388 included 5 to 673 words.

Figure 1a Word cloud of respondents describing exceptionally good doctors in their own words.

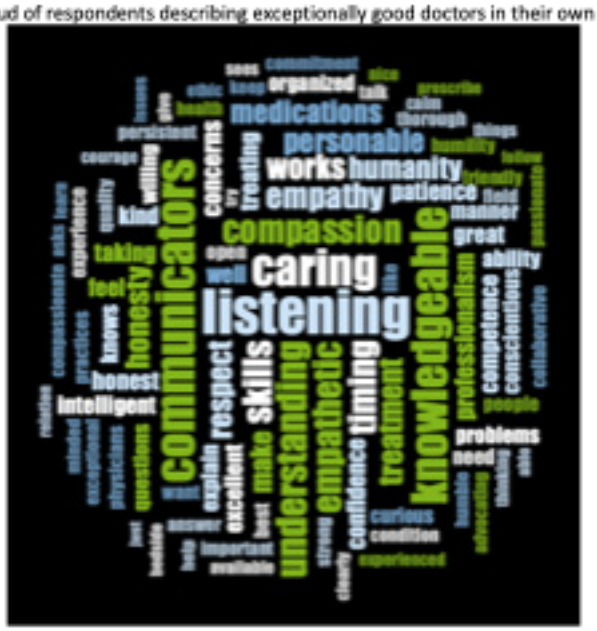

Figure 1b Word cloud of respondents describing experience with exceptionally good doctors.

Figures 1a and 1b Wordclouds – Study 5, patient survey

The Likert question results showed that average doctors were rated with mean scores of 3.5 to 3.9 out of 5, and exceptionally good doctors at mean scores of 4.0 to 4.3. Exceptionally good doctors were nominated for three broad reasons: They were exceptional diagnosticians, exceptionally successful with interventions, or exceptionally good at relating to the patient. The respondents gave similar Likert scores to groups of exceptional doctors based on each of these three categories (Table 2, Doctor Evaluations). The exception is listening as outlined below.

The survey respondents were asked to select and rank the three most important questions among the Likert questions they scored 4.5 to 5 (the maximum score). A total of 387 respondents (77%) provided at least one score of 4.5 or higher; with 45 top ranks given to the doctor being knowledgeable, 35 for being accurate at diagnosing, and 22 for communication (Table 2, Likert ranking).

Results from the linear regression analysis of the mean Likert scores for each respondent showed that respondents aged 55 or older provided higher Likert scores for the exceptionally good doctors (t-value of 4.9, $p<0.001$). The 159 respondents who reported “the doctor willingly listens to me to the end” scored their exceptionally good doctor higher than the other respondents ($t = 6.9$, $p<0.001$) but also scored the average doctor more negatively than their peers ($t = -3.3$, $p=0.001$). Female respondents scored average doctors higher than male respondents ($t=2.3$, $p = 0.02$) and respondents who were patients of the exceptionally good doctor for a long time scored both more highly ($t = 2.1$ and 2.4, $p=0.03$ and 0.02). (Supplementary document, appendices 4 and 5). There was no difference in scores between the 334 respondents who were patients and the 218 respondents who knew the doctor in other ways, nor between the 362 respondents who had an outstanding health event and the 190 respondents who didn’t. (Not listed).

Appendix 5 shows a summary of the 34 individual regressions for exceptionally good and average doctors to show variations in outcomes for some independent variables. For example t-values for exceptionally good doctor Likert questions for “The doctor willingly listens to the end” are above 2.5 ($p=0.01$ or smaller) for 31 of the 34 Likert questions but not for the Likert question “The doctor is popular”.

Figure 2 shows the distributions of answers to the Likert question “The (exceptionally good) doctor is knowledgeable” as histograms and kernel density plots stratified by whether the respondents affirmed that “The doctor listens to me willingly to the end” – blue for “Yes”, yellow for “No”.[33]

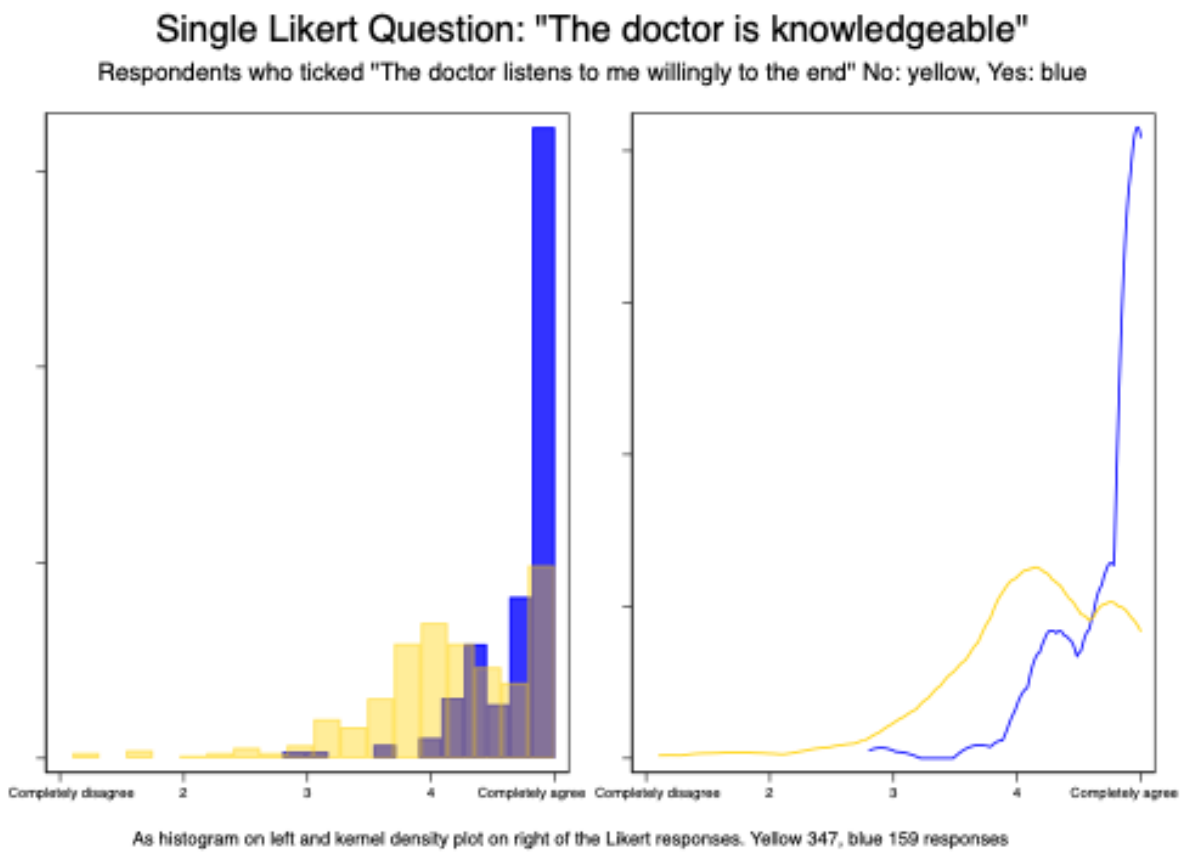

Figure 2 Two histograms for “The doctor is knowledgeable” stratified by whether the exceptionally good doctor willingly listens to the patient to the end (blue) or not (yellow). Also shown as kernel density plots on right, Survey of Adults.

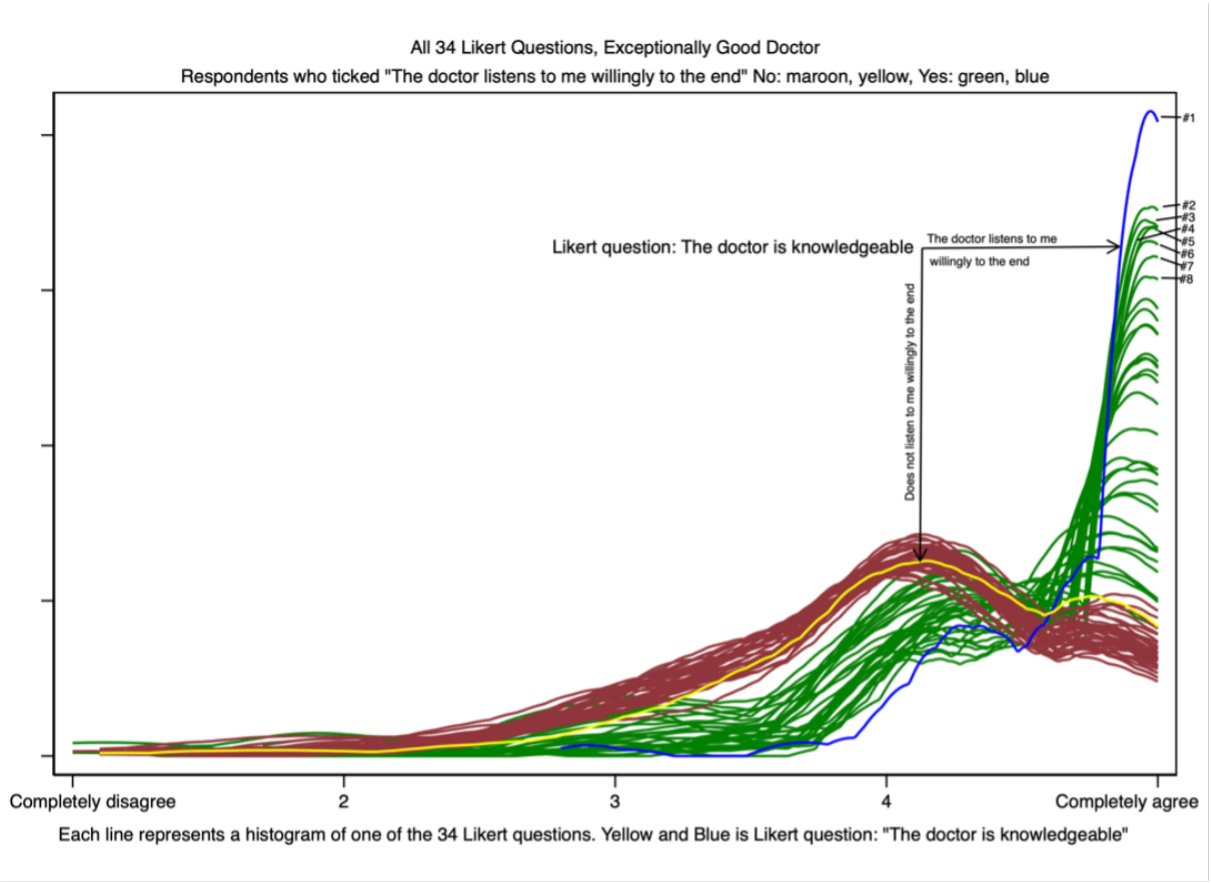

Figure 3 shows all 34 Likert questions with the question shown in Figure 2 highlighted. - Survey of Adults

Figure 3 illustrates where respondents, who were listened to by the doctor to the end, gave higher Likert scores than other respondents with the largest differences for:

1. The doctor is knowledgeable (blue line)
2. The doctor is caring (top green line)
3. The doctor is honest (2nd top green line etc.)
4. The doctor is good at communicating
5. The doctor cares for the patient
6. The doctor is understanding and/or shows empathy
7. The doctor has patience
8. The doctor has integrity

Supplementary Appendix 1 shows 18 descriptive graphs of items in table 1 and table 2. The qualitative responses are included in the Supplementary Appendix 2. Survey feedback obtained from 221 respondents is shown in Supplementary Appendix 3. Supplementary Appendix 4 shows the results from the regression analyses of the mean Likert scores per person. Supplementary Appendix 5 shows summary results from each of the 34 individual models for the exceptionally good doctors.

DISCUSSION

Of the 580 respondents to our survey of the general adult public, 86% could recall meeting an exceptionally good doctor and describe such a doctor in detail. This result suggests a substantial number of such doctors exist, a finding consistent with a recent qualitative study in which 13 medical doctors were able to recall at least one exceptionally good doctor.[23] Hence, the dearth of research on such doctors or even good doctors is surprising.[13-17,37,38]

The survey respondents nominated doctors as being exceptionally good for at least one of three overarching reasons: for exceptional communication with the patient, an exceptional diagnostic, or an exceptionally successful intervention. The respondents gave similar scores to groups of exceptional doctors based on these three characteristics. The respondents therefore echoed medical doctors who stated that a doctor can be an exceptionally good doctor for a heterogenous set of reasons.[23]

Of the variables assessed for association with the Likert scales ratings, three showed consistent positive or negative associations with exceptionally good and average doctors: Female respondents scored all doctors higher than their male counterparts; those aged 55 or higher scored exceptionally good doctors higher but average doctors lower than the younger respondents; and the 154 respondents who, responding to an item in question 17 of the survey, reported the doctor willingly listens to them to the end gave higher scores to the exceptionally good doctor and lower scores to the average doctor.

These 154 listened-to respondents considered their doctor to be particularly knowledgeable, caring, honest, and with integrity in addition to the expected qualities of being understanding, patient, and good at communicating. The quality of listening was associated with a host of seemingly unrelated positive associations for the patients.

Patients being more critical of average doctors after meeting a doctor who listens could provide motivation for average doctors to undermine their exceptional colleagues as described in a recent qualitative study of doctors.[23] It is not a surprise that patients want their doctor to listen but there is no published research that shows quantitatively how much more positively listened-to patients rate their doctor. These participants considered the exceptionally good doctor to be substantially more knowledgeable and honest in addition to being better communicators and were substantially less positive about average doctors. These findings need replication but could potentially be a fruitful avenue for further research; addressing questions such as why doctors who listen to the end are considered more knowledgeable and honest, and why are their patients more critical of average doctors?

A medical specialist, in a qualitative study[23] described the process of listening as:

> *"Every patient, every person, every being is different. Every person has a different reading. So how can you be generalized into a sample or whatever, a random whatever. So that makes exceptional physicians more humble because you can't let go - be complacent. I got books everywhere. … But when I'm with a patient, I'm totally dedicated to listening - by listening I don't know - something comes up, an impress is given, the whole package of treatment comes through - more and more than ever before And that's what [three famous and exceptionally good doctors] did all the time".*

These statements suggest 'listening' could lead to more accurate diagnoses and appropriate treatments, supporting the 154 survey respondents' impression.

Currently, there is no definition of what is an exceptionally good doctor, and no characteristic in the survey was nominated as most important by more than 12% of the respondents. This suggests there are multiple ways to be an exceptional doctor as reported by the medical doctors in the qualitative study.[23] Doctors with exceptional communication qualities, excellent diagnostic abilities, or outstanding treatment success were equally valued by the respondents and the respondents had no consensus on how many qualities are needed to be exceptional. For our previous systematic reviews, we operationally defined an exceptionally good doctor as one who has exceptionally good patient physical health outcomes. 5-7 Conversely, our survey respondents took a much broader view on their opinions and experiences of exceptionally good doctors.

This survey has some limitations that need to be acknowledged. First, it was subject to potential non-response bias, as it was unable to know how many Mturk workers accessed the survey but chose not to participate. Nevertheless, response rates are less important than response representativeness,[39] which was ensured as our sample of respondents are of gender and age distribution similar to that of the general population of adults. Second, the respondents were English speakers, predominantly from the US. Thus, it is uncertain whether the findings can be generalized to other regions, particularly developing nations. In addition, due to heterogeneity regarding patient demographics, types of interventions, and types of outcomes relevant to different medical conditions, there may be differing criteria on what makes an exceptionally good doctor for different medical/surgical specialties.

Despite the limitations, this survey of adult public provides an insightful view of exceptionally good doctors, who appear to be commonly encountered by the general adult public. They tend to be exceptional communicators, diagnosticians, or interventionists. The highest ratings for exceptional doctors are given by patients whose doctors listen to them willingly to the end. The ability to attentively listen makes an exceptionally good doctor stand out among their peers but its lack then also makes average doctors appear worse. Targeting listening skills for quality improvement could improve patient perceptions of doctors and potentially lead to better patient outcomes and higher doctor satisfaction.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation of data, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclaimer

The views expressed are those of the authors and not necessarily those of Bond University.

Competing Interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf , and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work

Consent

The participants will only be able to preview the rest of the survey after they provide their consent.

Ethics approval

Ethical approval CS03416 was provided on April 27th, 2022, by the Bond University Human Research Ethics Committee.

Data Storage

Data will be stored in a secured location at Bond University for a period of 5 years after the end of this project as per 601.3/C150 of the Qld Government University Sector Retention and Disposal Schedule in accordance with the guidelines set out by the Bond University Human Research Ethics Committee.

Data Sharing

The survey protocol is published. 24 The statistical code and the dataset are available from CS on request.

REFERENCES

1. Divine GW, Brown JT, Frazier LM. The unit of analysis error in studies about physicians' patient care behavior. J Gen Intern Med. 1992/11/01 1992;7(6):623-629. doi:10.1007/BF02599201

2. Campbell MK, Elbourne DR, Altman DG. CONSORT statement: extension to cluster randomised trials. BMJ. 2004;328(7441):702-708. doi:10.1136/bmj.328.7441.702

3. Wears RL. Advanced Statistics:Statistical Methods for Analyzing Cluster and Cluster-randomized Data. Academic Emergency Medicine. 2002;9(4):330-341. doi:https://doi.org/10.1197/aemj.9.4.330

4. Cook JA, Bruckner T, MacLennan GS, Seiler CM. Clustering in surgical trials - database of intracluster correlations. Article. Trials. 2012;132. doi:10.1186/1745-6215-13-2

5. Schnelle C, Clark J, Mascord R, Jones M. Is There a Surgeons' Effect on Patients' Physical Health, Beyond the Intervention, That Requires Further Investigation? A Systematic Review. Ther Clin Risk Manag. 2022;(18):467-490. doi:https://doi.org/10.2147/TCRM.S357934

6. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. Clinical Epidemiology. 2022 Jul 18 2022;14:851-870. PMC9307914. doi:10.2147/CLEP.S357927

7. Schnelle C, Clark J, Mascord R, Jones M. Is there a doctors' effect on patients' physical health, beyond the intervention and all known factors? A systematic review. Ther Clin Risk Manag. 2022;18:721-737. doi:10.2147/TCRM.S372464

8. Papachristofi O, Sharples LD, Mackay JH, Nashef SAM, Fletcher SN, Klein AA. The contribution of the anaesthetist to risk-adjusted mortality after cardiac surgery. Article. Anaesthesia. 2016;71(2):138-146. doi:10.1111/anae.13291

9. Glance LG, Hannan EL, Fleisher LA, et al. Feasibility of Report Cards for Measuring Anesthesiologist Quality for Cardiac Surgery. Anesthesia &

Analgesia. 2016;122(5):1603-1613. doi:10.1213/ane.0000000000001252

10. Churchill LR, Schenck D. Healing Skills for Medical Practice. Annals of Internal Medicine. 2008;149(10):720-724. doi:10.7326/0003-4819-149-10-200811180-00006 %m 19017590

11. Hanyok LA, Hellmann DB, Rand C, Ziegelstein RC. Practicing patient-centered care: The questions clinically excellent physicians use to get to know their patients as individuals. Article. Patient. 2012;5(3):141-145. doi:10.2165/11599530

12. Schenck D, Churchill L. Healers: extraordinary clinicians at work. Oxford University Press; 2011.

13. Steiner-Hofbauer V, Schrank B, Holzinger A. What is a good doctor? Review. Wiener Medizinische Wochenschrift. 2018;168(15-16):398-405. doi:10.1007/s10354-017-0597-8

14. Kim JH, Tor PC, King J, Seo JS. A Korean survey on qualities and definition of a good psychiatrist. Article. Journal of Korean Medical Science. 2015;30(5):632-638. doi:10.3346/jkms.2015.30.5.632

15. Lambe P, Bristow D. What are the most important non-academic attributes of good doctors a Delphi survey of clinicians. Article. Medical Teacher. 2010;32(8):e347-e354. doi:10.3109/0142159X.2010.490603

16. Miratashi Yazdi SN, Nedjat S, Majdzadeh R, Arbabi M. Who is a good doctor? Patients & physicians' perspectives. Letter. Iranian Journal of Public Health. 2015;44(1):150-152.

17. Whitehead CR. The good doctor in medical education 1910–2010: A critical discourse analysis. University of Toronto (Canada); 2011.

18. Bianco Jr FJ, Vickers AJ, Cronin AM, et al. Variations Among Experienced Surgeons in Cancer Control After Open Radical Prostatectomy. Article. Journal of Urology. 2010;183(3):977-983. doi:10.1016/j.juro.2009.11.015

19. Brown EC, Robicsek A, Billings LK, et al. Evaluating Primary Care Physician

Performance in Diabetes Glucose Control. Article. Am J Med Qual. 2016;31(5):392-399. doi:10.1177/1062860615585138

20. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. Mayo Clin Proc. Nov 2013;88(11):1250-8. doi:10.1016/j.mayocp.2013.07.017

21. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors Associated with Reoperation in Breast-Conserving Surgery for Cancer: A Prospective Study of American Society of Breast Surgeon Members. Ann Surg Oncol. Oct 2019;26(10):3321-3336. doi:10.1245/s10434-019-07547-w

22. Rudmik L, Xu Y, Alt JA, et al. Evaluating Surgeon-Specific Performance for Endoscopic Sinus Surgery. JAMA Otolaryngol Head Neck Surg. Sep 1 2017;143(9):891-898. doi:10.1001/jamaoto.2017.0752

23. Schnelle C, Jones MA. Qualitative Study of Medical Doctors on Their Experiences and Opinions of the Characteristics of Exceptionally Good Doctors. Adv Med Educ Pract. 2022;13:717-731. doi:https://doi.org/10.2147/AMEP.S370980

24. Schnelle C, Jones MA. Characteristics of exceptionally good doctors: A protocol for a cross-sectional survey of adults. Patient Related Outcome Measures. 2022;(13):181-188. doi:10.2147/PROM.S376033

25. Vandenbroucke JP, von Elm E, Altman DG, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and Elaboration. PLOS Medicine. 2007;4(10):e297. doi:10.1371/journal.pmed.0040297

26. Zheng M. Conceptualization of cross-sectional mixed methods studies in health science: a methodological review. International Journal of Quantitative and Qualitative Research Methods. 2015;3(2):66-87.

27. Amazon. Amazon Mechanical Turk. Accessed February 5th, 2022, 2022. https://www.mturk.com/

28. Boas TC, Christenson DP, Glick DM. Recruiting large online samples in the United States and India: Facebook, Mechanical Turk, and Qualtrics. Article. Political Sci Res Methods. 2020;8(2):232-250. doi:10.1017/psrm.2018.28

29. Buhrmester M, Kwang T, Gosling SD. Amazon's mechanical Turk: A new source of inexpensive, yet high-quality, data? Article. Perspect Psychol Sci. 2011;6(1):3-5. doi:10.1177/1745691610393980

30. Mortensen K, Hughes TL. Comparing Amazon's Mechanical Turk Platform to Conventional Data Collection Methods in the Health and Medical Research Literature. Review. J Gen Intern Med. 2018;33(4):533-538. doi:10.1007/s11606-017-4246-0

31. Buhrmester MD, Talaifar S, Gosling SD. An Evaluation of Amazon's Mechanical Turk, Its Rapid Rise, and Its Effective Use. Article. Perspect Psychol Sci. 2018;13(2):149-154. doi:10.1177/1745691617706516

32. Krosnick JA, Narayan S, Smith WR. Satisficing in surveys: Initial evidence. New Directions for Evaluation. 1996;1996(70):29-44. doi:https://doi.org/10.1002/ev.1033

33. Baxter MJ, Beardah CC, Wright RVS. Some Archaeological Applications of Kernel Density Estimates. Journal of Archaeological Science. 1997/04/01/1997;24(4):347–354. doi:https://doi.org/10.1006/jasc.1996.0119

34. Barge S, Gehlbach H. Using the Theory of Satisficing to Evaluate the Quality of Survey Data. Research in Higher Education. 2012/03/01 2012;53(2):182-200. doi:10.1007/s11162-011-9251-2

35. Madden J. What makes a good doctor. St George's University. Updated July 6, 2021. Accessed June 14th, 2022, 2022. https://www.sgu.edu/blog/medical/what-makes-a-good-doctor/

36. Murphy J. 10 qualities that make a good doctor. MDLinx. Accessed June 14th, 2022, 2022. https://www.mdlinx.com/article/do-you-have-the-10-qualities-that-make-a-good-doctor/lfc-2631

37. Jones D. What are the character strengths of a good doctor? Jubilee Centre for Character and Virtues: Insight Series. 2013;

38. Wilkinson E. The patients who decide what makes a good doctor. BMJ. 2018;361:k1829. doi:10.1136/bmj.k1829

39. Cook C, Heath F, Thompson RL. A Meta-Analysis of Response Rates in Web- or Internet-Based Surveys. Educational and Psychological Measurement. 2000;60(6):821-836. doi:10.1177/00131640021970934

Tables

Table 1 Respondent demographics (N=552) – Study 5, Survey of Adults

Respondent demographics	**n**	**%**
Demographics		
Consented	587	100.0
Stopped at whether met EGD	35	6.0
Satisficers	35	6.0
Did not finish	12	2.0
Finished survey	505	86.0
Sex (n=505)		
Male	237	46.9
Female	266	52.7
Non-binary	1	0.2
Prefer not to say	1	0.2
Age (n=505)		
18-24	24	4.8
25-34	214	42.4
35-44	64	12.7
45-54	36	7.1
55-64	97	19.2
65+	70	13.9
Education (n=505)		
No schooling completed	1	0.2
Grades 1 through 11	1	0.2
12th grade-no diploma	3	0.6
High school diploma	24	4.8
High school diploma equivalent	8	1.6
Some college (university)	21	4.2
1+ years of college, no degree	22	4.4
Associates degree	26	5.2
Bachelor's degree	277	54.9
Master's degree	96	19.0
Profess. degree (MD/ODS/DVM/LLB/JD}	8	1.6
Doctorate degree	18	3.6
Country of Origin by IP address (n=552)		
United States of America	502	90.9
India	21	3.8
Brazil	7	1.3

Respondent demographics	n	%
Canada	6	1.1
Netherlands	5	0.9
United Kingdom	3	0.5
Italy	3	0.5
Unknown	3	0.5
Romania	1	0.2
Bangladesh	1	0.2
Visits to any Doctor in previous 12 months? (n=505)		
Not at all	25	5.0
1-2 times	135	26.7
3-5 times	207	41.0
6-10 times	103	20.4
11-20 times	28	5.5
21-50 times	6	1.2
51 or more times	1	0.2
Number of doctors met in life? (n=505)		
1-5	145	28.7
6-10	171	33.9
11-20	108	21.4
21-50	67	13.3
51-100	11	2.2
101 or more	3	0.6
Number of exceptionally good doctors met in life? (n=496)		
1	69	13.9
2	185	37.3
3	138	27.8
4	51	10.3
5 or more	53	10.7
Relationship to exceptionally good doctor? (n=522)		
I have been treated by one	469	89.9
I have met one	38	7.3
I know of one	10	1.9
None of the above	5	1.0

Table 2 Doctor information (N=517) – Survey of Adults

This table is best viewed while looking at the survey questions themselves to give context to the entries on this table.

Doctor Information		**n**	**%**
Demographics			
Sex (n=517)			
	Male	309	59.8
	Female	208	40.2
Age, estimated (n=517)			
	Under 25 years	6	1.2
	25-34	185	35.8
	35-44	155	30.0
	45-54	113	21.9
	55-64	53	10.3
	65+	5	1.0
Type of doctor (n=517)			
	Primary Care or GP	214	41.4
	Hospital non-specialist	11	2.1
	Likely private non-specialist	3	0.6
	Subtotal	**228**	**44.1**
	Hospital specialist	174	33.7
	Private practice specialist	51	9.9
	Likely Hospital specialist	40	7.7
	Likely Hospital non-specialist	5	1.0
	Likely private specialist	12	2.3
	Subtotal	**282**	**54.6**
	Other	7	1.4
Specialty of doctor? (n=414)			
	Cardiologist	63	15.2
	All Surgeons (aggregate)	40	9.7
	Emergency physician	35	8.5
	Community child health	34	8.2
	Psychiatrist	30	7.3
	Dermatologist	23	5.6
	Neurologist	13	3.1
	Addiction medicine	12	2.9

Doctor Information		n	%
	Hospitalist /Internal Medicine	12	2.9
	Surgeon, general	12	2.9
	Not sure or not listed	12	2.9
	Obstetrician and gynecologist	9	2.2
	Oncologist	9	2.2
	Gastroenterologist / hepatologist	8	1.9
	Immunologist	8	1.9
	Medical administrator	8	1.9
	Public health physician	8	1.9
	Pediatrician	7	1.7
	Surgeon, orthopedic	7	1.7
	Surgeon, cardio-thoracic	6	1.5
	Urologist	6	1.5
	Endocrinologist	5	1.2
	Geriatrician	5	1.2
	Gynecological oncologist	5	1.2
	Intensive care physician	5	1.2
	Nephrologist	5	1.2
	Surgeon	5	1.2
	Anesthetist	4	1.0
	Neurosurgeon	4	1.0
	Pain medicine physician	4	1.0
	Ophthalmologist	3	0.7
	Surgeon, pediatric	3	0.7
	Immunologist and allergist	2	0.5
	Surgeon, otolaryngologist	2	0.5
	Infectious diseases physician	1	0.2
	Respiratory and sleep medicine	1	0.2
	Rheumatologist	1	0.2
	Surgeon, plastic	1	0.2
How did you come across the doctor? (n=954, multiple responses)			
	Recommended by a friend or family member or acquaintance	158	16.6
	The doctor treated a family member	141	14.8
	Recommended to me by a health care professional	128	13.4
	The doctor is a close or extended family member	88	9.2
	No recommendation, I found him or her myself	83	8.7
	The doctor was my employer or superior	60	6.3

Doctor Information		**n**	**%**
	The doctor treated a colleague of mine	59	6.2
	The doctor worked for me	54	5.7
	The doctor was a colleague	46	4.8
	The doctor was my teacher	44	4.6
	Discovered via an internet search	43	4.5
	The doctor was my student	32	3.4
	Other	18	1.9
How was doctor met? (n=513)			
	General health check-up	248	48.3
	Single health event	154	30.0
	Multiple health events	61	11.9
	Patient for a long time	31	6.0
	Other	19	3.7
Visits to exceptionally good doctor in previous 12 months (n=513)			
	Not at all	69	13.5
	1-2 times	144	28.1
	3-5 times	187	36.5
	6-10 times	84	16.4
	11-20 times	24	4.7
	21-50 times	4	0.8
	51 or more times	1	0.2
Doctor Evaluation		**n**	**%**
What made you think this doctor is exceptionally good? (n=1,910, 506 respondents)			
	It was an overall impression, there are multiple reasons	293	15.3
Category: Communication	I trust this doctor more than other doctors	224	11.7
Communication	I feel safe with this doctor, different to other doctors	194	10.2
	Because of this doctor am *healthier* than I would otherwise be	179	9.4
Communication	The doctor listens to me willingly to the end	159	8.3
	This doctor definitely or probably saved my life	154	8.1
	I had an outstanding outcome, unexpectedly successful operation or recovery	144	7.5
Communication	I know the doctor will do whatever is needed to help me or has done so	142	7.4
	Because of this doctor I am *much healthier* than would otherwise be	114	6.0
Communication	The doctor allows me to make my own decisions	110	5.8

Doctor Information		**n**	**%**
	The doctor treats financially poor patients at a discount or for free	83	4.4
Communication	Empowered me in my healing/treatment process much more than I thought possible	71	3.7
	The doctor is ready to extend guidelines and go off-label	43	2.3
Could you state your reasons why you said this earlier (the doctor improved your health) (n=925, 175 respondents)			
Treatment	The doctor gave me a different treatment that worked very well	181	19.6
Treatment	The doctor changed my medication with a big beneficial effect	152	16.4
Diagnosis	I had a diagnosis that transformed my life for the better	119	12.9
Diagnosis	Difficult diagnosis because my symptoms were obscure/hidden/unusual	100	10.8
Diagnosis	I had a diagnosis that other doctors missed	91	9.8
Treatment	The doctor removed medication or other treatments and I was much better	85	9.2
Treatment	I had a dangerous or difficult operation and it went well	83	9.0
Treatment	I was not expected to recover a from a terminal illness but did	55	6.0
Treatment	I was not expected to recover from a non-terminal illness but did	47	5.1
	Other	12	1.3
What is needed to be an exceptionally good doctor? (n=513)			
	Outstanding in a single item	108	21.4
	Outstanding in 2 or more areas	101	20.0
	Surgeon one area, others multiple areas	65	12.9
	Outstanding in everything	147	29.1
	Above average in everything	80	15.8
	Other	4	0.8
Likert ranking			
How often ranked as most important (n=384 respondents with at least one Likert score >= 4.5)			
	Knowledgeable	45	11.7
	Accurate diagnoser	35	9.1
	Cares for patient	27	7.0
	Good communicator	22	5.7
	Sees patient as whole person	19	5.0
	Very thorough in patient assessment	18	4.7

Doctor Information		n	%
	Honest	18	4.7
	Understanding / empathy	18	4.7
	Good at explaining	18	4.7
	Very good observer	17	4.4
	Patient trusts doctor	15	3.9
	Confident	12	3.1
	Listens, rarely interrupts	9	2.3
	Open minded	9	2.3
	Personable	9	2.3
	Is caring	8	2.1
	Connects on personal level	7	1.8
	Always on time	7	1.8
	Yes to patient's experience, knowledge	6	1.6
	Humble	6	1.6
	Great treatment room	6	1.6
	Courageous in difficult decisions	5	1.3
	Determined to get past obstacles	5	1.3
	Popular	5	1.3
	Good physical shape	5	1.3
	Has patience	5	1.3
	Good at following up	4	1.0
	No fear of doctor, may be friend	4	1.0
	Gives time needed	4	1.0
	Has integrity	4	1.0
	Organized	4	1.0
	Avoids medical terminology	4	1.0
	Good mental shape	3	0.8
	Adaptable to the unexpected	1	0.3
How often ranked as one of three most important (n=384 respondents with at least one Likert score >= 4.5, counting 1st place as 3, 2nd as 2, 3rd as 1, total 1,837)			
	Knowledgeable	166	9.0
	Accurate diagnoser	155	8.4
	Cares for patient	127	6.9
	Good communicator	113	6.2
	Very thorough in patient assessment	102	5.6
	Honest	90	4.9
	Patient trusts doctor	79	4.3
	Sees patient as whole person	79	4.3

Doctor Information		n	%
	Understanding / empathy	76	4.1
	Good at explaining	70	3.8
	Very good observer	69	3.8
	Open minded	65	3.5
	Is caring	58	3.2
	Confident	56	3.1
	Gives time needed	48	2.6
	Listens, rarely interrupts	42	2.3
	Personable	39	2.1
	Connects on personal level	36	2.0
	Has patience	35	1.9
	Courageous in difficult decisions	31	1.7
	Humble	31	1.7
	Determined to get past obstacles	28	1.5
	Always on time	28	1.5
	Yes to patient's experience, knowledge	27	1.5
	Good at following up	23	1.3
	Has integrity	23	1.3
	Avoids medical terminology	23	1.3
	Good physical shape	20	1.1
	Adaptable to the unexpected	19	1.0
	Great treatment room	19	1.0
	Organized	17	0.9
	Good mental shape	15	0.8
	No fear of doctor, may be friend	14	0.8
	Popular	14	0.8

Table 3 – 34 Likert questions - Survey of Adults

1	The doctor cares for patient
2	Acknowledges patient's experience and knowledge
3	Good at following things up or addressing items from prior consultation
4	Listens well, rarely or never interrupts
5	Connects with the patient on a personal level
6	The patient has no fear of the doctor and may see as a friend
7	The patient trusts the doctor
8	He/She sees patient as a whole person not just a collection of symptoms
9	The doctor is very thorough in the patient's assessment
10	The doctor is a very good observer
11	The doctor gives the patient the time needed
12	The doctor is confident
13	The doctor is courageous when making difficult decisions
14	The doctor is good at communicating
15	The doctor is adaptable, i.e. can respond to the unexpected
16	The doctor is honest
17	The doctor is humble
18	The doctor has integrity
19	The doctor is open minded
20	The doctor is organised
21	The doctor is personable
22	Determined to get past bureaucratic obstacles that affect treatment
23	The doctor is understanding and/ or shows empathy
24	The doctor avoids using medical terminology I don't understand
25	The doctor is accurate in diagnosing the issue/ problem
26	The doctor is good at explaining things
27	The doctor is knowledgeable
28	The doctor is popular (if you have seen the doctor with others)
29	The doctor is in good physical shape
30	The doctor is in good mental shape
31	The doctor is in an especially harmonious or cared for treatment room
32	The doctor is always on time
33	The doctor has patience
34	The doctor is caring

CHAPTER 6:

CONCLUSIONS AND IMPLICATIONS

6.1 Summary of Results

Study 1 – Is There a Surgeons' Effect on Patients' Physical Health, Beyond the Intervention, That Requires Further Investigation? A Systematic Review

This systematic review of 52 cohort studies and three randomised controlled trials of approximately 52,436 surgeons with 33 unique outcomes, showed that among the 31 studies that graded surgeons from best to worst there was a substantial number of both over- and under-performers in terms of patients' physical health outcomes. Fifteen studies reported multiple outliers whose performance was substantially above average, a group of practitioners that has, so far, not been investigated for insights into how they achieved their exceptional performance.

Among the 22 publications that reported the percentage of variation in patient outcomes the surgeons were responsible for, the percentage varied widely from 0.001% to 47.3% with a median of 4.0%. Composite outcome measures that combined multiple items such as the SANE score in shoulder surgery tended to show higher percentages than single item measures such as readmission.

Study 2 – Is There a Doctors' Effect on Patients' Physical Health, Beyond the Intervention and All Known Factors? A Systematic Review

Despite there being approximately 102 non-surgical medical specialties and billions of doctor visits by patients worldwide each year, a single systematic review was able to cover all published studies (n=30) that addressed whether non-surgeon medical doctors have an effect on patients' physical health after taking account of all known information about the doctor, the patient, and their environment. Of the 30 studies, 16 graded doctors by performance, 11 studies reported the variation in patients' physical health outcomes, 11 studies showed evidence of at least one exceptional performer, and three studies found no performance outliers.

The percentage of variation in patients' physical health outcomes due to the doctors ranged from zero to 33% with a median of 1.9%. This result suggests that the doctors' effect may be less in non-surgical doctors than it is for surgeons. Percentages varied markedly between studies, even for the same treatment and outcome, such as avoiding uncontrolled diabetes, something that may warrant further research. Findings suggest

that the percentage was higher for more common interventions and tended to rise with increases in the complexity of the components measured.

Study 3 – The Doctors' Effect on Patients' Physical Health Outcomes Beyond the Intervention: A Methodological Review

This review focused on the methods used in the included studies from the 2 systematic reviews described above. This included the methods used in the estimation and reporting of doctors' performances ranked from best to worst (fixed effects) and the percentage of variation in patients' physical health outcomes due to the doctor (random effects). It was concluded that these are best estimated via a multi-level multi-variable regression model after adjusting for all variables known to be associated with patient physical outcomes. Further, it was suggested which variables to report and how to report them including several suggestions for graphs that can be used to report fixed effects. If the recommendations of this review are adhered to, we can expect more consistent reporting leading to the possibility of meta-analysis able to be conducted.

Study 4 – Qualitative Study on Doctors' Opinions on and Experiences of Exceptionally Good Doctors

Study 4 was a qualitative study of 13 medical doctors on their opinions on what makes an exceptionally good doctor, whether they have met an exceptionally good doctor and whether they consider themselves to be such a doctor. Study 4 was preceded by a published protocol, shown in the appendix.

All 13 doctors reported having been influenced by the exceptionally good doctors they had met and were able to recall their experiences with great depth of details and evident enthusiasm. All 13 doctors expressed positive attitudes towards exceptionally good doctors, but most also reported that while some exceptionally good doctors are honoured and praised, others are undermined by their peers and the health system in which they work.

An important outcome of this study was the finding that being an exceptionally good doctor is based on more than being successful at interventions; it also includes exceptional diagnostics skills, overall medical knowledge, and the ability to interact well with patients.

Study 5 – Characteristics of exceptionally good doctors: a cross-sectional survey of adults

The final study was a survey of the general public on their experiences with exceptionally good doctors and followed a published protocol, included in the appendix. Approximately 86% of respondents could recall meeting an exceptionally good doctor and describe their experience in detail. In the survey, a doctor could be nominated as being exceptionally good for several different reasons, including for being an exceptional person, an exceptional diagnostician, or exceptional at delivering interventions, with all three categories being valued equally. A substantial number of the exceptional doctors (37%) were estimated to be aged 35 or younger and only a small proportion (11%) were aged over 55. Respondents aged 55 or older valued exceptionally good doctors more highly than their younger counterparts. Women also gave generally higher ratings for both exceptional and average doctors.

A seemingly important and to the author unexpected finding was the correlation between respondents agreeing with the statement “the doctor willingly listens to me to the end” and their overall positivity towards the exceptionally good doctor they nominated. Respondents considered doctors who listen attentively to be more knowledgeable, have more integrity, and to be more honest in addition to the more expected qualities of being more caring and good at communication. A final significant finding was that respondents who were most positive about exceptionally good doctors were also found to be substantially less positive about average doctors.

How do the studies of this PhD relate to each other and previous research?

This section is limited by the fact that there is very little previous research on what makes a good doctor and none on what makes an exceptionally good doctor.

Doctors are effect modifiers of interventions and it therefore can be important which doctor is chosen by patients and healthcare administrators

For most measured patients’ physical health outcomes, it matters which doctor is chosen.

A way to measure how much doctors matter to patients’ physical health outcomes is by calculating the percent of variation in patients’ outcomes that the doctor is responsible

for.

Even 1% between group variation in patient outcomes observed in a randomised controlled trial of aspirin to prevent heart attacks[43] led to an early termination of the trial with the placebo group offered aspirin. The importance of "small" such variations is further covered here.[35, pg 170,44, pg 53,45]

The measure that estimates the percentage of variation in outcomes due to a particular factor is called the intra-class correlation coefficient or ICC, with the aspirin trial being halted when it was clear that aspirin had an ICC of 1% and therefore was responsible for a 1% variation in patients' physical health outcomes.

The systematic review conducted as part of this PhD thesis showed that doctors vary in their ability to apply interventions and can have a substantial modifying effect on interventions applied as measured by their patients' physical health outcomes. It also showed the doctors' effect on patients' physical health outcomes has only been reported for a small number of interventions and outcomes. The Sackett definition of evidence-based medicine,[25] with the doctor's individual clinical expertise being regarded as an important component, is supported by the findin s of the systematic review as doctors clearly can have an effect over and above the effect of the intervention and that the effect can be large.

Some doctors have exceptionally good patient physical health outcomes

The two systematic reviews showed that, as doctors' performance varies, there are doctors whose outcomes are significantly better than the outcomes of the average doctor.[48,49,51-70] The Oxford English Dictionary defines a medical doctor as "a person who is qualified to diagnose and treat people who are ill"[71] which implies that being a doctor has an element of skill (qualified) in the pursuit of their work activities (diagnose and treat). A presumption here is that the doctor's aim is to make their patients less ill as a result of their skills and activities. As with all professions it would be expected that performance as a doctor would vary with some of that variation able to be explained by known factors such as their level of experience. If there are differences between doctors in their performance, then there is a range and the top of the range could reasonably be described as "exceptionally good" in terms of the outcome of their activities (diagnose and treat). As the aim of treatment is better patient health, then

those doctors who have exceptionally good patients' physical health outcomes are a group that could reasonably be labelled "exceptionally good doctors", i.e. exceptionally good doctors are, potentially inter alia, doctors whose patients have exceptionally good physical health outcomes as identified through studies 1, 2, and 3

As exceptionally good doctors exist, have other doctors and patients experienced exceptionally good doctors?

The term "exceptionally good doctor" has never been defined or scientifically examined before this PhD. Only the term 'good doctor' has received a small amount of relevant survey-based research which was mainly concerned with defining the term 'good doctor'.

To the authors' knowledge there are only four major publications in this area – a 2002 special edition of the BMJ[72] concluding that defining even a good doctor is impossible, a systematic review on what makes a good (not an exceptionally good) doctor[73] and two publications investigating so-called healers or extraordinary clinician nominated by acclaim.[74,75]

There are no surveys of doctors or members of the public of exceptionally good doctors.

Study 4 showed that doctors have clear and consistent opinions on what makes a doctor an exceptionally good doctor and therefore are aware that a clinician's contribution to the practise of evidence-based medicine can be important. With one exception, all interviewed doctors agreed that patients' physical health outcomes are one determinant, but the 13 interviewed doctors added further details, with the most common being that to be exceptionally good, a doctor needs to be highly knowledgeable but also have excellent communication skills.

The interviewed doctors added a host of other positive attributes such as humility, flexibilit , and the ability to listen, to the list of what makes an exceptionally good doctor. Further, the interviewees' encounters of such doctors were clearly remembered even after many years had passed and such doctors were strongly remembered role models. The interviewees considered exceptionally good doctors to be important in their life and to have added substantial value to the interviewees' ability to be a doctor.

It follows that exceptionally good doctors are not just valuable in patients' physical

health outcomes but can also be valuable for their colleagues.

Exceptionally good doctors receive feedback other than praise

Those interviewees who identified themselves as being exceptionally good relayed how much they were affected by and had to modify their ability to practise in order to respond to adversarial and destabilising behaviour from their colleagues and their employers and regulators. The other doctors interviewed also mentioned attacks on exceptionally good doctors they knew from peers and the health system.

Key results from the doctors' interviews used to survey the general public on exceptionally good doctors

A large majority (86%) of respondents of the survey of the general public knew at least one exceptionally good doctor and 74% at least two such doctors. Doctors were considered to be exceptionally good for any one of communication, diagnostic or intervention applying ability. Out of 505 completed and valid responses 388 described their experiences in 5-673 words. Older or female respondents or those who were patients of such a doctor for a long time gave higher Likert scores for positive characteristics than younger or male respondents. The 154 respondents who confirmed that the exceptionally good doctor willingly listened to them to the end gave substantially more positive Likert scores to the exceptional doctor for knowledge, honesty, and integrity, in addition to more positive scores on communication, being caring, empathetic and patient. These 154 respondents also gave lower scores to the average doctor than other respondents.

Therefore, both medical doctors and patients know exceptionally good doctors, have a strongly positive recollection of them and nominate multiple factors that make a doctor exceptionally good. Both groups emphasise the value of doctors listening to their patients.

Definition of the term “Exceptionally Good Doctor”

In the systematic reviews (studies 1 and 2), doctors with statistically significantly better patients’ physical health outcomes than the average doctor appeared in 38 out of 79 of the included papers. Such doctors were therefore exceptional performers with clearly better outcomes for patients.

The adjective “better” is the comparative form of the positive adjective “good”. Existing research on doctors uses the term “good doctor” to describe above average performers. The doctors with better patients’ health outcomes identified in the systematic reviews performed exceptionally well and we therefore chose the term “exceptionally good doctors” to describe such doctors. They were usually a small proportion of all doctors reviewed. An alternative descriptor could be the superlative of the adjective “good”, i.e. “best doctors”. We chose the term “exceptionally good doctor” to describe such doctors as the term “exceptional” is commonly used for other professions such as in “exceptional performer”, “exceptional cook”, and "exceptional lawyer”. In order to eliminate misunderstanding we chose “exceptionally good doctor” as it can be argued that Harold Shipman and Josef Mengele were also exceptional doctors.

We further explored the topic by asking 13 medical doctors in our qualitative study for their definition of “exceptionally good doctor”, their experiences of such doctors and whether they considered themselves to be such a doctor. None of them suggested an alternative term to describe such a doctor and there was a clear consensus that an exceptionally good doctor is a very knowledgeable doctor who is a very good communicator with patients and 12 of the 13 agreed that a doctor with exceptionally good patient health outcomes is an exceptionally good doctor.

We then further explored the term “exceptionally good doctor” with our patient pilot study and full survey. The term was readily understood with 86% of respondents professing to have met at least one such doctor. The survey respondents considered a wider range of doctors to be exceptionally good doctors. For the survey respondents, a doctor qualified to be exceptionally good if they were any of an unusually good communicator, diagnostician, or interventionist, i.e. a doctor qualified with just one of these characteristics was eligible.

Therefore, the term “exceptionally good doctor” has a more restrictive meaning for doctors than for patients but every doctor that a fellow medical doctor would consider

to be exceptionally good could also be considered exceptionally good by a patient. It could be argued that a patient who has been to 15 doctors with only the 16th providing an accurate diagnosis, or the right treatment, would consider the 16th doctor to be exceptionally good purely on the strength of either their diagnosis or their intervention in comparison to the previous 15 doctors.

Implications

Implications for practice

Choosing doctors and their employment environment to benefit patients

As doctors' performances differ and matter to patients' physical health outcomes, it becomes important which doctors are chosen for employment, consultation, referral, or further training. As it is currently not known why some doctors have substantially better patients' physical health outcomes it would be worth considering which day-to-day management practices may be beneficial or detrimental to doctors' performances. For example, asking trainee surgeons and other doctors to work a level of hours where they show signs of extreme exhaustion may well have an influence on patients' physical health outcomes as doctors' performances differ in their quality of healthcare and exhausted doctors may be less effective. Finding out which management methods lead to better or worse performance seems a worthwhile pursuit as it, for example, may lead to fewer lawsuits against hospitals. Identifying doctors who have consistently significantly better or worse patients' physical health outcomes in order to improve their performance or to learn from their excellent performance is important for patient health care and for their colleagues.

Data collection considerations

Collecting data on patients' physical health outcomes and their doctors, diagnoses, and interventions will allow identification of positive and negative outliers and those who are neither, potentially offering ways to improve all three groups by listening to the requirements of the positive outliers, teaching or providing role models for those who are not outliers, and taking measures to support negative outliers to improve or, if that is not possible, enact necessary consequences. However, collecting the right data is crucial and the methodological review provides some guidance.

Doctors listening to patients – potential benefits

Listening to their patients makes exceptionally good doctors and perhaps all doctors appear to be substantially better in their patients' eyes. This could be a criterion for the general public in identifying a better or even exceptionally good doctor. This could be due to the doctor having gathered more information by not interrupting, is able to make a more accurate diagnosis, or is more attuned to the patient's preferences, making it easier to tailor a suitable intervention, or the attentiveness itself might have a placebo effect, making the patient feel or be better, even if the doctor engages in no further action. In any case, improving doctors' listening ability seems to be an intervention with very little downside if it doesn't lead to excessive consultation times and a very large potential upside with patients holding doctors in substantially higher esteem.

Listening, with its large effect on patient's perceptions is therefore an important part of both approaches to evidence-based medicine, whether it is Sackett's inclusive approach being more supportive "*in more effective and efficient diagnosis and in the more thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care.*[25]" or supporting Djulbegovic and Guyatt's more distant approach[26] supporting "*with patient's values and preferences through shared decision making*". More simply, it might be useful to add more research to the "clinical expertise" part of the definition of evidence-based medicine in this popular and oft-cited primer for doctors:[76]

"Evidence-based medicine (EBM) requires the integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances."

The importance of doctors' authority for their effectiveness and health

Giving doctors more authority could lead to better outcomes than provided by guidelines alone and could also benefit doctors' physical and mental health as they will have more control over their work.

This possibility is reinforced in that one of the findings of the Whitehall II study[77] of UK public servants showed that workers who have little control over their work have worse morbidity and mortality outcomes than those who have more control over their work. Doctors have a major and at the time of writing (October, 2022) sharply increasing issue with burnout[78] and giving doctors more authority and therefore more

control about their ability to practice, in interventions where doctors are substantial effect modifiers of interventions, giving more authority may have a substantial positive effect on doctors' physical and mental health.

There is an effect modifier of interventions that is applied billions of times each year worldwide. That effect modifier is the doctor herself or himself. This thesis shows that there are extensive differences in how well this effect modifier (doctors) is applied and received, and more efficiency in maximising this modifier of the effectiveness of interventions may be rewarded with large improvements in healthcare, and in the execution of evidence-based medicine.

Implications for research

Very few combinations of interventions and outcomes have been researched for a doctors' effect on patients' physical health despite the potential size of the effect

We now know that doctors make a difference to patients' physical health and that difference varies substantially among interventions and measured outcomes, but we only have data for a few combinations of interventions and outcomes. Since more such data is easily available in the form of already cleaned-up cohort study datasets as per the Methodological Review in this thesis, investigating such datasets seems to be a particularly fruitful line of enquiry.

This is especially so as the doctors' effect can be large, seems to generally be larger the more common a treatment is and the more components an outcome measure has, as ubiquity and larger component numbers may give better doctors multiple opportunities to create better patient physical health outcomes.

Gaining more understanding of doctors with exceptionally good patients' physical health outcomes

Contacting doctors who have been identified through a cohort study or randomised controlled trials as having exceptionally good patients' health outcomes, could lead to more detailed research, beyond simply identifying their existence, as the publications that are part of this thesis do. Exploring queries such as what made them exceptional, what supports their excellence, and what hinders them in their practice? What and how can other doctors learn from them? Does their work have a positive

financial impact on the health care system they work in? How big a difference do they make in their patients' quality of life?

When doctors make a measurable positive difference in the lives of their patients, then the implication is that some doctors are better and some doctors are worse; if all doctors provided the same quality of work, then what difference they made could not be easily measured unless compared with other types of health practitioners. If all doctors have the same effect, any variance in patients' physical health outcomes would in such a case be due to other causes.

Further qualitative studies of medical doctors and their experiences of exceptionally good doctors could give more insights into such doctors. It could provide more details on when, how, and why exceptionally good doctors encounter difficulties with their peers and with the health system.

Defining the term "Exceptionally Good Doctor"

In order to define the term "Exceptionally Good Doctor" more rigorously, future research can investigate which attributes do contribute to a doctor being considered to be an exceptionally good doctor, such as diagnostic ability, intervention skill, communication and especially listening skills and by how much they contribute. A popular tool in health economics to investigate which of multiple competing characteristics apply in what proportion in healthcare is Discrete Choice Experiment (DCE), a survey tool which can give more clarity on which of multiple options describe such doctors.[79]

Further research on doctors willingly listening to the end of their patients speaking

The concept of willingly listening to the end is worth researching further. Does it also elevate patients' opinion and experiences of average doctors who listen or is it limited to exceptionally good doctors?

The phenomenon that those patients who value exceptionally good doctors particularly highly have a substantially less favourable opinion of the average doctor is worth researching to identify the cause of this discrepancy.

Interviewing patients with exceptionally good experiences

Qualitative studies interviewing patients with particularly positive doctor experiences may also be worthwhile, giving more details on exceptional doctors from the patient perspective.

Researching when and how exceptionally good doctors are undermined and researching remedies of such behaviour

Finally, the phenomenon that medical doctors and health systems are just as likely to undermine as to praise their best practitioners should be thoroughly investigated, as such a toxic culture would have a deeply negative effect on doctors by reducing their incentive to be excellent and by limiting or crippling the activities of the best doctors. The average doctor is already an exceptional practitioner. Forcing them to work in an environment where there are incentives to be less than excellent is wasteful.

Conclusions

The Research aims of this PhD research were to determine:

(1) whether doctors affect patients' physical health, and if so;

(2) how large is the doctor's effect on patient's physical health;

(3) how common are exceptionally good doctors;

(4) the characteristics of exceptionally good doctors.

Re (1): Doctors affect patients physical health in addition to the intervention and do so at varying but often substantial levels.

(2): The effect ranges from the negligible to the large, depending on the intervention and the outcome measured.

(3): Doctors with exceptionally good patients' physical health outcomes appear regularly at varying proportions depending on the intervention and outcome. Every doctor that was interviewed and 86% of surveyed patients experienced at least one exceptionally good doctor.

(4): Doctors consider a doctor with both exceptional knowledge and ability to communicate as exceptionally good. Patients consider a doctor that is any of being a very good communicator, or diagnostician, or interventionist as being exceptionally good and are particularly positive towards doctors that willingly listen to them to the end.

The lack of research on exceptionally good doctors may be unsurprising, as some professions, such as chefs and lawyers, have external yardsticks, such as awards, ranges of hourly rates, or extensive customer feedback to act as indicators of their abilities and success, but this is less common in the medical profession. Though, as

doctors have a direct influence on patients' health and often their lives, it seems to be particularly worthwhile to find out whether it is possible to know if doctors have different levels of inherent ability and whether there are doctors that are exceptionally good, especially as evidence-based medicine historically put great value on the role of the doctor in the interaction of doctor, patient, and intervention.
Re-investigating the doctor's role in evidence-based medicine in general seems a worthwhile approach to improve healthcare.

Therefore an answer to the question, "What's a good doctor and how do you make one?"[80] is very similar to asking "What makes an exceptional doctor?, "A good or exceptionally good doctor is a doctor with significantly better patient health outcomes than the average doctor but can also be an exceptional communicator and, especially, is a doctor who listens, who does not interrupt." Factor analysis in study 5 showed that these items are highly correlated in patients' minds, i.e. a good communicator is strongly associated with better patient health outcomes as there was only a single relevant factor identifying exceptionally good doctors. In addition to that definition, a possible answer to "and how do you make one?" could be "Many good and even exceptionally good doctors already exist and can be identified. Unless good doctors' abilities are wholly innate, more good doctors can be made by learning from those who already are good doctors and by removing disincentives to becoming an exceptionally good doctor".

REFERENCES

1. Schnelle C, Clark J, Mascord R, Jones M. Is There a Surgeons' Effect on Patients' Physical Health, Beyond the Intervention, That Requires Further Investigation? A Systematic Review. *Ther Clin Risk Manag*. 2022;(18):467-490. doi:https://doi.org/10.2147/TCRM.S357934

2. Schnelle C, Clark J, Mascord R, Jones M. Is there a doctors' effect on patients' physical health, beyond the intervention and all known factors? A systematic review. *Ther Clin Risk Manag*. 2022;18:721-737. doi:10.2147/TCRM.S372464

3. Schnelle C, Jones MA. Protocol for a Qualitative Study on Doctors' Opinions on and Experiences of Exceptionally Good Doctors. *Adv Med Educ Pract*. 2022;13:103-109. doi:10.2147/AMEP.S343554

4. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. *Clinical Epidemiology*. 2022 Jul 18 2022;14:851-870. PMC9307914. doi:10.2147/CLEP.S357927

5. Schnelle C, Jones MA. Qualitative Study of Medical Doctors on Their Experiences and Opinions of the Characteristics of Exceptionally Good Doctors. *Adv Med Educ Pract*. 2022;13:717-731. doi:https://doi.org/10.2147/AMEP.S370980

6. Schnelle C, Jones MA. Characteristics of exceptionally good doctors: A protocol for a cross-sectional survey of adults. *Patient Related Outcome Measures*. 2022;(13):181-188. doi:10.2147/PROM.S376033

7. Press DM. Dove Medical Press Limited Terms and Conditions. Accessed Jul 30, 2022, 2022. https://www.dovepress.com/terms.php

8. National Ambulatory Medical Care Survey: 2018 National Summary Tables (2018).

9. OECD. Doctors' consultations (indicator). OECD. Accessed Accessed on 23 March 2022, https://data.oecd.org/healthcare/doctors-consultations.htm

10. Dyer C. Investigators should be trained to "think dirty" about cause of death, Shipman report says. *BMJ*. 2003;327(7407):123. doi:10.1136/bmj.327.7407.123-c

11. Seidelman WE. The professional origins of Dr. Joseph Mengele. Article. *CAN MED ASSOC J*. 1985;133(11):1169-1171.

12. Wilt TJ, Shamliyan TA, Taylor BC, MacDonald R, Kane RL. Association Between Hospital and Surgeon Radical Prostatectomy Volume and Patient

Outcomes: A Systematic Review. Article. *Journal of Urology*. 2008;180(3):820-829. doi:10.1016/j.juro.2008.05.010

13. Maruthappu M, Gilbert BJ, El-Harasis MA, et al. The influence of volume and experience on individual surgical performance: A systematic review. Review. *Annals of Surgery*. 2015;261(4):642-647. doi:10.1097/SLA.0000000000000852

14. Lester PB, Diener ED, Seligman M. Top Performers Have a Superpower: Happiness. *MIT Sloan Management Review*. Spring

Spring 2022

2022-05-02 2022;63(3):57-61.

15. Ready DA, Conger JA. Why leadership-development efforts fail. *MIT Sloan Management Review*. Spring

Spring 2003

2021-09-09 2003;44(3):83-88.

16. Burkus D, Osula B. Faulty Intel in the War for Talent: Replacing the Assumptions of Talent Management with Evidence-based Strategies. *Journal of Business Studies Quarterly*. Dec 2011

2021-09-09 2011;3(2):1-9.

17. Klitgaard RE. Identifying Exceptional Performers. *Policy Analysis*. 1978;4(4):529-547.

18. Ericsson KA, Nandagopal K, Roring RW. Toward a Science of Exceptional Achievement. *Annals of the New York Academy of Sciences*. 2009;1172(1):199-217. doi:https://doi.org/10.1196/annals.1393.001

19. Ruthsatz J. The Summation Theory as a multivariate approach to exceptional performers. *Intelligence*. 2014/07/01/ 2014;45:118-119. doi:https://doi.org/10.1016/j.intell.2014.02.005

20. Turley RT, Bieman JM. Competencies of exceptional and nonexceptional software engineers. *Journal of Systems and Software*. 1995/01/01/ 1995;28(1):19-38. doi:https://doi.org/10.1016/0164-1212(94)00078-2

21. Judy LW, Diane BW. Investigating traits of top performing software developers. *Information Technology & People*. 2000

2021-09-09 2000;13(3):186. doi:https://doi.org/10.1108/09593840010377626

22. Collings DG, McDonnell A, Scullion H. Global talent management: the law of the few. *Poznan University of Economics Review*. 2009;9(2)

23. Aguinis H, O'Boyle Jr. E. Star Performers in Twenty-First Century Organizations. *Personnel Psychology*. 2014;67(2):313-350. doi:https://doi.org/10.1111/peps.12054

24. Asgari E, Hunt RA, Lerner DA, Townsend DM, Hayward MLA, Kiefer K. Red Giants or Black Holes? The Antecedent Conditions and Multilevel Impacts of Star Performers. *Academy of Management Annals*. 2021;15(1):223-265. doi:10.5465/annals.2019.0061

25. Sackett DL. *Evidence-based medicine*. Encyclopedia of Biostatistics. Wiley Online Library; 2000.

26. Djulbegovic B, Guyatt GH. Progress in evidence-based medicine: a quarter century on. *Lancet*. 2017/07/22/ 2017;390(10092):415-423. doi:https://doi.org/10.1016/S0140-6736(16)31592-6

27. The BMJ ‘s wild goose chase. Article. *BMJ*. 2002;325(7366)doi:10.1136/bmj.325.7366.0/i

28. Howick J. Exploring the asymmetrical relationship between the power of finance bias and evidence. Article. *Perspect Biol Med*. 2019;62(1):159-187. doi:10.1353/pbm.2019.0009

29. De Craen A, Kaptchuk TJ, Tijssen J, Kleijnen J. Placebos and placebo effects in medicine: historical overview. *Journal of the Royal Society of Medicine*. 1999;92(10):511.

30. Moerman DE. *Meaning, Medicine, and the "Placebo Effect"*. vol 28. 2002.

31. Panagioti M, Geraghty K, Johnson J, et al. Association between Physician Burnout and Patient Safety, Professionalism, and Patient Satisfaction: A Systematic Review and Meta-analysis. Review. *JAMA Internal Medicine*. 2018;178(10):1317-1330. doi:10.1001/jamainternmed.2018.3713

32. Panagioti M, Hodkinson A, Esmail A. Clarifications Needed on Study of Association between Physician Burnout and Patient Safety - Reply. Letter. *JAMA Internal Medicine*. 2019;179(4):593-594. doi:10.1001/jamainternmed.2019.0152

33. Bauchner H, Redberg RF. Notice of Retraction: Panagioti et al. Association Between Physician Burnout and Patient Safety, Professionalism, and Patient Satisfaction: A Systematic Review and Meta-analysis. JAMA Intern Med. 2018;178(10):1317-1331. *JAMA Internal Medicine*. 2020;doi:10.1001/jamainternmed.2020.1755

34. Wampold BE, Imel ZE. *The great psychotherapy debate: The evidence for what makes psychotherapy work: Second edition*. The Great Psychotherapy Debate: The Evidence for What Makes Psychotherapy Work: Second Edition. Taylor and Francis Inc.; 2015:1-323.

35. Baldwin SA, Imel Z. Therapist effects: Findings and methods. *Bergin and Garfield's handbook of psychotherapy and behavior change*. 2013;6:258-297.

36. Akobeng AK. Understanding randomised controlled trials. *Archives of Disease in Childhood*. 2005;90(8):840-844. doi:10.1136/adc.2004.058222

37. Ho JY, Hendi AS. Recent trends in life expectancy across high income countries: retrospective observational study. *BMJ*. 2018;362:k2562. doi:10.1136/bmj.k2562

38. OECD. *Obesity Update 2017*. 2017. http://www.oecd.org/health/health-systems/Obesity-Update-2017.pdf

http://www.oecd.org/health/obesity-update.htm

39. Basu S, Phillips RS, Berkowitz SA, Landon BE, Bitton A, Phillips RL. Estimated Effect on Life Expectancy of Alleviating Primary Care Shortages in the United States. *Ann Intern Med*. Jul 2021;174(7):920-926. doi:10.7326/m20-7381

40. Basu S, Berkowitz SA, Phillips RL, Bitton A, Landon BE, Phillips RS. Association of Primary Care Physician Supply With Population Mortality in the United States, 2005-2015. *JAMA Intern Med*. Apr 1 2019;179(4):506-514. doi:10.1001/jamainternmed.2018.7624

41. Macinko J, Starfield B, Shi L. Quantifying the Health Benefits of Primary Care Physician Supply in the United States. *International Journal of Health Services*. 2007;37(1):111-126. doi:10.2190/3431-g6t7-37m8-p224

42. Huang X, Lin J, Demner-Fushman D. Evaluation of PICO as a knowledge representation for clinical questions. *AMIA Annu Symp Proc*. 2006;2006:359-363.

43. Steering committee of the physicians' health study research group. Final Report on the Aspirin Component of the Ongoing Physicians' Health Study. *New*

England Journal of Medicine. 1989;321(3):129-135. doi:10.1056/nejm198907203210301

44. Wampold BE. *The Great Psychotherapy Debate: Models, Methods, and Findings*. Lawrence Erlbaum Associates, Inc.; 2001.

45. Kraemer HC, Kupfer DJ. Size of Treatment Effects and Their Importance to Clinical Research and Practice. *Biological Psychiatry*. 2006/06/01/ 2006;59(11):990-996. doi:https://doi.org/10.1016/j.biopsych.2005.09.014

46. Begg CB, Riedel ER, Bach PB, et al. Variations in morbidity after radical prostatectomy. Article. *New Engl J Med*. 2002;346(15):1138-1144. doi:10.1056/NEJMsa011788

47. Bianco FJ, Jr., Riedel ER, Begg CB, Kattan MW, Scardino PT. Variations among high volume surgeons in the rate of complications after radical prostatectomy: further evidence that technique matters. *J Urol*. Jun 2005;173(6):2099-103. doi:10.1097/01.ju.0000158163.21079.66

48. Bianco Jr FJ, Vickers AJ, Cronin AM, et al. Variations Among Experienced Surgeons in Cancer Control After Open Radical Prostatectomy. Article. *Journal of Urology*. 2010;183(3):977-983. doi:10.1016/j.juro.2009.11.015

49. Brown EC, Robicsek A, Billings LK, et al. Evaluating Primary Care Physician Performance in Diabetes Glucose Control. Article. *Am J Med Qual*. 2016;31(5):392-399. doi:10.1177/1062860615585138

50. Glance LG, Dick A, Osler TM, Li Y, Mukamel DB. Impact of changing the statistical methodology on hospital and surgeon ranking: The case of the New York State cardiac surgery report card. Article. *Medical Care*. 2006;44(4):311-319. doi:10.1097/01.mlr.0000204106.64619.2a

51. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. *Mayo Clin Proc*. Nov 2013;88(11):1250-8. doi:10.1016/j.mayocp.2013.07.017

52. Harley M, Mohammed MA, Hussain S, Yates J, Almasri A. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. Article. *British Medical Journal*. 2005;330(7497):929-932. doi:10.1136/bmj.38377.675440.8F

53. Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing performance of PCI performing hospitals and cardiologists: demonstration

of utility using the New York hospital mortality data. *Catheter Cardiovasc Interv*. Apr 1 2009;73(5):589-94. doi:10.1002/ccd.21893

54. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors Associated with Reoperation in Breast-Conserving Surgery for Cancer: A Prospective Study of American Society of Breast Surgeon Members. *Ann Surg Oncol*. Oct 2019;26(10):3321-3336. doi:10.1245/s10434-019-07547-w

55. Rudmik L, Xu Y, Alt JA, et al. Evaluating Surgeon-Specific Performance for Endoscopic Sinus Surgery. *JAMA Otolaryngol Head Neck Surg*. Sep 1 2017;143(9):891-898. doi:10.1001/jamaoto.2017.0752

56. Aquina CT, Blumberg N, Probst CP, et al. Significant Variation in Blood Transfusion Practice Persists following Upper GI Cancer Resection. Article. *J Gastrointest Surg*. 2015;19(11):1927-1937. doi:10.1007/s11605-015-2903-3

57. Glance LG, Hannan EL, Fleisher LA, et al. Feasibility of Report Cards for Measuring Anesthesiologist Quality for Cardiac Surgery. *Anesthesia & Analgesia*. 2016;122(5):1603-1613. doi:10.1213/ane.0000000000001252

58. Healy MA, Regenbogen SE, Kanters AE, et al. Surgeon Variation in Complications With Minimally Invasive and Open Colectomy: Results From the Michigan Surgical Quality Collaborative. *JAMA Surg*. Sep 1 2017;152(9):860-867. doi:10.1001/jamasurg.2017.1527

59. Quinn CM, Bilimoria KY, Chung JW, Ko CY, Cohen ME, Stulberg JJ. Creating Individual Surgeon Performance Assessments in a Statewide Hospital Surgical Quality Improvement Collaborative. Article. *Journal of the American College of Surgeons*. 2018;227(3):303-312.e3. doi:10.1016/j.jamcollsurg.2018.06.002

60. Singh S, Sparapani R, Wang MC. Variations in 30-day readmissions and length of stay among spine surgeons: a national study of elective spine surgery among US Medicare beneficiaries. *J Neurosurg Spine*. Sep 2018;29(3):286-291. doi:10.3171/2018.1.Spine171064

61. Bolling SF, Li S, O'Brien SM, Brennan JM, Prager RL, Gammie JS. Predictors of mitral valve repair: Clinical and surgeon factors. Article. *Annals of Thoracic Surgery*. 2010;90(6):1904-1911. doi:10.1016/j.athoracsur.2010.07.062

62. Bridgewater B. Mortality data in adult cardiac surgery for named surgeons: Retrospective examination of prospectively collected data on coronary artery surgery and aortic valve replacement. Article. *British Medical Journal*. 2005;330(7490):506-510. doi:10.1136/bmj.330.7490.506

63. Burns EM, Bottle A, Aylin P, Darzi A, John Nicholls R, Faiz O. Variation in reoperation after colorectal surgery in England as an indicator of surgical performance: Retrospective analysis of Hospital Episode Statistics. Article. *BMJ (Online)*. 2011;343(7820)d4836. doi:10.1136/bmj.d4836

64. Goodwin JS, Lin YL, Singh S, Kuo YF. Variation in length of stay and outcomes among hospitalized patients attributable to hospitals and hospitalists. *J Gen Intern Med*. Mar 2013;28(3):370-6. doi:10.1007/s11606-012-2255-6

65. Jemt T, Olsson M, Renouard F, Stenport V, Friberg B. Early Implant Failures Related to Individual Surgeons: An Analysis Covering 11,074 Operations Performed during 28 Years. *Clin Implant Dent Relat Res*. Oct 2016;18(5):861-872. doi:10.1111/cid.12379

66. Kaplan SH, Griffith JL, Price LL, Pawlson LG, Greenfield S. Improving the reliability of physician performance assessment: identifying the ""physician effect"" on quality and creating composite measures. *Med Care*. Apr 2009;47(4):378-87. doi:10.1097/MLR.0b013e31818dce07

67. Prasad-Kerlin MP, Epstein A, Kahn JM, et al. Physician-Level Variation in Outcomes of Mechanically Ventilated Patients. *Ann Am Thorac Soc*. Mar 2018;15(3):371-379. doi:10.1513/AnnalsATS.201711-867OC

68. Navar-Boggan AM, Boggan JC, Stafford JA, Muhlbaier LH, McCarver C, Peterson ED. Hypertension control among patients followed by cardiologists. *Circ Cardiovasc Qual Outcomes*. May 2012;5(3):352-7. doi:10.1161/circoutcomes.111.963488

69. Papachristofi O, Klein AA, Mackay J, Nashef S, Fletcher N, Sharples LD. Effect of individual patient risk, centre, surgeon and anaesthetist on length of stay in hospital after cardiac surgery: Association of Cardiothoracic Anaesthesia and Critical Care (ACTACC) consecutive cases series study of 10 UK specialist centres. *BMJ Open*. Sep 11 2017;7(9):e016947. doi:10.1136/bmjopen-2017-016947

70. Verma AA, Guo Y, Jung HY, et al. Physician-level variation in clinical outcomes and resource use in inpatient general internal medicine: An observational study. Article. *BMJ Quality and Safety*. 2020;bmjqs-2019-010425. doi:10.1136/bmjqs-2019-010425

71. Stevenson A. medical doctor. Oxford University Press; 2010.

72. BMJ Editors. The BMJ 's wild goose chase. *BMJ : British Medical Journal*. 2002;325(7366):0-0.

73. Steiner-Hofbauer V, Schrank B, Holzinger A. What is a good doctor? *Wiener Medizinische Wochenschrift*. 2018/11/01 2018;168(15):398-405. doi:10.1007/s10354-017-0597-8

74. Churchill LR, Schenck D. Healing Skills for Medical Practice. *Annals of Internal Medicine*. 2008;149(10):720-724. doi:10.7326/0003-4819-149-10-200811180-00006 %m 19017590

75. Schenck D, Churchill L. *Healers: extraordinary clinicians at work*. Oxford University Press; 2011.

76. Straus SE, Glasziou P, Richardson WS, Haynes RB. *Evidence-based medicine E-book: How to practice and teach EBM*. Fifth ed. Elsevier Health Sciences; 2018.

77. Marmot MG, Stansfeld S, Patel C, et al. Health inequalities among British civil servants: the Whitehall II study. *Lancet*. 6/8/ 1991;337(8754):1387-1393. doi:http://dx.doi.org/10.1016/0140-6736(91)93068-K

78. Shanafelt TD, West CP, Dyrbye LN, et al. Changes in Burnout and Satisfaction With Work-Life Integration in Physicians Over the First 2 Years of the COVID-19 Pandemic. *Mayo Clinic Proceedings*. doi:10.1016/j.mayocp.2022.09.002

79. Soekhai V, de Bekker-Grob EW, Ellis AR, Vass CM. Discrete Choice Experiments in Health Economics: Past, Present and Future. *PharmacoEconomics*. 2019/02/01 2019;37(2):201-226. doi:10.1007/s40273-018-0734-2

80. What's a good doctor and how do you make one? *BMJ*. 2002;325(7366):711. doi:10.1136/bmj.325.7366.711

81. Tabachnick BG, Fidell LS, Ullman JB. *Using Multivariate Statistics*. Seventh Edition ed. Pearson Education, Inc.; 2018.

THESIS APPENDICES

THESIS APPENDIX 1 - PROTOCOL FOR A QUALITATIVE STUDY ON DOCTORS' OPINIONS ON AND EXPERIENCES OF EXCEPTIONALLY GOOD DOCTORS

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STUDY PROTOCOL

Protocol for a Qualitative Study on Doctors' Opinions on and Experiences of Exceptionally Good Doctors

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Video abstract

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Objective: Doctors have a varying effect on patients' physical health. This means that there are doctors that are more effective than others. Even though the doctor is a part of very many medical interactions, it is not known in which way exceptionally good doctors differ from their peers. After authoring two systematic and one methodological review on identifying exceptional doctors, the authors in this qualitative interview-based study take a bottom-up, inductive approach to answer the question of what makes an exceptionally good doctor.

Methods: About 10–15 semi-structured interviews of medical doctors of any specialty who speak English will be conducted. Recruitment will be through the authors' network and their referrals. Questions will be whether they have an opinion on what makes an exceptionally good doctor, whether they have met such a person and how did this doctor differ from other doctors. The interviews will be done by a 62-year old PhD student who is not a clinician but has extensive experience in having personal conversations as a financial adviser. This could be helpful as the interviewer is only aware that there are exceptionally good doctors but has no notion how exceptionally good doctors differ from their colleagues.

Analysis: A six-phase thematic analysis in an experiential framework as per Braun and Clarke will be implemented with the aim to find out what the doctors think and have experienced. This is an inductive approach using a realist epistemological position under the assumption that it is possible to acquire truthful knowledge on what makes exceptionally good doctors.

Discussion: Previous qualitative research on exceptionally good doctors consisted of interviewing author-selected exceptionally good doctors. This study takes a step back from this approach by asking the peers of exceptionally good doctors how they define being exceptionally good and how they experience such doctors.

Keywords: qualitative study, thematic analysis, doctors' performance

Plain Language Summary

There is evidence that some doctors are exceptionally good, even if at least in terms of patients' physical health outcomes, however, there is little research on how such exceptionally good doctors differ from their peers. There is research showing that good doctors deal well with people, are competent, and ethical but almost none on doctors who are exceptionally good. This paper outlines how the authors will try to find out more about what doctors think it takes to make an exceptional doctor and learn more about doctors' experiences with exceptionally good doctors, through a series of interview. The understanding gained from these interviews may then be used in future to improve medical doctors' abilities and performance.

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Strengths and Limitations of This Study

- One strength of this work is the relevant experience of the authors in recently systematically reviewing over 10,000 studies on doctors' or surgeons' effect on patients' physical health.
- Another strength is that the interviewer is not a clinician and therefore the doctors will not feel the need to take account of the opinion of a colleague during the interview.
- A further strength is that there are no pre-conceived notions on what makes an exceptionally good doctor beyond the opinion that there are such doctors, allowing for a wide range of possible outcomes of this research study.
- A limitation is that this is a qualitative study with a limited number of interviewees on a wide subject, and therefore may not achieve saturation, ie it is possible that many more interviews than the considered 10–15 may be needed.
- A second limitation is that, as all of the subjects will be English-speaking doctors and most of them are expected to be residing in Australia, with perhaps some from North America and Europe, it is uncertain whether the findings could be generalised to other regions, particularly developing nations.
- Finally, due to the heterogeneity regarding medical/surgical specialties, types of interventions, and types of outcomes relevant to different interventions, there may be differing criteria on what makes an exceptionally good doctor for different medical/surgical specialties.

Background

In a classic[1] paper from 1955, Michael Balint[2] raised the possibility that "the most frequently used drug in general practice was the doctor himself" and over the next seven pages he details how a doctor should "prescribe himself". At the time of writing, this paper has 86 citations as per Scopus[3] and over 4800 citations in google scholar, a discrepancy which points to an impact that is largely outside the traditional scientific literature. On a similar theme, a special issue of The British Medical Journal (BMJ) in 2002 attempted to answer the question, "*What's a good doctor and how do you make one?*".[4] In one article, letters from individual doctors and others who tried to answer this question were published. Among which, one quote was: "*There is not a single piece of evidence or the means to measure whether a doctor is good or bad*".[5]

Previous research has shown that there can be exceptionally poor performing doctors,[6,7] to the point of legal consequences[6] and historical precedents of malpractice.[6,7] Systematic reviews have evaluated the influence of surgical experience measured in case volume or years of practice, recognizing it as a key factor of medical performance and acknowledging a learning curve.[8,9] Recent evidence also suggests that the provider expectations can substantially affect patient outcomes.[10] While research on doctors' effect in many non-surgical specialties is rare, there is evidence in primary care,[11] obstetrics[12] and acute care[13] that physician factors had a sizeable effect on health outcomes. Furthermore, there are publications where author-selected outstanding practitioners are investigated.[14–16] "Outstanding" is defined as the mastery of identified skills that would improve patient care and reaffirm medicine's calling,[14,16] and recognized practice of patient-centred care.[15]

The authors of this proposal have recently completed two systematic reviews on existing research of the doctors' effect on patients' physical health. Both studies have revealed that there is an unknown doctors' effect even after controlling for the intervention and all known information such as patient risk factors, hospital and doctor demographics, and experience. It has further been established that there are positive outliers among doctors, ie doctors whose patients' physical health outcomes are substantially above average. Hence, detecting a significant doctors' effect also implies that there are doctors who perform better than others. Knowing what identifies exceptional doctors could make it possible for other doctors to learn the same characteristics or practices,[14] and thereby improving patients' physical health outcomes. If such skills can be passed on to other doctors, then this could be an effective way to improve healthcare.

The current level of knowledge on attributes of good, not necessarily exceptionally good, doctors is also limited, as Abu-Hilal et al's study illustrates.[17] The authors constructed a "standard questionnaire" to identify attributes considered important in being a good doctor. The attributes identified included clinical ability, to be approachable, appreciate limitations, and knowledge. However, this type of study does not allow a deeper understanding of the phenomenon. A similar but more rigorous qualitative study by Churchill & Schenck identified eight pivotal skills of exceptionally good

doctors regarding patient-relationship[14] "do the little things; take time; be open and listen; find something to like; remove barriers; let the patient explain; share authority; and be committed".

Furthermore, on good doctors, Steiner-Hofbauer et al[18] have systematically reviewed the existing literature regarding the topic of "good doctors" in different stakeholder groups, and they have found 6 studies on doctors of different specialities,[19–23] plus studies gathering the opinions of medical students, patients, the general population, nurses, and children. Steiner-Hofbauer et al[18] have stated that what makes a good doctor is not clearly defined yet, and that the answer to such a question will definitely vary depending on the type of population you ask.[24]

Others have provided opinion pieces,[25–35] an analysis of publications on stakeholders' opinions on character strengths of a good doctor,[36] patient and physician perspectives,[37] and a thesis on the changing perceptions from 1910–2010 on the good doctor in education.[38]

Currently it is still not known what makes an exceptionally good doctor. This research project aims to address this knowledge gap by conducting a study to identify and describe exceptional doctors. As there is little literature on this subject, an exploratory qualitative study is needed. This approach is commonly used to generate theory when previous knowledge is limited. The selected approach consists of semi-structured interviews and Braun and Clarke's thematic analysis.[39–41]

Materials and Methods

Study Design

The qualitative approach for this study involves semi-structured interviews of medical doctors of any specialty who are available for interviewing. The only other inclusion criterion is that they speak English. Recruitment will be achieved through acquaintances, contacting authors of relevant research papers, contacting medical practices or medical doctors with an internet contact, the GP recruitment program of the Institute of Evidence-based Healthcare of Bond University, and any doctors referred by any of these groups.

Semi-Structured Interviews

Participants will be interviewed in person or via zoom or via telephone or any other similar way at a time and place of their convenience. It will be emphasised that participants are free to terminate the interview at any time or not to answer any question.

The potential participants will indicate their consent by clicking a link that takes them to an online survey consisting solely of the participant information sheet and the consent form, and they can confirm their consent by clicking on a "I agree to participate in this research project" or "I do not agree". Each potential participant will be given an individual link so the survey can greet them by name and record their consent.

The interviews are expected to take between 15 minutes to an hour, depending on the amount a participant wishes to contribute. There may be a subsequent, shorter interview to clarify matters.

The interview guide will include three open-ended questions, as follows:

a. What, in your opinion and experience, makes an exceptional doctor?

b. Have you ever met an exceptional doctor?

c. If yes, how did this doctor differ from other doctors?

There is scope for participants to raise issues not anticipated. The interviews will be, as recommended in qualitative research, flexible and responsive to the participant. Interviews will continue either until 10-15 interviews have been done or until saturation has been achieved, ie when additional participants only add marginal new relevant data; whichever is earlier.

The interviews will be recorded in audio or video format. Where available, video via zoom, skype or Microsoft Teams (Teams) will be used, otherwise audio-only zoom, skype or Teams, or, if the interviews are done in person or by telephone, an audio recorder will be employed.

The interviewees will receive a transcript of the interview and will be able to edit their answers. This will occur after the interviews have been transcribed. The transcripts will be sent to the interviewees by email, or mail if email is not

available, and they will be offered to edit their answers before further processing by the researchers. If they choose to edit their answers they will be followed-up until they have done so, and they are free to change their decision to not wishing to edit, or to indicate their withdrawal from the study.

The Interviewer (Reflexivity)

The lead researcher will be doing all the interviews. He is a 62-year-old PhD student whose profession is being a financial adviser. He has experience in running focus groups to design a lengthy health survey for a group of women. In his professional work, he has extensive experience talking to a varied group of people with very different backgrounds about their financial matters. Many of these conversations become very personal without being intrusive, and without imposing his own opinions as that would impair the client's ability to outline their situation and their own, at times unexpected, ways to respond to their situation.

This background will be useful for several reasons. One is that describing an experience with an exceptionally good doctor can be relaying a very personal event. Another is that any displayed bias can reduce the effectiveness of the interview.

It could be an advantage that the lead researcher is not a medical or health care practitioner as he will have fewer or no pre-conceived notions on exceptional doctors and the doctors will not feel the need to modify their opinions in the presence of a fellow professional. It could be a source of bias that, due to the two systematic reviews, the lead researcher is aware that there are doctors who have exceptionally positive effect on the physical health of the patients that they treat. However, the results of those previous systematic reviews show that there are exceptionally good doctors but do not suggested a reason for outperformance, so the only prior assumption is the lack of knowledge regarding what makes a good doctor.

Analysis

This is a qualitative study using Thematic Analysis as practised by Braun and Clarke.[39–41] As per Norris et al,[42] Thematic Analysis

> is a highly flexible methodology that can result in rich, complex accounts from different research participants, underlying similarities and differences, as well as generating unanticipated insights.

Thematic analysis will be used in an experiential framework, ie seeking to understand what doctors think and experienced in regards to exceptional doctors. The approach will be inductive while using a realist epistemological (what is the nature of knowledge) position which assumes that it is possible to obtain truthful knowledge on what makes exceptional doctors. As Braun and Clarke[43] state

> Inductive analysis is therefore a process of coding the data without trying to fit it into a preexisting coding frame, or the researcher's analytic preconceptions.

Phase one is transcribing and familiarisation with the transcripts.

Phase two is systematic coding of the data using codes that are relevant to the research question.

Phase three is development of candidate themes by examining the codes for similarities and overlap, similar to principal component analysis in survey responses.

Phase four is reviewing the candidate themes against the coded data for fit, and whether the themes tell a coherent story about the transcripts.

Phase five is going backward and forward between phases three and four, until the themes have been finalised.

Phase six is writing up, assembling and editing the resulting themes, including short data extracts to support any analytical claims.

Patient and Public Involvement

There is no patient or public involvement at this stage, though a survey for the public may be constructed after this project.

The results will be disseminated through scientific journals as well as magazines or websites aimed at medical doctors and the wider public.

Ethical Considerations

We will use consent forms for all interview participants. Names will be erased from the interviews or any other delivery document and, in the summary of the findings, contact details will be erased as well. All documents will be kept in secured premises of the lead researcher. Contact details will be destroyed after the summary reports have been sent.

One version of the transcripts will have identifying data but will not be processed further. A version of the transcript without identifying data will be used for further analysis. Video data is by definition identifiable but will only be available outside the research team if there is explicit informed consent from all participants in any interview.

The NVivo software is a secure qualitative data analysis tool used by the lead researcher on his password-protected computer.

Discussion

There is very little research on whether there are exceptionally good doctors, and, if they exist, the data is limited regarding who they are and how they differ from their peers. Previous qualitative research in this area was either on author-selected outstanding practitioners,[14–16] or about what patients think a good doctor is.[44–46] What this research adds is details on what doctors themselves consider to be criteria for exceptionally good doctors, and what they have experienced about them. Future research could then extend this approach comparing the definitions and experiences obtained from such doctors to the patients' point of view.

Who is a good doctor? And what it takes to make an exceptionally good practitioner? Such questions are crucial to anyone involved in the healthcare practice, and more importantly for medical education. However, yet, responses to these questions are still elusive and not easy to answer, since there is no clear definition about the essence of a good doctor, and the answers most certainly vary depending on whom you ask according to their different needs and interests.[47] Prior studies seeking the answer of who a good doctor is have involved students, doctors, patients, and nurses. The aspects covered have included the general interpersonal qualities, communication skills and patient involvement, medical experience and skills, the doctor–patient relationship ethics, management and leadership qualities, teaching and supervision skills, research, and continuous education.[18] Interestingly, it was found that patients have tended to evaluate the doctor according to their communication skills, while doctors were more focusing on medical skills. Herein, we intend to retrieve more answers about the essence of an exceptionally good doctor and the qualities behind their outperformance via semi-structured interviews of broader samples of medical doctors of any specialty.

In the future, the results of this project could be compared with the opinions and experiences of doctors who have been objectively identified as being exceptionally good in large cohort studies and those doctors and other practitioners who have worked with such doctors. This could provide useful information about how much the opinions of doctors are shared by their exceptionally good peers.

Disclaimer

The views expressed are those of the authors and not necessarily those of Bond University.

Data Storage

Data will be stored in a secured location at Bond University for a period of 5 years after the end of this project as per 601.3/C150 of the Qld Government University Sector Retention and Disposal Schedule in accordance with the guidelines set out by the Bond University Human Research Ethics Committee.

Provenance and Peer Review

Not commissioned; peer reviewed for ethical and funding approval prior to submission.

Patient and Public Involvement

No patients, carers, or members of the public were formally involved in setting the research plan, defining research questions, or outcome measures.

Ethics Approval

Ethical approval Number CS03393 has been received from the Bond University Human Research Ethics Committee on September 27th, 2021.

Consent

The participants will only be interviewed after they have provided their consent.

Author Contributions

All authors contributed to conception and design, acquisition of data, interpretation of data, and drafting the article or revising it critically; CS provided the initial research idea and drafted the protocol as part of his PhD studies at Bond University. MJ was his principal supervisor who assisted and guided throughout all areas, and substantially revised the article. All authors have agreed on the journal to which the article was submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

All authors declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

References

1. Curran J. The doctor, his patient and the illness. *BMJ*. 2007;335(7626):941. doi:10.1136/bmj.39384.467928.94
2. Balint M. The doctor, his patient, and the illness. *Lancet*. 1955;265(6866):683–688. doi:10.1016/S0140-6736(55)91061-8
3. Elsevier. Scopus. Elsevier; 2021.
4. Hurwitz B. What's a good doctor, and how can you make one? *BMJ*. 2002;325(7366):667–668. doi:10.1136/bmj.325.7366.667
5. Rizo CA, Jadad AR, Enkin M. What's a good doctor and how do you make one?: Doctors should be good companions for people. *BMJ*. 2002;325(7366):711. doi:10.1136/bmj.325.7366.711
6. Dyer C. Investigators should be trained to "think dirty" about cause of death, Shipman report says. *BMJ*. 2003;327(7407):123. doi:10.1136/bmj.327.7407.123-c
7. Seidelman WE. The professional origins of Dr. Joseph Mengele. *Can Med Assoc J*. 1985;133(11):1169–1171.
8. Wilt TJ, Shamliyan TA, Taylor BC, et al. Association between hospital and surgeon radical prostatectomy volume and patient outcomes: a systematic review. *J Urol*. 2008;180(3):711. doi:10.1136/bmj.325.7366.711
9. Maruthappu M, Gilbert BJ, El-Harasis MA, et al. The influence of volume and experience on individual surgical performance: a systematic review. *Ann Surg*. 2015;261(4):642–647. doi:10.1097/SLA.0000000000000852
10. Chen P-HA, Cheong JH, Jolly E, et al. Socially transmitted placebo effects. *Nat Hum Behav*. 2019;3(12):1295–1305. doi:10.1038/s41562-019-0749-5
11. Moreau A, Boussageon R, Girier P, et al. The "doctor" effect in primary care. *Presse Med*. 2006;35(6I):967–973. doi:10.1016/S0755-4982(06)74729-7
12. Harley M, Mohammed MA, Hussain S, et al. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. *Br Med J*. 2005;330(7497):929–932. doi:10.1136/bmj.38377.675440.8F
13. Beckett DJ, Spears M, Thomson E. Reliable consultant level data from an acute medical unit: a powerful tool for improvement. *J R Coll Physicians Edinb*. 2018;48(2):108–113. doi:10.4997/jrcpe.2018.202
14. Churchill LR, Schenck D. Healing skills for medical practice. *Ann Intern Med*. 2008;149(10):720–724. doi:10.7326/0003-4819-149-10-200811180-0000619017590
15. Hanyok LA, Hellmann DB, Rand C, et al. Practicing patient-centered care: the questions clinically excellent physicians use to get to know their patients as individuals. *Patient*. 2012;5(3):141–145. doi:10.2165/11599530
16. Schenck D, Churchill L. Healers: extraordinary clinicians at work. Oxford University Press; 2011.

17. Abu-Hilal M, Morgan EC, Lewis G, et al. What makes a good doctor in the 21st century? A qualitative study. *Br J Hosp Med*. 2006;67(7):375–377. doi:10.12968/hmed.2006.67.7.21623
18. Steiner-Hofbauer V, Schrank B, Holzinger A. What is a good doctor? *Wien Med Wochenschr*. 2018;168(15–16):398–405. doi:10.1007/s10354-017-0597-8
19. Herzig S, Biehl L, Stelberg H, et al. What makes a doctor a good doctor? A content analysis of assessments by a sample of doctors. *Dtsch Med Wochenschr*. 2006;131(51–52):2883–2888. doi:10.1055/s-2006-957216
20. Kim JH, Tor PC, King J, et al. A Korean survey on qualities and definition of a good psychiatrist. *J Korean Med Sci*. 2015;30(5):632–638. doi:10.3346/jkms.2015.30.5.632
21. Kliems H, Witt CM. The good doctor: a qualitative study of German homeopathic physicians. *J Altern Complement Med*. 2011;17(3):265–270. doi:10.1089/acm.2010.0158
22. Lambe P, Bristow D. What are the most important non-academic attributes of good doctors a Delphi survey of clinicians. *Med Teach*. 2010;32(8):e347–e54. doi:10.3109/0142159X.2010.490603
23. Miratashi Yazdi SN, Nedjat S, Majdzadeh R, et al. Who is a good doctor? Patients & physicians' perspectives. *Iran J Public Health*. 2015;44(1):150–152.
24. Bardgett RJM, Darling JC, Webster E, et al. What makes a good children's doctor? Exploring the child perspective in the OSCE setting. *Med Teach*. 2016;38(5):471–475. doi:10.3109/0142159X.2015.1060301
25. Conti CR. What makes a good doctor? *Clin Cardiol*. 2005;28(11):496–498. doi:10.1002/clc.4960281102
26. Bates C. The good doctor. *Clin Med*. 2001;1(2):128–131. doi:10.7861/clinmedicine.1-2-128
27. Smith DH. How to be a good doctor in the 1990s: stand and deliver. *Am J Obstet Gynecol*. 1994;170(6):1724–1728. doi:10.1016/S0002-9378(94)70347-7
28. Magauran CE, Brennan M. Being a "Good Doctor". *J Palliat Med*. 2008;11(3):506–508. doi:10.1089/jpm.2007.0206
29. Davis K, Carbone R, Fredericks J, et al. What makes a good doctor: a qualitative study of patient perspectives; 2021.
30. Simpson L. What makes a good surgeon? *J Natl Med Assoc*. 2008;100(2):261–264. doi:10.1016/S0027-9684(15)31216-5
31. Crile GW. The most important factor in the treatment of war wounds and the most important factor in civilian surgery-The Good Surgeon. *Ann Surg*. 1919;70(4):385–387. doi:10.1097/00000658-191910000-00001
32. Darzi A, Smith S, Taffinder N. Assessing operative skill: Needs to become more objective. *BMJ*. 1999;318(7188):887–888. doi:10.1136/bmj.318.7188.887
33. Gandhi J. Making of a Surgeon. *Al Ameen J Med Sci*. 2019;12(2):54–55.
34. Arora S, Sevdalis N, Suliman I, et al. What makes a competent surgeon?: Experts' and trainees' perceptions of the roles of a surgeon. *Am J Surg*. 2009;198(5):726–732. doi:10.1016/j.amjsurg.2009.01.015
35. Jackson B. What makes an excellent surgeon? *Obes Surg*. 2019;29(4):1087–1089. doi:10.1007/s11695-019-03778-8
36. Jones D. What are the character strengths of a good doctor? *Jubilee Centre Charact Virtuesies*. 2013.
37. Miratashi Yazdi SN, Nedjat S, Arbabi M, et al. Who is a good doctor? Patients & physicians' perspectives. *Iran J Public Health*. 2015;44(1):150–152.
38. Whitehead CR. The good doctor in medical education 1910–2010: a critical discourse analysis: University of Toronto (Canada); 2011.
39. Braun V, Clarke V. What can "thematic analysis" offer health and wellbeing researchers? *Int J Qual Stud Health Well-Being*. 2014;9:26152. doi:10.3402/qhw.v9.26152
40. Braun V, Clarke V. *Successful Qualitative Research: A Practical Guide for Beginners*. Sage; 2013.
41. Clarke V, Braun V. Thematic analysis. In: *Encyclopedia of Critical Psychology*. New York: Springer; 2014:1947–1952.
42. Norris JM, White DE, Nowell L, et al. How do stakeholders from multiple hierarchical levels of a large provincial health system define engagement? A qualitative study. *Implement Sci*. 2017;12(1):98. doi:10.1186/s13012-017-0625-5
43. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77–101. doi:10.1191/1478088706qp063oa
44. Klingenberg A, Bahrs O, Szecsenyi J. [How do patients evaluate general practice? German results from the European Project on Patient Evaluation of General Practice Care (EUROPEP)]. *Z Arztl Fortbild Qualitatssich*. 1999;93(6):437–445. German.
45. Mercer SW, McConnachie A, Maxwell M, et al. Relevance and practical use of the Consultation and Relational Empathy (CARE) measure in general practice. *Fam Pract*. 2005;22(3):328–334. doi:10.1093/fampra/cmh730
46. Schattner A, Rudin D, Jellin N. Good physicians from the perspective of their patients. *BMC Health Serv Res*. 2004;4(1):26. doi:10.1186/1472-6963-4-26
47. Hofhansl A, Horn W, Kainberger F, et al. To be a good doctor": Wie werden Medizinstudierende auf die Zukunft vorbereitet? *Wien Med Wochenschr*. 2015;165(5):83–85. doi:10.1007/s10354-015-0349-6

THESIS APPENDIX 2 - CHARACTERISTICS OF EXCEPTIONALLY GOOD DOCTORS: A PROTOCOL FOR A CROSS-SECTIONAL SURVEY OF ADULTS

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STUDY PROTOCOL

Characteristics of Exceptionally Good Doctors: A Protocol for a Cross-Sectional Survey of Adults

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Background: Doctors constitute a significant proportion of a very large number of medical interactions. They are known to vary in the quality of their work, with some having an exceptionally beneficial effect on patients' physical health. In a qualitative study, we interviewed medical doctors on their opinions and experiences of exceptionally good doctors. Their responses and the results from previous research are used as a basis for this proposed cross-sectional survey directed to members of the public on their encounters with exceptionally good doctors. The primary aim of this cross-sectional study is to describe the characteristics of exceptional doctors as reported by a large representative sample of adult patients.

Methods and Analysis: A mixed qualitative and quantitative anonymous cross-sectional survey of 500 Amazon Mechanical Turk (MTurk) respondents, who have met one or more exceptionally good doctors in their life, will be conducted. Information requested will include reasons for nominating a particular doctor; experience of how that doctor differs from other and average doctors; and 34 5-point Likert scale questions on the characteristics of that doctor and the same Likert questions for the average doctor. An opportunity to report their experience in free-text form will be provided. Sample size will be sufficient to obtain a margin of error of 4%. The authors will provide descriptive statistics, including graphs of the Likert scale question responses; conduct factor analysis for internal validity; investigate satisficing and logical inconsistencies; and explore whether there are multiple types of exceptionally good doctors.

Discussion: Previous surveys of patients' perceptions of doctors exist though none have focused on exceptionally good doctors. The expected results will include a list of characteristics that are important to patients in determining exceptionally good doctors.

Keywords: medical practice, good doctors, doctors' performance, patients' opinion, cross-sectional survey

Plain Language Summary

Previous research has shown that some doctors are exceptionally good. In a qualitative study, we have interviewed doctors about what characteristics make up an exceptionally good doctor. Using the interview results, we have designed a survey to investigate the opinions of the general adult public on exceptionally good doctors. The survey will be conducted via Amazon's Mechanical Turk (MTurk) platform, where members are offering to provide online services like answering surveys or identifying objects in images. MTurk has been used successfully in previous research surveys. The responses to this survey will provide a list of the important characteristics of an exceptionally good doctor from a patient perspective.

Background

"[T]he most frequently used drug [intervention] in general practice is the doctor himself".[1,2] In Australia, general practitioners receive more than 150 million visits per year.[3] That is an average of six visits for each Australian. Adding visits to specialists and extending this to the entire world, we can expect billions of times this intervention, "the doctor himself" is used each year.

It is possible to identify doctors who have an exceptionally beneficial impact on patients' physical health, even after accounting for all known confounding factors such as patient risk, doctor demographics, and hospital factors.[4–16] Evidence from systematic reviews has shown that surgical experience, measured in case volume or years of practice, is a key factor in improved surgical performance and outcomes, supporting the need for a continuing learning process.[17,18] Provider

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expectations can substantially affect patient outcomes.[19] For non-surgical specialties, data have suggested that doctor-related factors have a considerable effect on patients' health outcomes in primary,[20] acute care,[21] and obstetrics.[10] Abu-Hilal et al[22] studied the characteristics of good doctors, concluding that clinical ability, knowledge, approachability, and appreciation of limitations are the most important factors. Qualitative study research has identified eight vital skills of exceptionally good doctors in their relationships with patients: "do the little things; take time; be open and listen; find something to like; remove barriers; let the patient explain; share authority; and be committed".[23] Steiner-Hofbauer et al's[24] systematic review of "good doctors" included 6 studies and 2 questionnaires,[25–29] and concluded that there is no clear definition on what makes a good doctor.

Although there are published opinions on what makes a good doctor,[30–40] the character of a good doctor,[41] divergent patient and doctor viewpoints,[29] and a thesis on the good doctor in education,[42] exceptionally good doctors have been investigated infrequently.[23,43,44] It is not known what makes an exceptionally good doctor.

In a qualitative study, we have interviewed a sample of medical doctors on their opinions of what makes an exceptionally good doctor.[45,46] These interviews have led to a set of characteristics that describe an exceptional doctor from the practitioner point of view.

A systematic review on the links between patient experience and clinical safety and effectiveness reported "consistent positive associations between patient experience, patient safety and clinical effectiveness for a wide range of disease areas, settings, outcome measures and study designs"[47] and therefore "supports the case for the inclusion of patient experience as one of the central pillars of quality in healthcare." Patient tutors now work in collaboration with clinical staff to develop the curriculum and assessment of medical students in the UK.[48]

Given the importance of patient input into medical education, the positive associations between patient experience and clinical effectiveness, and the knowledge gap on what makes an exceptional doctor, we plan to conduct a survey of adult patients on their experiences with exceptionally good doctors. The primary aim of the survey is to describe the characteristics of exceptional doctors from a patient perspective.

Methods and Analysis

The study design reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines on observational studies.[49]

Study Design

This is an observational cross-sectional study, using a mixed qualitative and quantitative anonymous online survey design to collect data on patients' perceptions of exceptionally good doctors. In particular, this is both an exploratory sequential design mixed methods study[50] as the authors previously interviewed 13 medical doctors about exceptionally good doctors[45,46] and used the insights gained to produce the quantitative part of this survey. It is also a convergent design mixed-method study[50] as the three qualitative questions and six questions with a free-text option "other" provide a more in-depth and personal perspective of the respondents.

Participants will be sampled through Amazon Mechanical Turk.[51]

Data will be collected for the respondent demographic information on gender; age by decade; highest education level achieved; count of doctor visits in the previous year; and country will be deduced from the respondents' IP address. The respondents will be asked how many exceptionally good doctors they have met in their life (1, 2, 3, 4, 5+) and how many overall doctors they have met (1–5, 6–10, 11–20, 21–50, 51–100, 101+).

Questions asked in the survey about the nominated exceptionally good doctor are the doctor's age by decade, gender, type of doctor (GP, specialist, other), the respondent's relationship to that doctor (patient, employer, etc), and the reason for nominating this doctor as exceptionally good, with the reasons offered for the respondents to choose from falling into the broad categories of firstly being an exceptional person or behaving exceptionally by being an exceptional communicator or empowering patients, secondly being an exceptional diagnostician or, thirdly, being an exceptional wielder of interventions. A further question asks how many characteristics are needed for a doctor to be exceptional.

In addition there are 34 5-point Likert scale questions. The Likert scale questions were chosen based on responses from a sample of doctors interviewed as part of a qualitative study on the characteristics of exceptional doctors.[45] The full list of questions is shown in the Supplementary File.

With the Likert questions, the respondents are asked how much they agree with the nominated doctor having specific traits compared to an average doctor.

A further qualitative question offers the respondents the opportunity to relate their experience with the exceptionally good doctor into their own words.

One question displays all the Likert question items where the respondent gave 4.5 or more out of 5 for the exceptionally good doctor, and asks to pick the top three such questions and rank them.

Participants

The participants will be recruited from Amazon's Mechanical Turk (MTurk) population. As per Amazon's website,[51] "Amazon Mechanical Turk (MTurk) is a crowdsourcing marketplace that makes it easier for individuals and businesses to outsource their processes and jobs to a distributed workforce who can perform these tasks virtually. This could include anything from conducting simple data validation and research to more subjective tasks like survey participation, content moderation, and more.

MTurk has been used by thousands of social scientists in research[52] and is very suitable for surveying the general population.[53–55] In addition, the large number of MTurk workers alleviates concerns of non-naivety of the workers.[56] MTurk works by logging in if you have an Amazon account, or by registering as a requester. The requester creates a new project by providing instructions and a link to the survey, to which the workers are requested to respond, in this case a Qualtrics[57] survey. The Qualtrics survey creates a code that is displayed to the worker if they finish the survey, which should be entered by the respondent into the Amazon MTurk instruction page, as proof of them having done the survey. Thereafter, the requester is enabled to download a list of the workers' anonymous IDs and the codes the workers have submitted, compare this list to the codes that were generated, include those who submitted a correct code and exclude those who did not.

The demographics of MTurk workers are generally representative of the population, except that they are skewed younger,[58] therefore, to assure a representative sample, we conducted a pilot study of 210 respondents, of which 6% were found to be over 55, and 67% were males. To obtain a gender split that is closer to 50/50 and to have a representative age-based distribution, the authors will submit four requests, also known as batches, as per Table 1. In this manner, we expect to have around one third of participants over 55 and approximate gender parity. MTurk makes it possible to ensure that no worker participates in more than one project or batch. Survey weighting[59,60] will be used for age and gender if the respondents' age and gender are more skewed than expected.

Sample Size

We have based our sample size of 500 participants on a desire to obtain a margin of error of 4% around estimates of proportions of participants reporting particular characteristics of exceptional doctors (eg, communication skills) and reasons why they consider the doctor in question to be exceptional (eg, they saved my life).

Table 1 MTurk Batches

Participants	Batch	Size of Batch	Expected % Female	Expected Count of Females	Expected % >55	Expected Count of Aged >55
Any demographic	1	250	33	83	6	15
Female, any age	2	101	100	101	6	6
Any gender, aged >55	3	125	33	42	100	123
Female, aged >55	4	24	100	24	100	24
		500	**50%**	**250**	**34%**	**168**

Bias

Selection Bias

Since MTurk population tends to be skewed towards younger-aged workers and males, a random sample could lead to sampling bias. We will avoid this possibility by selecting a stratified sample to ensure 34% of the population being aged 55 years or older and gender equality.

Nonresponse Bias

In the MTurk marketplace, where the survey is accessed by Amazon's workers, it is not possible to determine the number of potential respondents who have seen the survey but chose not to participate. Consequently, it is not possible to accurately calculate the response rates. Nevertheless, it is argued that response representativeness is more important than response rate in survey research.[61] Therefore, since we will attempt to obtain a representative sample, this bias will be less of a concern.[62]

Response Bias

Question order bias will be addressed by randomizing the order in which the response categories within the Likert question sets are presented.

In addition, there is a potential for bias as the questions have been derived from interviews with medical doctors on what they consider to be the characteristics of exceptionally good doctors. Any putative exogenous characteristics that pertained to exceptionally good doctors were addressed in the pilot study by offering the respondents a free-text opportunity to add further characteristics; likewise, several free-text spaces have been added to the final version of the survey.

Missing Data

All questions, except for the free-text questions, will be mandatory; therefore, no missing data is expected. However, since this requirement may lead to satisficing, ie respondents not replying truthfully in order to get to the end of the survey more quickly,[63] the responses will be checked for unusual patterns such as many identical responses to the Likert questions.

Confounding variables are not an issue as no cause-and-effect relationship is investigated, only opinions and experiences.

Planned Analysis

The authors will provide descriptive statistics of the demographic variables supplied, in addition to the combined graphs of the Likert questions. The 10 most commonly reported characteristics of exceptional doctors will be reported as proportions with 95% confidence intervals. The frequency of reasons why a doctor was nominated as exceptional will also be reported as proportions with 95% confidence intervals.

Factor analysis[64] of the Likert questions in the pilot study showed that there were 37 factors, in which component one had an eigenvalue of 18, component two had an eigenvalue of 1.1, while all other components had smaller eigenvalues. Thereafter, as factors 22–37 were very slightly negative in their contributions, the first factor accounted for 82% of the total proportion. Therefore, the pilot survey overwhelmingly measured a single factor: the characteristics of exceptionally good doctors.

The validity of the Likert questions for identifying exceptionally good doctors will be further explored by asking the same Likert questions in relation to average doctors and then assessing whether factor analysis identifies separate factors for exceptionally good doctors and average doctors. Further, the Likert questions will be specified as dependent variables in linear regression models to explore whether the demographic and doctor characteristics show an association with the Likert question responses. As the Likert question responses may not follow a normal distribution, nonparametric regression will also be conducted.[65]

To facilitate visual comparisons between the responses to the Likert questions, "[k]ernel density estimates [plots], which can be considered as a smoothed form of histogram"[66] will be constructed. Kernel density plots allow multiple histogram outlines to be shown in a single graph.

Subgroup comparisons will be performed for all relevant variables to explore whether responses differ by age group, gender, education levels, or count of doctor visits.

The free-text question 5 responses will be analyzed to investigate whether the traits, aspects or qualities that make a doctor exceptional listed by the respondents at the very beginning of the survey are consistent with the responses provided by the 13 medical doctors interviewed in the qualitative study. The free-text question asking respondents for their personal experience will be analyzed by the usage of an NVivo[67] word cloud to detect patterns.

Ethical Considerations

Ethical approval has been received from Bond University. A preprint shows that it is ethical to use MTurk as a survey tool.[68] An informed consent form will be provided at the beginning of the survey. The participants will be informed that they can stop the survey at any time though they will forego payment if they do. The data will be stored at Bond University in a secured facility by the lead researcher on a password-protected computer.

Discussion

There is existing research on patients' opinions on what constitutes a good doctor,[69–71] but not on what constitutes an exceptionally good doctor. Currently, there is no clear definition on what is an exceptionally good doctor. A qualitative study aims to provide a set of characteristics that describe exceptional doctors from the doctor perspective.[45] This proposed study will add to this knowledge base by providing a set of characteristics that describe exceptional doctors from the patient perspective.

Strengths

A strength of this proposed survey is that the questions are based on in-depth interviews with medical doctors on what they consider to be the characteristics of exceptionally good doctors. The survey also has a qualitative element to allow the respondents to report their experience in a free-text format. The participant responses to the survey questions will be important to anyone in healthcare practice and medical education but also of interest to the general public.

Limitations

A limitation is that this is a survey of respondents who speak English and are mostly from developed nations with a preponderance of respondents being from the US. Therefore, it is uncertain whether the findings could be generalized to other regions, particularly developing nations. In addition, due to the heterogeneity regarding medical/surgical specialties, types of interventions, and types of outcomes relevant to different interventions, there may be differing criteria on what makes an exceptionally good doctor for different medical/surgical specialties.

Disclaimer

The views expressed are those of the authors and not necessarily those of Bond University.

Data Storage

Data will be stored in a secured location at Bond University for a period of 5 years after the end of this project as per 601.3/C150 of the Qld Government University Sector Retention and Disposal Schedule in accordance with the guidelines set out by the Bond University Human Research Ethics Committee.

Ethics Approval

Ethical approval CS03416 was provided on April 27th by the Bond University Human Research Ethics Committee.

Consent

The participants will only be able to preview the rest of the survey after they provide their consent.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation of data, or in all these areas; took part in drafting, revising

or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

References

1. Curran J. The doctor, his patient and the illness. *BMJ*. 2007;335(7626):941. doi:10.1136/bmj.39384.467928.94
2. Balint M. The doctor, his patient, and the illness. *Lancet*. 1955;265(6866):683–688. doi:10.1016/S0140-6736(55)91061-8
3. Health AGDo. Medicare in Australia. Australians make more than 150 million visits to a GP every year; 2022.
4. Begg CB, Riedel ER, Bach PB, et al. Variations in morbidity after radical prostatectomy. *New Engl J Med*. 2002;346(15):1138–1144. doi:10.1056/NEJMsa011788
5. Bianco FJ Jr., Riedel ER, Begg CB, Kattan MW, Scardino PT. Variations among high volume surgeons in the rate of complications after radical prostatectomy: further evidence that technique matters. *J Urol*. 2005;173(6):2099–2103. doi:10.1097/01.ju.0000158163.21079.66
6. Bianco FJ Jr., Vickers AJ, Cronin AM, et al. Variations among experienced surgeons in cancer control after open radical prostatectomy. *J Urol*. 2010;183(3):977–983. doi:10.1016/j.juro.2009.11.015
7. Brown EC, Robicsek A, Billings LK, et al. Evaluating primary care physician performance in diabetes glucose control. *Am J Med Qual*. 2016;31(5):392–399. doi:10.1177/1062860615585138
8. Glance LG, Dick A, Osler TM, Li Y, Mukamel DB. Impact of changing the statistical methodology on hospital and surgeon ranking: the case of the New York State cardiac surgery report card. *Med Care*. 2006;44(4):311–319. doi:10.1097/01.mlr.0000204106.64619.2a
9. Gossl M, Rihal CS, Lennon RJ, Singh M. Assessment of individual operator performance using a risk-adjustment model for percutaneous coronary interventions. *Mayo Clin Proc*. 2013;88(11):1250–1258. doi:10.1016/j.mayocp.2013.07.017
10. Harley M, Mohammed MA, Hussain S, Yates J, Almasri A. Was Rodney Ledward a statistical outlier? Retrospective analysis using routine hospital data to identify gynaecologists' performance. *Br Med J*. 2005;330(7497):929–932. doi:10.1136/bmj.38377.675440.8F
11. Kunadian B, Dunning J, Roberts AP, Morley R, de Belder MA. Funnel plots for comparing performance of PCI performing hospitals and cardiologists: demonstration of utility using the New York hospital mortality data. *Catheter Cardiovasc Interv*. 2009;73(5):589–594. doi:10.1002/ccd.21893
12. Landercasper J, Borgert AJ, Fayanju OM, et al. Factors associated with reoperation in breast-conserving surgery for cancer: a prospective study of American Society of Breast Surgeon members. *Ann Surg Oncol*. 2019;26(10):3321–3336. doi:10.1245/s10434-019-07547-w
13. Rudmik L, Xu Y, Alt JA, et al. Evaluating surgeon-specific performance for endoscopic sinus surgery. *JAMA Otolaryngol Head Neck Surg*. 2017;143(9):891–898. doi:10.1001/jamaoto.2017.0752
14. Schnelle C, Clark J, Mascord R, Jones M. Is there a surgeons' effect on patients' physical health, beyond the intervention, that requires further investigation? A systematic review. *Ther Clin Risk Manag*. 2022;18(18):467–490. doi:10.2147/TCRM.S357934
15. Schnelle C, Clark J, Mascord R, Jones M. Is there a doctors' effect on patients' physical health, beyond the intervention and all known factors? A systematic review. *Ther Clin Risk Manag*. 2022;18:721–737. doi:10.2147/TCRM.S372464
16. Schnelle C, Jones MA. The doctors' effect on patients' physical health outcomes beyond the intervention. A methodological review. *Clin Epidemiol*. 2022;14:851–870. doi:10.2147/CLEP.S35792
17. Wilt TJ, Shamliyan TA, Taylor BC, MacDonald R, Kane RL. Association between hospital and surgeon radical prostatectomy volume and patient outcomes: a systematic review. *J Urol*. 2008;180(3):820–829. doi:10.1016/j.juro.2008.05.010
18. Maruthappu M, Gilbert BJ, El-Harasis MA, et al. The influence of volume and experience on individual surgical performance: a systematic review. Review. *Ann Surg*. 2015;261(4):642–647. doi:10.1097/SLA.0000000000000852
19. Chen P-HA, Cheong JH, Jolly E, Elhence H, Wager TD, Chang LJ. Socially transmitted placebo effects. *Nat Hum Behav*. 2019;3(12):1295–1305. doi:10.1038/s41562-019-0749-5
20. Moreau A, Boussageon R, Girier P, Figon S. The "doctor" effect in primary care. *Presse Med*. 2006;35(6I):967–973. doi:10.1016/S0755-4982(06)74729-7
21. Beckett DJ, Spears M, Thomson E. Reliable consultant level data from an acute medical unit: a powerful tool for improvement. *J R Coll Physicians Edinb*. 2018;48(2):108–113. doi:10.4997/jrcpe.2018.202
22. Abu-Hilal M, Morgan EC, Lewis G, McPhail M, Malik HZ, Hocken D. What makes a good doctor in the 21st century? A qualitative study. *Br J Hosp Med*. 2006;67(7):375–377. doi:10.12968/hmed.2006.67.7.21623
23. Churchill LR, Schenck D. Healing skills for medical practice. *Ann Intern Med*. 2008;149(10):720–724.
24. Steiner-Hofbauer V, Schrank B, Holzinger A. What is a good doctor? Review. *Wien Med Wochenschr*. 2018;168(15–16):398–405. doi:10.1007/s10354-017-0597-8
25. Herzig S, Biehl L, Stelberg H, Hick C, Schmeißer N, Koerfer A. What makes a doctor a good doctor? A content analysis of assessments by a sample of doctors. *Dtsch Med Wochenschr*. 2006;131(51–52):2883–2888. doi:10.1055/s-2006-957216
26. Kim JH, Tor PC, King J, Seo JS. A Korean survey on qualities and definition of a good psychiatrist. *J Korean Med Sci*. 2015;30(5):632–638. doi:10.3346/jkms.2015.30.5.632
27. Kliems H, Witt CM. The good doctor: a qualitative study of German homeopathic physicians. *J Altern Complement Med*. 2011;17(3):265–270. doi:10.1089/acm.2010.0158

28. Lambe P, Bristow D. What are the most important non-academic attributes of good doctors a Delphi survey of clinicians. *Med Teach*. 2010;32(8): e347–e354. doi:10.3109/0142159X.2010.490603
29. Miratashi Yazdi SN, Nedjat S, Majdzadeh R, Arbabi M. Who is a good doctor? Patients & physicians' perspectives. *Iran J Public Health*. 2015;44 (1):150–152.
30. Conti CR. What makes a good doctor? *Clin Cardiol*. 2005;28(11):496–498. doi:10.1002/clc.4960281102
31. Bates C. The good doctor. *Clin Med*. 2001;1(2):128–131. doi:10.7861/clinmedicine.1-2-128
32. Smith DH. How to be a good doctor in the 1990s: stand and deliver. *Am J Obstet Gynecol*. 1994;170(6):1724–1728. doi:10.1016/S0002-9378(94) 70347-7
33. Magauran CE, Brennan M. Being a "good doctor". *J Palliat Med*. 2008;11(3):506–508. doi:10.1089/jpm.2007.0206
34. Davis K, Carbone R, Fredericks J, Lujan J, Basdeo A. What makes a good doctor: a qualitative study of patient perspectives; 2021.
35. Simpson L. What makes a good surgeon? Editorial. *J Natl Med Assoc*. 2008;100(2):261–264. doi:10.1016/S0027-9684(15)31216-5
36. Crile GW. The most important factor in the treatment of war wounds and the most important factor in civilian surgery – the good surgeon. *Ann Surg*. 1919;70(4):385–387. doi:10.1097/00000658-191910000-00001
37. Darzi A, Smith S, Taffinder N.Assessing operative skill. Needs Become More Objective. *BMJ*. 1999;318(7188):887–888. doi:10.1136/ bmj.318.7188.887
38. Gandhi J. Making of a surgeon. *Al Ameen J Med Sci*. 2019;12(2):54–55.
39. Arora S, Sevdalis N, Suliman I, Athanasiou T, Kneebone R, Darzi A. What makes a competent surgeon?: experts' and trainees' perceptions of the roles of a surgeon. *Am J Surg*. 2009;198(5):726–732. doi:10.1016/j.amjsurg.2009.01.015
40. Jackson B. What makes an excellent surgeon? Note. *Obes Surg*. 2019;29:1087–1089. doi:10.1007/s11695-019-03778-8
41. Jones D What are the character strengths of a good doctor? Jubilee centre for character and virtues: insight series; 2013.
42. Whitehead CR. *The Good Doctor in Medical Education 1910–2010: A Critical Discourse Analysis*. Canada: University of Toronto; 2011.
43. Hanyok LA, Hellmann DB, Rand C, Ziegelstein RC. Practicing patient-centered care: the questions clinically excellent physicians use to get to know their patients as individuals. *Patient*. 2012;5(3):141–145. doi:10.1007/BF03262487
44. Schenck D, Churchill L. *Healers: Extraordinary Clinicians at Work*. Oxford University Press; 2011.
45. Schnelle C, Jones MA. Protocol for a qualitative study on doctors' opinions on and experiences of exceptionally good doctors. *Adv Med Educ Pract*. 2022;13:103–109. doi:10.2147/AMEP.S343554
46. Schnelle C, Jones MA. Qualitative study of medical doctors on their experiences and opinions of the characteristics of exceptionally good doctors. *Adv Med Educ Pract*. 2022;13:717–731. doi:10.2147/AMEP.S370980
47. Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open*. 2013;3(1):e001570. doi:10.1136/bmjopen-2012-001570
48. Wilkinson E. The patients who decide what makes a good doctor. *BMJ*. 2018;361:k1829. doi:10.1136/bmj.k1829
49. Vandenbroucke JP, von Elm E, Altman DG, et al. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. *PLoS Med*. 2007;4(10):e297. doi:10.1371/journal.pmed.0040297
50. Zheng M. Conceptualization of cross-sectional mixed methods studies in health science: a methodological review. *Int J Qual Methods*. 2015;3 (2):66–87.
51. Amazon. Amazon mechanical turk; 2022. Available from: https://www.mturk.com/. Accessed February 5, 2022.
52. Buhrmester MD, Talaifar S, Gosling SD. An evaluation of Amazon's Mechanical Turk, its rapid rise, and its effective use. *Perspect Psychol Sci*. 2018;13(2):149–154. doi:10.1177/1745691617706516
53. Boas TC, Christenson DP, Glick DM. Recruiting large online samples in the United States and India: Facebook, mechanical turk, and qualtrics. *Political Sci Res Methods*. 2020;8(2):232–250. doi:10.1017/psrm.2018.28
54. Buhrmester M, Kwang T, Gosling SD. Amazon's Mechanical Turk: a new source of inexpensive, yet high-quality, data? *Perspect Psychol Sci*. 2011;6(1):3–5. doi:10.1177/1745691610393980
55. Mortensen K, Hughes TL. Comparing Amazon's Mechanical Turk platform to conventional data collection methods in the health and medical research literature. *J Gen Intern Med*. 2018;33(4):533–538. doi:10.1007/s11606-017-4246-0
56. Robinson J, Rosenzweig C, Moss AJ, Litman L. Tapped out or barely tapped? Recommendations for how to harness the vast and largely unused potential of the mechanical turk participant pool. *PLoS One*. 2019;14(12):e0226394. doi:10.1371/journal.pone.0226394
57. Qualtrics. Qualtrics website; 2022. Available from: https://qualtrics.com. Accessed February 5, 2022.
58. Moss A, Litman L Demographics of people on amazon mechanical turk. Cloud Research blog post. Available from: https://www.cloudresearch. com/resources/blog/who-uses-amazon-mturk-2020-demographics/. Accessed August 9, 2022.
59. Pfeffermann D. The role of sampling weights when modeling survey data. *Int Stat Rev*. 1993;61:317–337. doi:10.2307/1403631
60. Valliant R, Dever JA. *Survey Weights: A Step-by-Step Guide to Calculation*. TX: Stata Press College Station; 2018.
61. Cook C, Heath F, Thompson RL. A meta-analysis of response rates in web- or internet-based surveys. *Educ Psychol Meas*. 2000;60(6):821–836. doi:10.1177/00131640021970934
62. Cook C, Heath F, Thompson R. A meta-analysis of response rates in web- or internet-based survey. *Educ Psychol Meas*. 2000;60:821–836. doi:10.1177/00131640021970934
63. Krosnick JA, Narayan S, Smith WR. Satisficing in surveys: initial evidence. *New Dir Eval*. 1996;1996(70):29–44. doi:10.1002/ev.1033
64. Tabachnick BG, Fidell LS, Ullman JB. *Using Multivariate Statistics*. 7th ed. Pearson Educatoin, Inc.; 2018.
65. Altman NS. An introduction to kernel and nearest-neighbor nonparametric regression. *Am Stat*. 1992;46(3):175–185. doi:10.1080/ 00031305.1992.10475879
66. Baxter MJ, Beardah CC, Wright RVS. Some archaeological applications of kernel density estimates. *J Archaeol Sci*. 1997;24(4):347–354. doi:10.1006/jasc.1996.0119
67. NVivo (version 12); 2018. Available from: https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home?_ga=2.258719299. 835966230.1648946019-1691335512.1648946019. Accessed August 9, 2022.
68. Moss AJ, Rosenzweig C, Robinson J, Litman L. Is it ethical to use mechanical turk for behavioral research? Relevant data from a representative survey of MTurk participants and wages. *Prepr PsyArXiv Prepr*. 2020. doi:10.31234/osf.io/jbc9d

69. Klingenberg A, Bahrs O, Szecsenyi J. Wie beurteilen Patienten Hausärzte und ihre Praxen? *Z Arztl Fortbild Qualitatssich*. 1999;93(6):437–445. German.
70. Mercer SW, McConnachie A, Maxwell M, Heaney D, Watt GC. Relevance and practical use of the Consultation and Relational Empathy (CARE) measure in general practice. *Fam Pract*. 2005;22(3):328–334. doi:10.1093/fampra/cmh730
71. Schattner A, Rudin D, Jellin N. Good physicians from the perspective of their patients. *BMC Health Serv Res*. 2004;4(1):26. doi:10.1186/1472-6963-4-26

THESIS APPENDIX 3 SUPPLEMENT TO PUBLICATIONS 1, 2, AND 3 – SEARCH STRATEGY AND PUBLICATION 2 2ND SUPPLEMENTAL FILE

Search strategy

PubMed query

(Physicians[Mesh] OR Doctor[tiab] OR Doctors[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR “General practitioner”[tiab] OR “General practitioners”[tiab] OR Cardiologist[tiab] OR Cardiologists[tiab] OR Dermatologist[tiab] OR Dermatologists[tiab] OR Endocrinologist[tiab] OR Endocrinologists[tiab] OR Gastroenterologist[tiab] OR Gastroenterologists[tiab] OR Geriatrician[tiab] OR Geriatricians[tiab] OR Neurologist[tiab] OR Neurologists[tiab] OR Oncologist[tiab] OR Oncologists[tiab] OR Obstetrician[tiab] OR Obstetricians[tiab] OR Pediatrician[tiab] OR Pediatricians[tiab] OR Paediatrician[tiab] OR Paediatricians[tiab] OR Psychiatrist[tiab] OR Psychiatrists[tiab] OR “Family Physician”[tiab] OR “Family Physicians”[tiab] OR Surgeon[tiab] OR Surgeons[tiab] OR Urologist[tiab] OR Urologists[tiab] OR Psychiatrist[tiab] OR Psychiatrists[tiab] OR Resident[tiab] OR Residents[tiab] OR Registrar[tiab] OR Registrars[tiab] OR Consultant[tiab] OR Consultants[tiab] OR Specialist[tiab] OR Specialists[tiab])

AND

(“Practice Patterns, Physicians”[Mesh] OR “Clinical Competence”[Mesh] OR Individual[tiab] OR Individuals[tiab])

AND

(Variability[tiab] OR Variation[tiab] OR Vary[tiab])

AND

(“Outcome and Process Assessment, Health Care”[Mesh] OR “Quality of Health Care”[Mesh] OR “Patient Care”[Mesh] OR “Patient care”[tiab] OR “Care quality“[tiab] OR ((Treatment[tiab] OR Medical[tiab] OR Surgical[tiab]) AND (Outcome[tiab] OR Outcomes[tiab])))

AND

(“Epidemiologic Studies”[Mesh] OR “case-control studies”[Mesh] OR “Cohort Studies”[Mesh] OR “Case control”[tiab] OR Longitudinal[tiab] OR Prospective[tiab] OR Retrospective[tiab] OR “Cross sectional”[tiab] OR “Cross-Sectional Studies”[Mesh] OR Investigated[tiab] OR Analysis[tiab] OR Data[tiab] OR “statistics and numerical data”[sh] OR “epidemiology”[sh])

AND

(Doctor[ti] OR Doctors[ti] OR Physician[ti] OR Physicians[ti] OR Clinician[ti] OR Clinicians[ti] OR “General practitioner”[ti] OR “General practitioners”[ti] OR Cardiologist[ti] OR Cardiologists[ti] OR Dermatologist[ti] OR Dermatologists[ti] OR Endocrinologist[ti] OR Endocrinologists[ti] OR Gastroenterologist[ti] OR Gastroenterologists[ti] OR Geriatrician[ti] OR Geriatricians[ti] OR Neurologist[ti] OR Neurologists[ti] OR Oncologist[ti] OR Oncologists[ti] OR Obstetrician[ti] OR Obstetricians[ti] OR Pediatrician[ti] OR Pediatricians[ti] OR Paediatrician[ti] OR Paediatricians[ti] OR Psychiatrist[ti] OR Psychiatrists[ti] OR “Family Physician”[ti] OR “Family Physicians”[ti] OR Surgeon[ti] OR Surgeons[ti] OR Urologist[ti] OR Urologists[ti] OR Psychiatrist[ti] OR Psychiatrists[ti] OR Resident[ti] OR Residents[ti] OR Registrar[ti] OR Registrars[ti] OR Consultant[ti] OR Consultants[ti] OR Specialist[ti] OR Specialists[ti] OR Individual[ti] OR Individuals[ti] OR Variability[ti] OR Variation[ti] OR Vary[ti] OR “Patient care”[ti] OR “Care quality“[ti] OR ((Treatment[ti] OR Medical[ti] OR Surgical[ti]) AND (Outcome[ti] OR Outcomes[ti])))

Embase Query:

(‘physician’/exp OR Doctor:ti,ab OR Doctors:ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR “General practitioner”:ti,ab OR “General practitioners”:ti,ab OR Cardiologist:ti,ab OR Cardiologists:ti,ab OR Dermatologist:ti,ab OR Dermatologists:ti,ab OR Endocrinologist:ti,ab OR Endocrinologists:ti,ab OR Gastroenterologist:ti,ab OR Gastroenterologists:ti,ab OR Geriatrician:ti,ab OR Geriatricians:ti,ab OR Neurologist:ti,ab OR Neurologists:ti,ab OR Oncologist:ti,ab OR Oncologists:ti,ab OR Obstetrician:ti,ab OR Obstetricians:ti,ab OR Pediatrician:ti,ab OR Pediatricians:ti,ab OR Paediatrician:ti,ab OR Paediatricians:ti,ab OR Psychiatrist:ti,ab OR Psychiatrists:ti,ab OR “Family Physician”:ti,ab OR “Family Physicians”:ti,ab OR Surgeon:ti,ab OR Surgeons:ti,ab OR Urologist:ti,ab OR Urologists:ti,ab OR Psychiatrist:ti,ab OR Psychiatrists:ti,ab OR Resident:ti,ab OR Residents:ti,ab OR

Registrar:ti,ab OR Registrars:ti,ab OR Consultant:ti,ab OR Consultants:ti,ab OR Specialist:ti,ab OR Specialists:ti,ab)

AND

('clinical practice'/exp OR 'Clinical Competence'/exp OR Individual:ti,ab OR Individuals:ti,ab)

AND

(Variability:ti,ab OR Variation:ti,ab OR Vary:ti,ab)

AND

('treatment outcome'/exp OR 'health care quality'/exp OR 'Patient Care'/exp OR "Patient care":ti,ab OR "Care quality":ti,ab OR ((Treatment:ti,ab OR Medical:ti,ab OR Surgical:ti,ab) AND (Outcome:ti,ab OR Outcomes:ti,ab)))

AND

('epidemiology'/exp OR 'case control study'/exp OR 'cohort analysis'/exp OR "Case control":ti,ab OR Longitudinal:ti,ab OR Prospective:ti,ab OR Retrospective:ti,ab OR "Cross sectional":ti,ab OR 'cross-sectional study'/exp OR Investigated:ti,ab OR Analysis:ti,ab OR Data:ti,ab)

AND

(Doctor:ti OR Doctors:ti OR Physician:ti OR Physicians:ti OR Clinician:ti OR Clinicians:ti OR "General practitioner":ti OR "General practitioners":ti OR Cardiologist:ti OR Cardiologists:ti OR Dermatologist:ti OR Dermatologists:ti OR Endocrinologist:ti OR Endocrinologists:ti OR Gastroenterologist:ti OR Gastroenterologists:ti OR Geriatrician:ti OR Geriatricians:ti OR Neurologist:ti OR Neurologists:ti OR Oncologist:ti OR Oncologists:ti OR Obstetrician:ti OR Obstetricians:ti OR Pediatrician:ti OR Pediatricians:ti OR Paediatrician:ti OR Paediatricians:ti OR Psychiatrist:ti OR Psychiatrists:ti OR "Family Physician":ti OR "Family Physicians":ti OR Surgeon:ti OR Surgeons:ti OR Urologist:ti OR Urologists:ti OR Psychiatrist:ti OR Psychiatrists:ti OR Resident:ti OR Residents:ti OR Registrar:ti OR Registrars:ti OR Consultant:ti OR Consultants:ti OR Specialist:ti OR Specialists:ti OR Individual:ti OR Individuals:ti OR Variability:ti OR Variation:ti OR Vary:ti OR "Patient care":ti OR "Care quality":ti OR

((Treatment:ti OR Medical:ti OR Surgical:ti) AND (Outcome:ti OR Outcomes:ti)))

PsycINFO Query

(Doctor OR Doctors OR Physician OR Physicians OR Clinician OR Clinicians OR “General practitioner” OR “General practitioners” OR Cardiologist OR Cardiologists OR Dermatologist OR Dermatologists OR Endocrinologist OR Endocrinologists OR Gastroenterologist OR Gastroenterologists OR Geriatrician OR Geriatricians OR Neurologist OR Neurologists OR Oncologist OR Oncologists OR Obstetrician OR Obstetricians OR Pediatrician OR Pediatricians OR Paediatrician OR Paediatricians OR Psychiatrist OR Psychiatrists OR “Family Physician” OR “Family Physicians” OR Surgeon OR Surgeons OR Urologist OR Urologists OR Psychiatrist OR Psychiatrists OR Resident OR Residents OR Registrar OR Registrars OR Consultant OR Consultants OR Specialist OR Specialists).ti,ab

AND

(“Practice Patterns” OR “Clinical Competence” OR Individual OR Individuals).ti,ab

AND

(Variability OR Variation OR Vary).ti,ab

AND

(“Quality of Health Care” OR “Patient Care” OR “Patient care” OR “Care quality” OR ((Treatment OR Medical OR Surgical) AND (Outcome OR Outcomes))).ti,ab

AND

(Epidemiologic OR case-control OR “Cohort Studies” OR “Case control” OR Longitudinal OR Prospective OR Retrospective OR “Cross sectional” OR “Cross-Sectional Studies” OR Investigated OR Analysis OR Data).ti,ab

Supplemental File 2: Authors' judgments and justifications of the included RCTs using Cochrane assessment table for the risk of bias.

Arvidsson, 2005	Risk of bias	Reason/Quotation
Random sequence generation (selection bias)	Low risk	"Patients were randomized in computer-generated blocks"
Allocation concealment (selection bias)	Low risk	"Patients were randomized in computer-generated blocks of 20 and stratified for each centre using numbered closed envelopes"
Blinding of participants and personnel (performance bias)	High risk	Surgical intervention so the blinding is not applicable but there is no report whether the outcome is likely to be influenced by lack of blinding or not
Blinding of outcome assessment (detection bias)	Low risk	"An independent observer scored the surgeons' performance"
Incomplete outcome data (attrition bias)	Low risk	Missing outcome data balanced in numbers across intervention groups, with similar reasons for missing data across groups
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes
Other bias	Unclear risk	No sufficient data to judge
Fountain, 2004	**Risk of bias**	**Reason/Quotation**
Random sequence generation (selection bias)	Low risk	"They were then randomized on a 2 : 1 basis (LH: AH/VH) to one of the surgical procedures"
Allocation concealment (selection bias)	Unclear risk	No sufficient data to judge
Blinding of participants and personnel (performance bias)	High risk	Un-blinded trial. Although It is about a surgical intervention so the blinding is not applicable, there is no report whether the outcome is likely to be influenced by lack of blinding or not
Blinding of outcome assessment (detection bias)	High risk	
Incomplete outcome data (attrition bias)	Low risk	No lost to follow up
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes

Other bias	Unclear risk	No sufficient data to judge

Eklund, 2009	**Risk of bias**	**Reason/Quotation**
Random sequence generation (selection bias)	Low risk	"Randomization was performed in computer-generated blocks of 20 and stratified for each center"
Allocation concealment (selection bias)	Low risk	"Randomization was performed in computer-generated blocks of 20 and stratified for each center, using numbered and closed envelopes"
Blinding of participants and personnel (performance bias)	High risk	open versus laparoscopic surgical repair so the blinding is not applicable but there is no report whether the outcome is likely to be influenced by lack of blinding or not
Blinding of outcome assessment (detection bias)	Unclear risk	The study did not address whether the outcome assessment was blinded or not.
Incomplete outcome data (attrition bias)	Low risk	Missing outcome data is not significant and balanced in numbers across intervention groups; "At a median of 5.1 (4.4 –9.1) years after operation, 1275/1353 (94.2%) patients completed the follow-up "
Selective reporting (reporting bias)	Low risk	The study protocol is not available but it is clear that the published reports include all expected outcomes.
Other bias	Unclear risk	Insufficient information to assess whether an important risk of bias exists.

THESIS APPENDIX 4 SUPPLEMENT TO PUBLICATION 5 AND PROTOCOL PAPER – SURVEY

Patients' survey of Exceptional Doctors

Q1 [Bond University Logo]

Q2 Consent form

What makes an exceptionally good doctor (physician)?

Dear Participant, My name is Christoph Schnelle and I am currently completing a PhD at Bond University at the Institute for Evidence-Based Healthcare under the supervision of Dr Mark Jones.

We are conducting a research investigation into the experience of medical doctors. I am specifically interested in finding out what is an experience of an exceptionally good doctor. It has ethical approval CS03416 from the Bond University Human Research Ethics Committee.

This anonymous survey will take between 15 and 20 minutes. Participation in this survey is completely voluntary. The information I/we obtain from you will be dealt with in a manner that ensures you remain anonymous. Your participation in this study will enhance work towards learning from exceptionally good doctors.

Participation in this study is completely voluntary and you may withdraw at any time without risking any negative consequences. The information I/we obtain from you will be dealt with in a manner that ensures you remain anonymous. Data will be stored in a secured location at Bond University for a period of 5 years after the end of this project as per 601.3/C150 of the Qld Government University Sector Retention and Disposal Schedule in accordance with the guidelines set out by the Bond University Human Research Ethics Committee.

It is anticipated that the data collected during this study will assist us in understanding what doctors consider or experience to be exceptionally good doctors. Your participation in this study will enhance work towards learning from exceptionally good doctors.

If you experience distress from participation in this research, please contact an organisation such as SANE Helpline on +61 1800 187 263.

Should you have any complaints concerning the manner in which this research is being conducted please make contact with –

Bond University Human Research Ethics Committee, Bond University Office of Research Services.

Bond University, Gold Coast, 4229, Australia Tel: +61 7 5595 4194 Fax: +61 7 5595 1120 email: ethics@bond.edu.au

Many thanks, Christoph and Mark

Q4 Do you consent to participate in this survey?

- ○ Yes
- ○ No

End of Block: Consent

Start of Block: ED Contact?

Q5 In your opinion, what are three to five traits, aspects or qualities that would make a doctor (physician) an exceptionally good doctor (physician)?

- ○ 1 _____
- ○ 2 _____
- ○ 3 _____
- ○ 4 _____
- ○ 5 _____

Q6 Which of these groups do you fall into?

Please select one. If more than one is true, select the earlier answer.

- ○ I have been treated in the past by an exceptionally good doctor
- ○ I have met an exceptionally good doctor but was not treated by one
- ○ I know of an exceptionally good doctor but have not met him/her
- ○ None of the above

Q7 We will now ask you a series of questions about your experiences with an exceptionally good doctor. As you may have encountered more than one exceptionally doctor in your life, when answering this section, please only think about the MOST exceptional of these exceptionally good doctors.

End of Block: ED Contact?

Start of Block: Doctor 1 Part a

Q8 The most exceptionally good doctor (physician)

Q9 What is the **doctor's gender?** For the purpose of this survey we need to refer to the doctor as either him or her.

- ○ Male
- ○ Female

Q10 Do you have an idea how old the doctor was when you met them? It is fine to make an estimate.

- ○ Under 25 years old
- ○ 25-34 years old
- ○ 35-44 years old
- ○ 45-54 years old
- ○ 55-64 years old
- ○ 65+ years old

Q11 Do you know what type of doctor he/she is?

- ○ A primary care specialist (GP or Family Medicine / Doctor)
- ○ A medical specialist working mostly or exclusively in a hospital
- ○ A medical specialist working mostly or exclusively outside a hospital
- ○ A doctor in a hospital who is not a specialist
- ○ I met the doctor in a hospital and I think he/she is a specialist
- ○ I met the doctor in a hospital and I think he/she is NOT a specialist
- ○ I met the doctor outside a hospital and I think he/she is a specialist
- ○ I met the doctor outside a hospital and I think he/she is NOT a specialist
- ○ Other, could you give details? _____

Q12 (Optional) If it is a medical specialist (not primary care or GP), could you select the specialty from the list?

- ○ Addiction medicine
- ○ Anaesthetist
- ○ Cardiologist
- ○ Community child health
- ○ Dermatologist
- ○ Emergency physician
- ○ Endocrinologist
- ○ Gastroenterologist and hepatologist
- ○ Geriatrician
- ○ Gynaecological oncologist
- ○ Haematologist
- ○ Hospitalist or Internal Medicine
- ○ Immunologist
- ○ Immunologist and allergist
- ○ Infectious diseases physician
- ○ Intensive care physician
- ○ Maternal–fetal medicine
- ○ Medical administrator
- ○ Oncologist
- ○ Nephrologist
- ○ Neurologist
- ○ Neurosurgeon
- ○ Obstetrician and gynaecologist
- ○ Ophthalmologist
- ○ Paediatrician

- ○ Pain medicine physician
- ○ Palliative medicine physician
- ○ Pathologist
- ○ Psychiatrist
- ○ Public health physician
- ○ Radiologist
- ○ Rehabilitation physician
- ○ Reproductive endocrinology and infertility
- ○ Respiratory and sleep medicine physician
- ○ Rheumatologist
- ○ Sexual health physician
- ○ Sport and exercise physician
- ○ Surgeon
- ○ Surgeon, cardio-thoracic
- ○ Surgeon, general
- ○ Surgeon, oral and maxillofacial
- ○ Surgeon, orthopaedic
- ○ Surgeon, otolaryngologist – head and neck
- ○ Surgeon, paediatric
- ○ Surgeon, plastic
- ○ Surgeon, vascular
- ○ Urologist
- ○ I am not sure or I can't find the specialty

Page Break

Q13 How did you first come across this doctor? Tick **all** that apply.

- ☐ Discovered via an internet search
- ☐ Recommended to me by a health care professional
- ☐ Recommended by a friend or family member or acquaintance
- ☐ No recommendation, I found him or her myself
- ☐ The doctor treated a colleague of mine
- ☐ The doctor treated a family member (spouse, children, parents, siblings, close cousins, etc.)
- ☐ I worked for the doctor as an employee or the doctor was my superior
- ☐ The doctor worked for me
- ☐ The doctor was a colleague
- ☐ The doctor was my teacher
- ☐ The doctor was my student
- ☐ The doctor *is* a close or extended family member
- ☐ Other, please specify

Q14 Please describe the circumstances under which you first met this doctor. Please select one.

- ○ I was a patient for a general health check-up
- ○ I was a patient for one health event, like an operation or a particular illness
- ○ I was a patient for multiple health events
- ○ I was / am his or her patient for a long time
- ○ Other, please specify _____

Q15 How many times did you visit **this** doctor in the last 12 months? Please select one.

- ○ Not at all
- ○ 1-2 times
- ○ 3-5 times
- ○ 6-10 times
- ○ 11-20 times, i.e. on average 1-2 times a month
- ○ 21-50 times
- ○ 51 or more times, i.e. on average every week

End of Block: Doctor 1 Part a

Start of Block: Doctor 1 Part b

Q16 Would you like to tell us about your experience with this exceptionally good doctor in your own words? (Optional)
That would be very helpful because every individual experience can be very different and currently little is known about exceptionally good doctors.

_____

_____

_____

_____

_____

Page Break

Q17 What made you think this doctor is exceptionally good? Choose **all** that apply.

- ☐ It was an overall impression, there are multiple reasons
- ☐ I had an outstanding outcome, for example an unexpectedly successful operation or a recovery against the odds.
- ☐ Because of this doctor I am healthier than I would otherwise be
- ☐ Because of this doctor I am *much* healthier than I would otherwise be
- ☐ This doctor definitely or probably saved my life
- ☐ I trust this doctor more than other doctors
- ☐ I feel safe with this doctor, different to other doctors
- ☐ I know the doctor will do whatever is needed to help me or has done so
- ☐ The doctor treats financially poor patients at a discount or for free
- ☐ The doctor allows me to make my own decisions
- ☐ The doctor is ready to extend guidelines and prescribe medications beyond their original intended use ("off-label")
- ☐ The doctor empowered me in my healing or treatment process much more than I thought was possible
- ☐ The doctor listens to me willingly to the end
- ☐ Another reason, which is: _____

End of Block: Doctor 1 Part b

Start of Block: Doctor 1 Part c

Display This Question:

If Q17 = I had an outstanding outcome, for example an unexpectedly successful operation or a recovery against the odds.

Or Q17 = Because of this doctor I am healthier than I would otherwise be

*Or Q17 = Because of this doctor I am *much* healthier than I would otherwise be*

Or Q17 = This doctor definitely or probably saved my life

Or Q17 = The doctor empowered me in my healing or treatment process much more than I thought was possible

Q18 Could you state your reasons as to why you said this earlier? Choose **all** that apply.

- ☐ I had a diagnosis that other doctors missed
- ☐ I had a diagnosis that was difficult because my symptoms were obscure / hidden / unusual
- ☐ I had a diagnosis that transformed my life for the better
- ☐ I had a dangerous or difficult operation and it went well
- ☐ I was not expected to recover from a non-terminal illness but did
- ☐ I was not expected to recover from a terminal illness but did
- ☐ The doctor changed my medication with a big beneficial effect
- ☐ The doctor gave me a different treatment that worked very well
- ☐ The doctor removed medication or other treatments and I was much better
- ☐ Other, could you specify?

Q19

Important - we ask this question about **the exceptionally good doctor** you mentioned previously here. In your evaluation, to what extent does the doctor have these traits? If you don't know or cannot be sure, **tick** 'Not sure'. If you know the doctor as a patient, then the patient in this question is *you*.

If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
Cares for patient					
Acknowledges patient's experience and knowledge					
Good at following things up or addressing items from previous consultation					
Listens well, rarely or never interrupts					
Connects with the patient on a personal level					
The patient has no fear of the doctor and may see them as a friend					
The patient trusts the doctor					
The doctor sees the patient as a whole person, not just a collection of symptoms					
The doctor is very thorough in the patient's assessment					
The doctor is a very good observer					
The doctor gives the patient the time needed					

Page Break

Q20 In your evaluation, is/was the exceptionally good doctor:

If you don't know or cannot be sure, tick 'Not sure'.

If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
Confident					
Courageous when making difficult decisions					
Good at communicating					
Adaptable, i.e. can respond to the unexpected					
Honest					
Humble					
Has integrity					
Open minded					
Organised					
Personable					
Determined to get past bureaucratic obstacles that affect the treatment					
Understanding and/ or shows empathy					

Q21 In your evaluation, is/was/does the exceptionally good doctor: If you don't know or cannot be sure, tick 'Not sure'.
If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
Avoids using medical terminology I don't understand					
Accurate in diagnosing the issue/ problem					
Good at explaining things					
Knowledgeable					
Popular (if you have seen the doctor with others)					
In good physical shape					
In good mental shape					
In an especially harmonious or cared for treatment room					
Always on time					
Has patience					
Is caring					

Page Break

Q22 Important - we ask this question about **the average doctor** here. In your evaluation, to what extent does the **average** doctor have these traits? If you don't know or cannot be sure, tick 'Not sure'. If you have ever been to a doctor who you consider to be an average doctor, then the patient in this question is *you*.
If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
The **average** doctor cares for the patient					
Acknowledges patient's experience and knowledge					
Good at following things up or addressing items from previous consultation					
The **average** doctor listens well, rarely or never interrupts					
Connects with the patient on a personal level					
The patient has no fear of the **average** doctor and may see them as a friend					
The patient trusts the **average** doctor					
The **average** doctor sees the patient as a whole person, not just a collection of symptoms					
The **average** doctor is very thorough in the patient's assessment					
The **average** doctor is a very good observer					
The **average** doctor gives the patient the time needed					

Q23

More than half way through.In your evaluation, is/was the **average** doctor: If you don't know or cannot be sure, tick 'Not sure'. If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
The **average** doctor is confident					
Courageous when making difficult decisions					
The **average** doctor is good at communicating					
Adaptable, i.e. can respond to the unexpected					
Honest					
Humble					
Has integrity					
Open minded					
The **average** doctor is organised					
Personable					
Determined to get past bureaucratic obstacles that affect the treatment					
Understanding and/ or shows empathy					

Q24 In your evaluation, is/was/does the **average** doctor:

If you don't know or cannot be sure, tick 'Not sure'.

If you get an error message at the end it is usually because you haven't moved a pointer at all.

	Completely disagree		Not sure		Completely Agree
	1	2	3	4	5
Avoids using medical terminology I don't understand					
Accurate in diagnosing the issue/ problem					
Good at explaining things					
The **average** doctor is knowledgeable					
Popular (if you have seen the **average** doctor with others)					
The **average** doctor is in good physical shape					
In good mental shape					
In an especially harmonious or cared for treatment room					
Always on time					
The **average** doctor has patience					
Is caring					

Start of Block: Survey End

Q25 Mostly done

Q27 How many medical doctors (physicians) do you estimate you have met in your life?

▼ 1-5 ... 101 or more

Display This Question:

If Q6 = I have been treated in the past by an exceptionally good doctor

Or Q6 = I have met an exceptionally good doctor but was not treated by one

Q28 How many **exceptionally good doctors** have you met in your life?

▼ 1 ... 5 or more

Q29 In your opinion, what is needed for a doctor to be an **exceptionally good doctor**?

- ○ It is enough for them to be outstanding at a single item, for example: a surgeon who is like all others except they are outstandingly skilled at one type of surgery, or a doctor who is bad-mannered but has outstanding diagnostic abilities, or a doctor who is outstandingly reassuring but otherwise normal, or a doctor who is particularly skilled in dealing with bureaucracy if their clients need to get compensation or government help.
- ○ They need to be outstanding in at least two areas to be considered an exceptionally good doctor.
- ○ For a surgeon it is enough if they are exceptionally good at one or more types of surgery, other doctors need to be exceptional in multiple areas.
- ○ They need to be **outstanding** in everything to be considered an exceptionally good doctor
- ○ They need to be **above average** in everything to be considered an exceptionally good doctor
- ○ Other, please specify _____

Display This Question: [Q30]

If Q19 [Cares for patient] >= 4.5
Or Q19 [Acknowledges patient's experience and knowledge] > 4.5
Or Q19 [Good at following things up or addressing items from previous consultation] >= 4.5
Or Q19 [Listens well, rarely or never interrupts] >= 4.5
Or Q19 [Connects with the patient on a personal level] >= 4.5
Or Q19 [The patient has no fear of the doctor and may see them as a friend] >= 4.5
Or Q19 [The patient trusts the doctor] >= 4.5
Or Q19 [The doctor sees the patient as a whole person, not just a collection of symptoms] >= 4.5
Or Q19 [The doctor is very thorough in the patient's assessment] >= 4.5
Or Q19 [The doctor is a very good observer] >= 4.5
Or Q19 [The doctor gives the patient the time needed] >= 4.5
Or Q20 [Confident] >= 4.5
Or Q20 [Courageous when making difficult decisions] >= 4.5
Or Q20 [Good at communicating] >= 4.5
Or Q20 [Adaptable, i.e. can respond to the unexpected] >= 4.5
Or Q20 [Honest] >= 4.5
Or Q20 [Humble] >= 4.5
Or Q20 [Has integrity] >= 4.5
Or Q20 [Open minded] >= 4.5
Or Q20 [Organised] >= 4.5
Or Q20 [Personable] >= 4.5
Or Q20 [Determined to get past bureaucratic obstacles that affect the treatment] >= 4.5
Or Q20 [Understanding and/ or shows empathy] >= 4.5
Or Q21 [Avoids using medical terminology I don't understand] >= 4.5
Or Q21 [Accurate in diagnosing the issue/ problem] >= 4.5
Or Q21 [Good at explaining things] >= 4.5
Or Q21 [Knowledgeable] >= 4.5
Or Q21 [Popular (if you have seen the doctor with others)] >= 4.5
Or Q21 [In good physical shape] >= 4.5

Q30 Which 3 of these items are most important for an **exceptionally good** doctor to have? Could you choose 3, with the most important on top.
If only 1, 2 or 3 items are displayed, move these into the box.
[Items are displayed if any item of Q19, Q20, or Q21 was scored at 4.5/5 or higher. The respondents indicate which of these are their top 3 choices]

Q31 How many times did you visit a doctor or went to hospital in the last 12 months?

- ○ Not at all
- ○ 1-2 times
- ○ 3-5 times
- ○ 6-10 times
- ○ 11-20 times, i.e. on average 1-2 times a month
- ○ 21-50 times
- ○ 51 or more times, i.e. on average every week

Q32 Could you tell us **your** age?

- ○ Under 18
- ○ 18-24 years old
- ○ 25-34 years old
- ○ 35-44 years old
- ○ 45-54 years old
- ○ 55-64 years old
- ○ 65+ years old

Q33 How do you describe yourself?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer to self-describe _____
- ○ Prefer not to say

Q34 What is the highest level of education you have completed?

- ○ No schooling completed
- ○ Nursery school
- ○ Grades 1 through 11
- ○ 12th grade—no diploma
- ○ Regular high school diploma
- ○ GED or alternative credential (high school diploma equivalent)
- ○ Some college (university) credit, but less than 1 year of college
- ○ 1 or more years of college (university) credit, no degree
- ○ Associates degree (for example: AA, AS)
- ○ Bachelor's degree (for example: BA. BS)
- ○ Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA)
- ○ Professional degree beyond bachelor's degree (for example: MD, DDS, DVM, LLB, JD)
- ○ Doctorate degree (for example, PhD, EdD)

Q35 (Optional) Would you like to comment on the survey? Anything that can be improved or your opinion or any feedback or anything you would like added or removed? Did you enjoy doing the survey? Was it difficult? Was it quick or did it take a long time? Is there anything else you would like to add?

_____

_____

_____

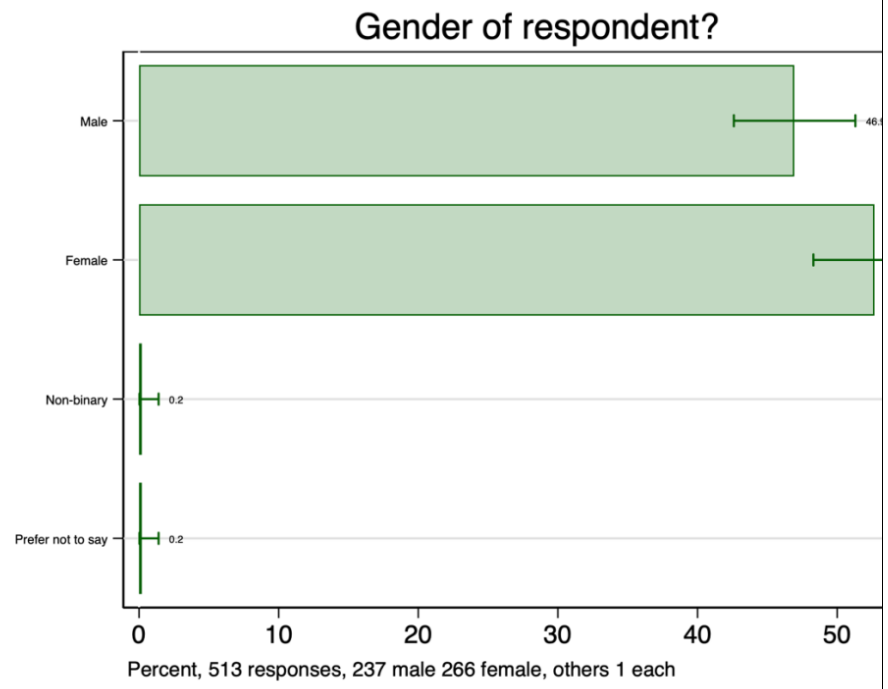
_____

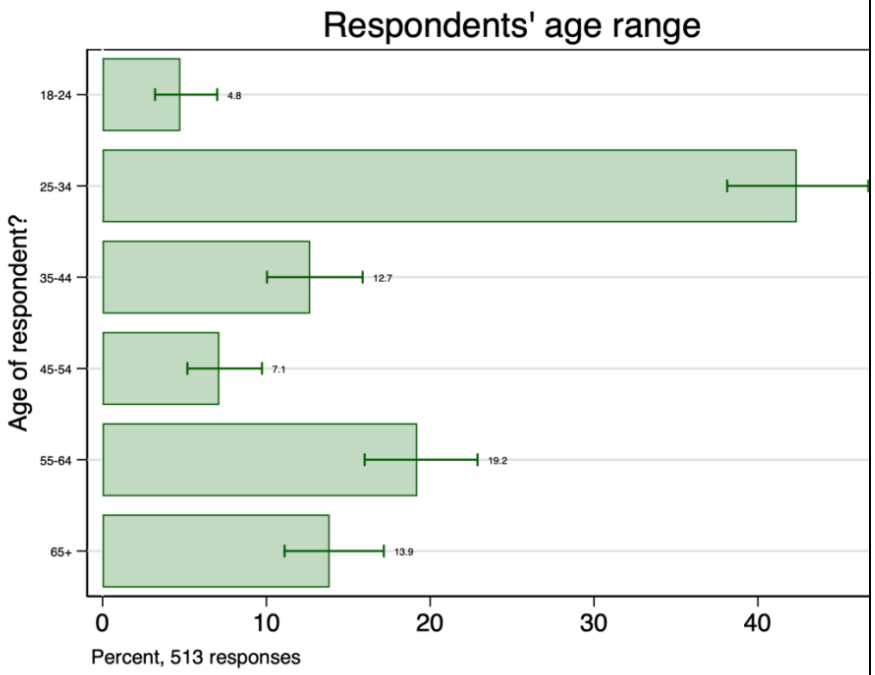
_____

End of Block: Survey End

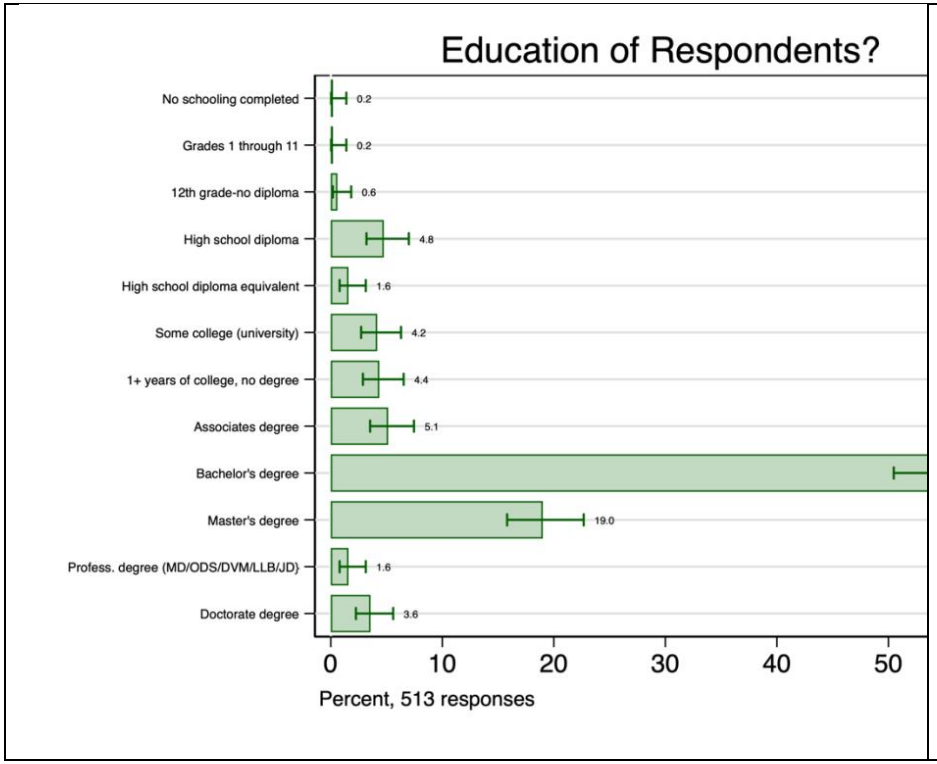
THESIS APPENDIX 5 SUPPLEMENT TO PUBLICATION 5 – SURVEY

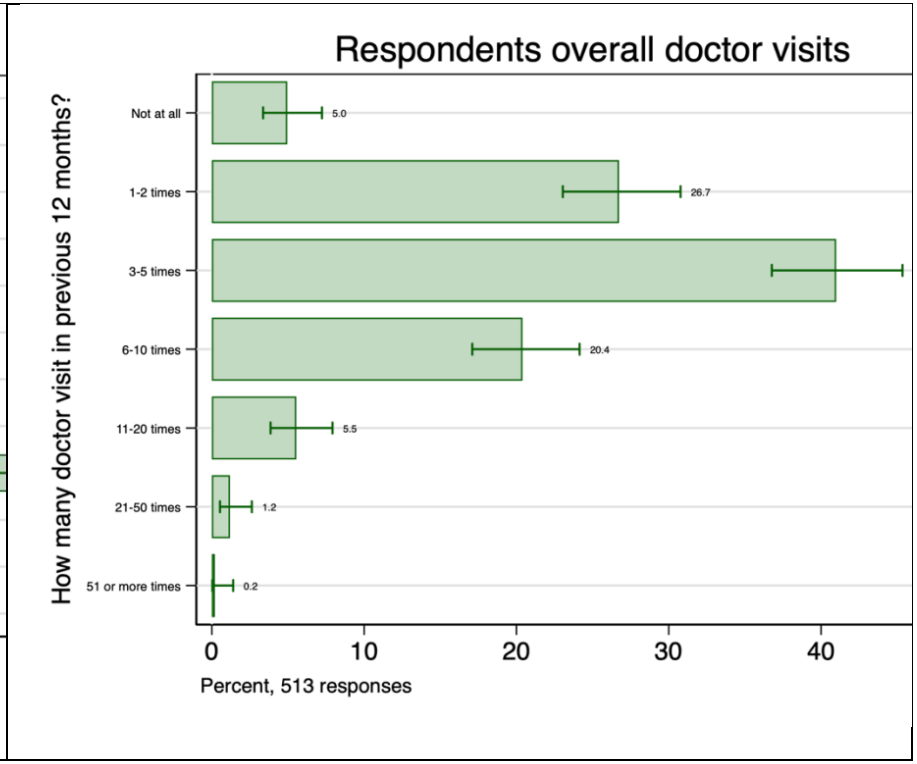
(Appendix 1) – further graphs

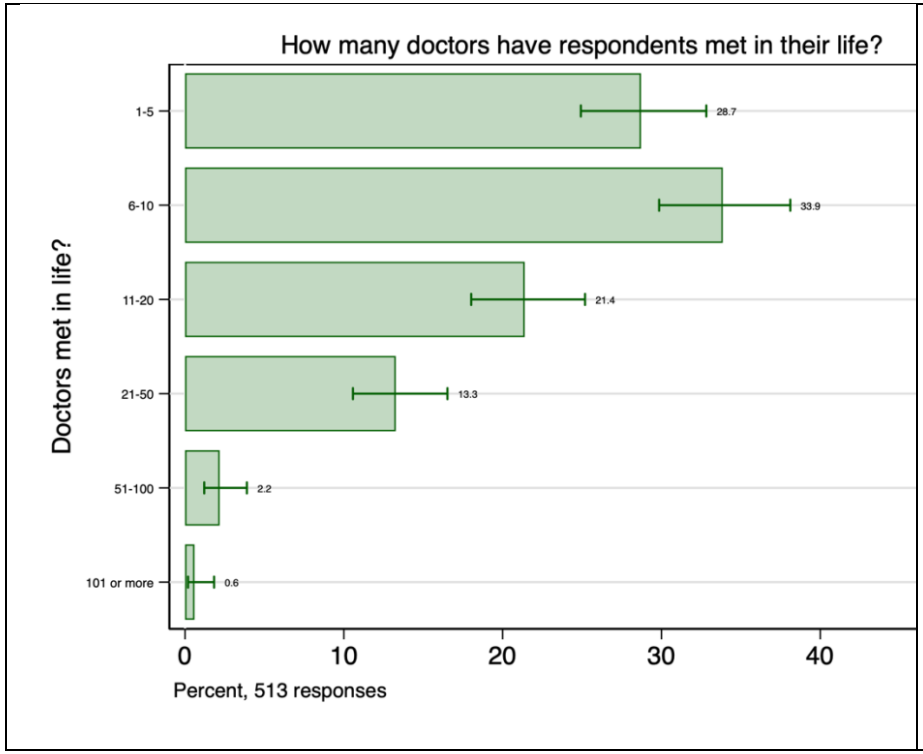




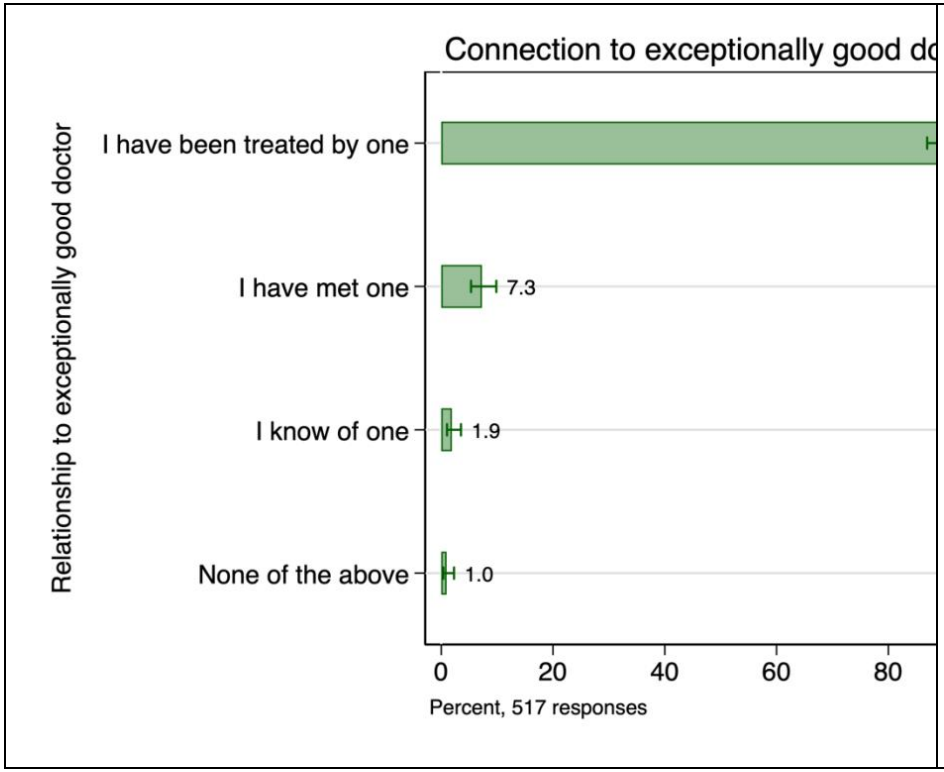
4 Publication 5 Survey - **further graphs,** Survey of Adults

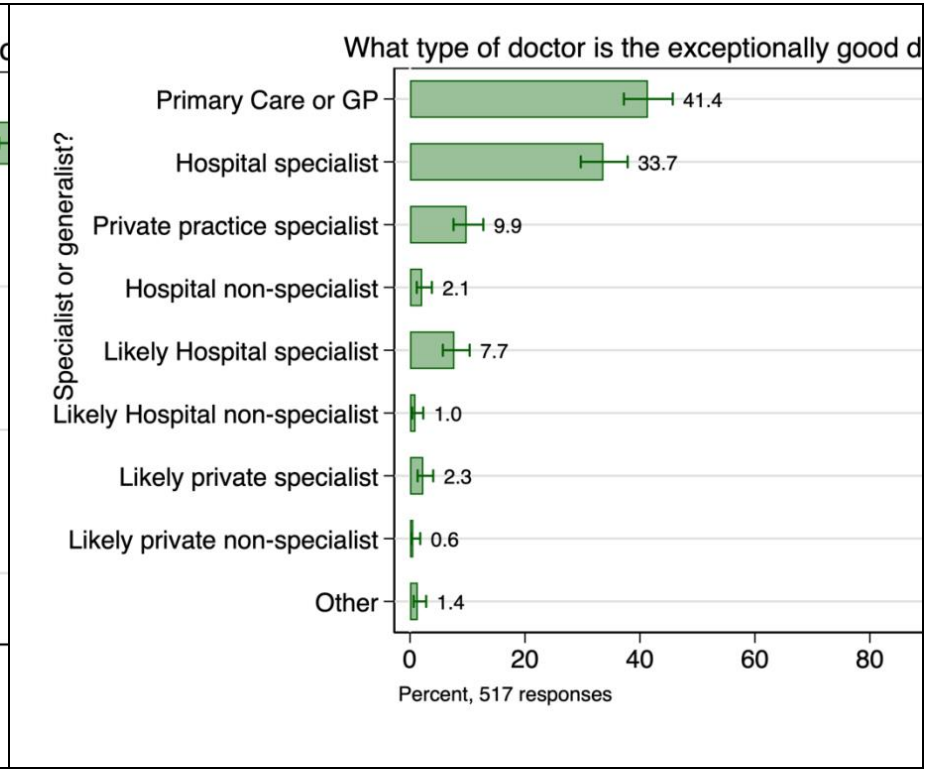

Education of Respondents?
No schooling completed
Grades 1 through 11
12th grade-no diploma
High school diploma
High school diploma equivalent
Some college (university)
1+ years of college, no degree
Associates degree
Bachelor's degree
Master's degree
Profess. degree (MD/ODS/DVM/LLB/JD)
Doctorate degree
0.2
0.2
0.6
4.8
1.6
4.2
4.4
5.1
19.0
1.6
3.6
0
10
20
30
40
50
Percent, 513 responses

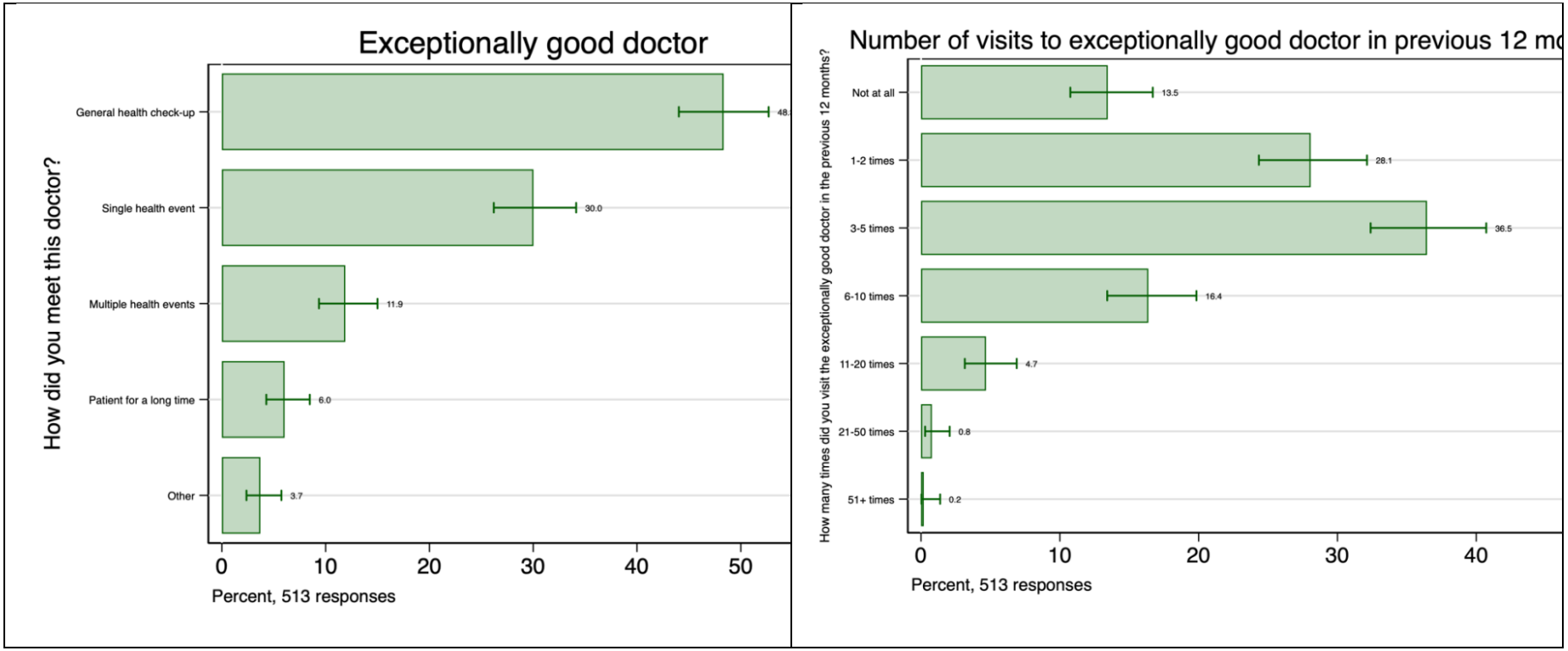

Respondents overall doctor visits
How many doctor visit in previous 12 months?
Not at all
1-2 times
3-5 times
6-10 times
11-20 times
21-50 times
51 or more times
5.0
26.7
20.4
5.5
1.2
0.2
0
10
20
30
40
Percent, 513 responses

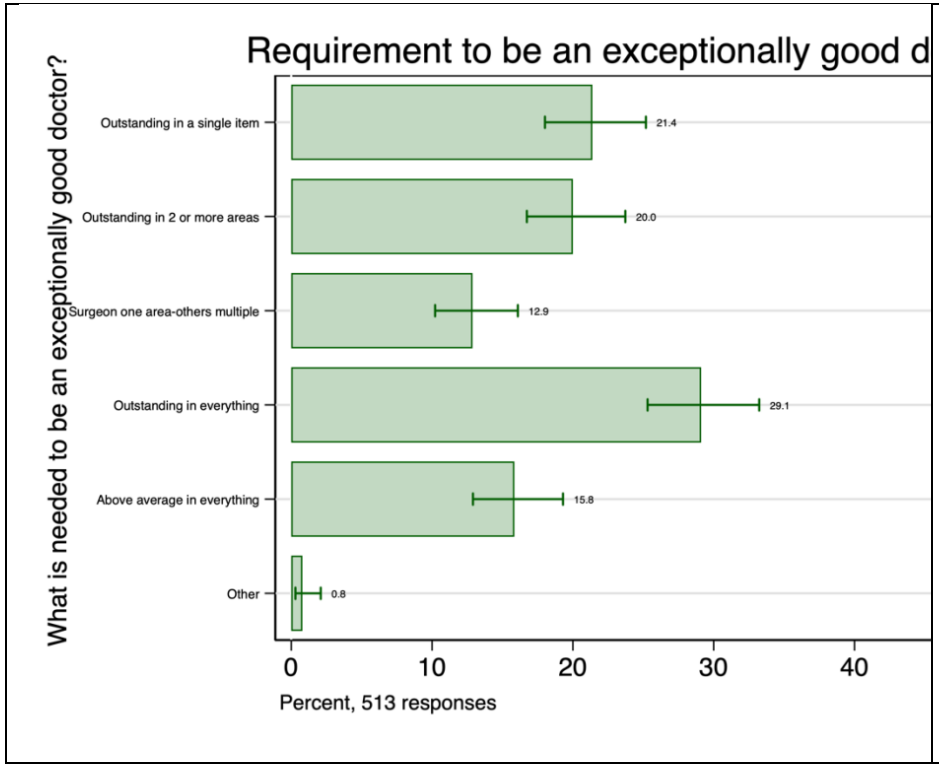

How many doctors have respondents met in their life?
Doctors met in life?
1-5
6-10
11-20
21-50
51-100
101 or more
28.7
33.9
21.4
13.3
2.2
0.6
0
10
20
30
40
Percent, 513 responses

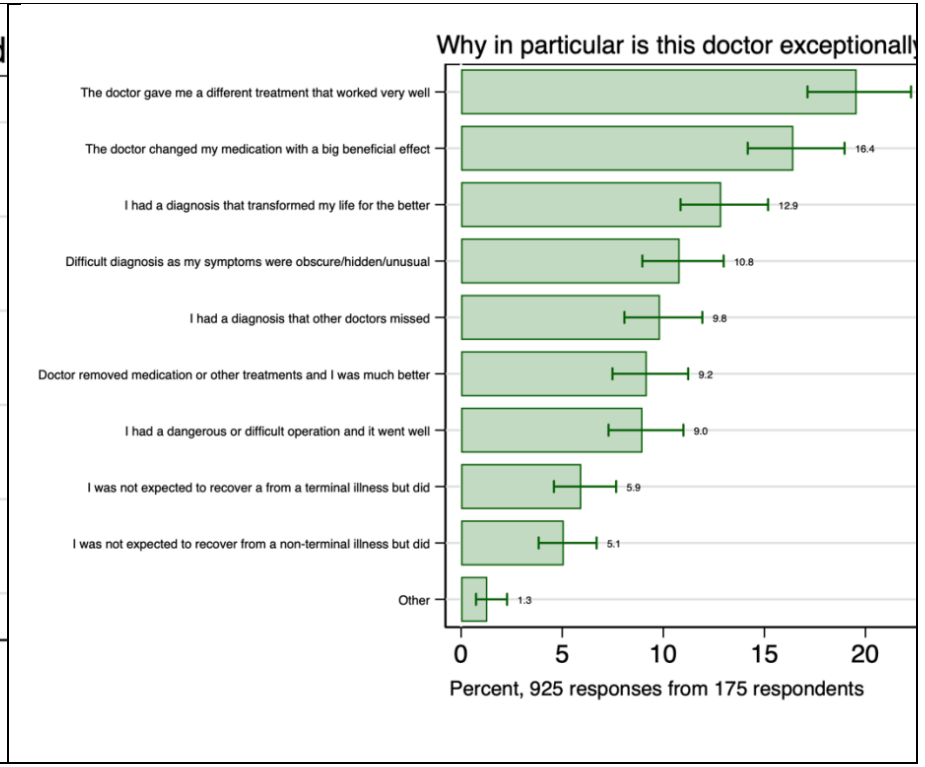

Exceptionally good doctors met in life
How many exceptionally good doctors met in life?
1
2
3
4
5+
13.9
37.3
27.8
10.3
10.7
0
10
20
30
40
Percent, 513 responses

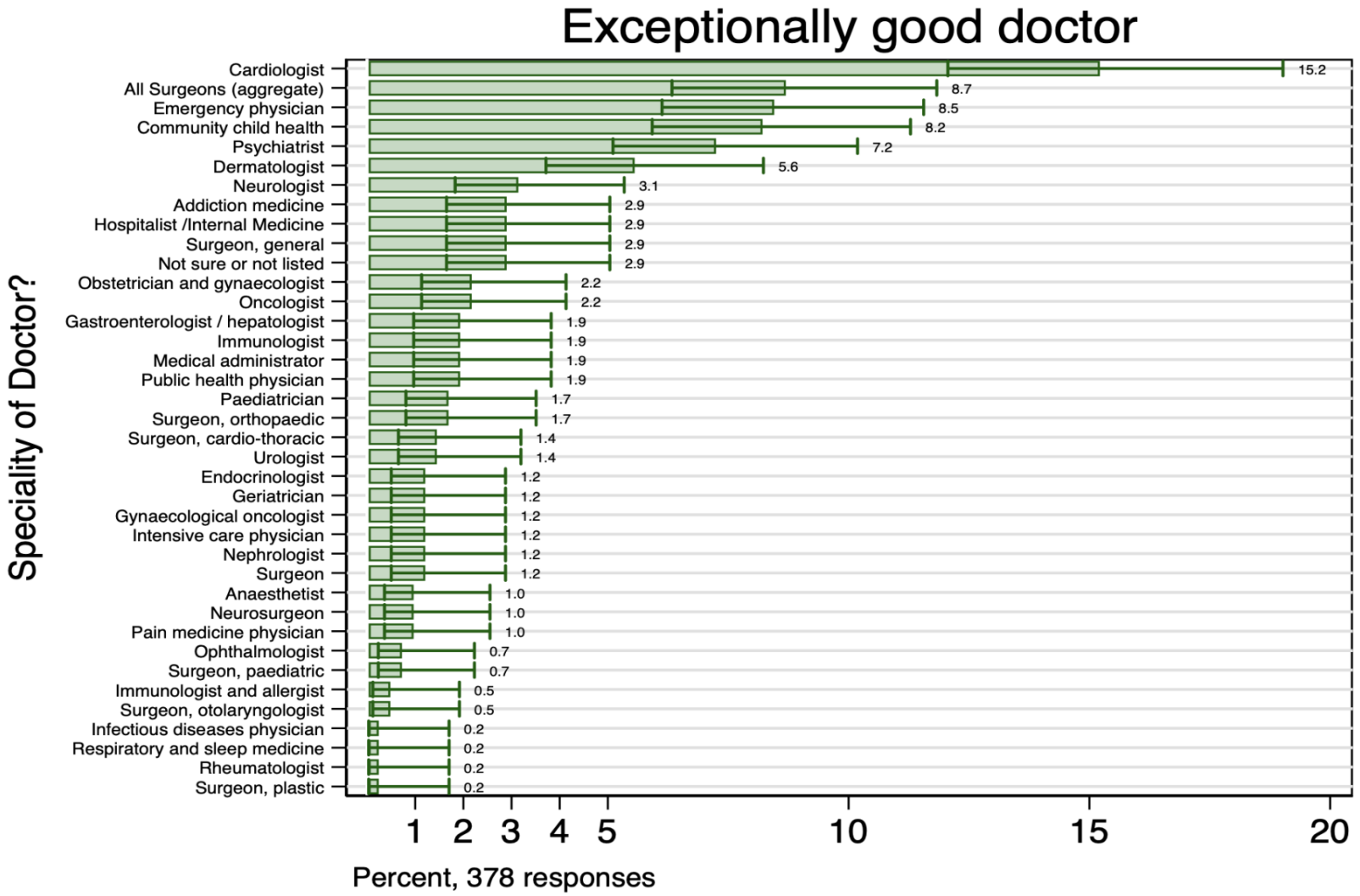

Connection to exceptionally good do
Relationship to exceptionally good doctor
I have been treated by one
I have met one
7.3
I know of one
1.9
None of the above
1.0
0
20
40
60
80
Percent, 517 responses

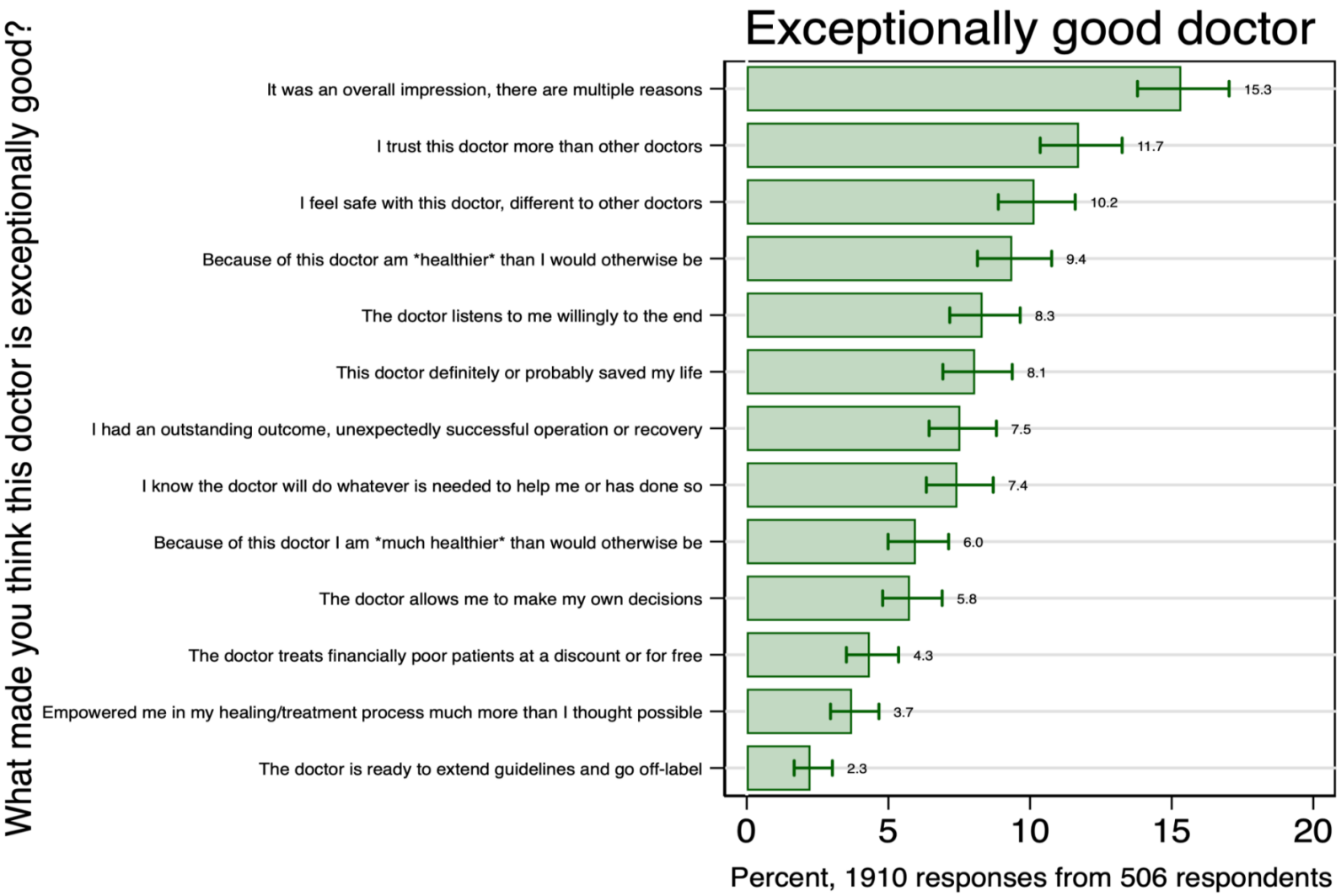

What type of doctor is the exceptionally good d
Specialist or generalist?
Primary Care or GP
41.4
Hospital specialist
33.7
Private practice specialist
9.9
Hospital non-specialist
2.1
Likely Hospital specialist
7.7
Likely Hospital non-specialist
1.0
Likely private specialist
2.3
Likely private non-specialist
0.6
Other
1.4
0
20
40
60
80
Percent, 517 responses

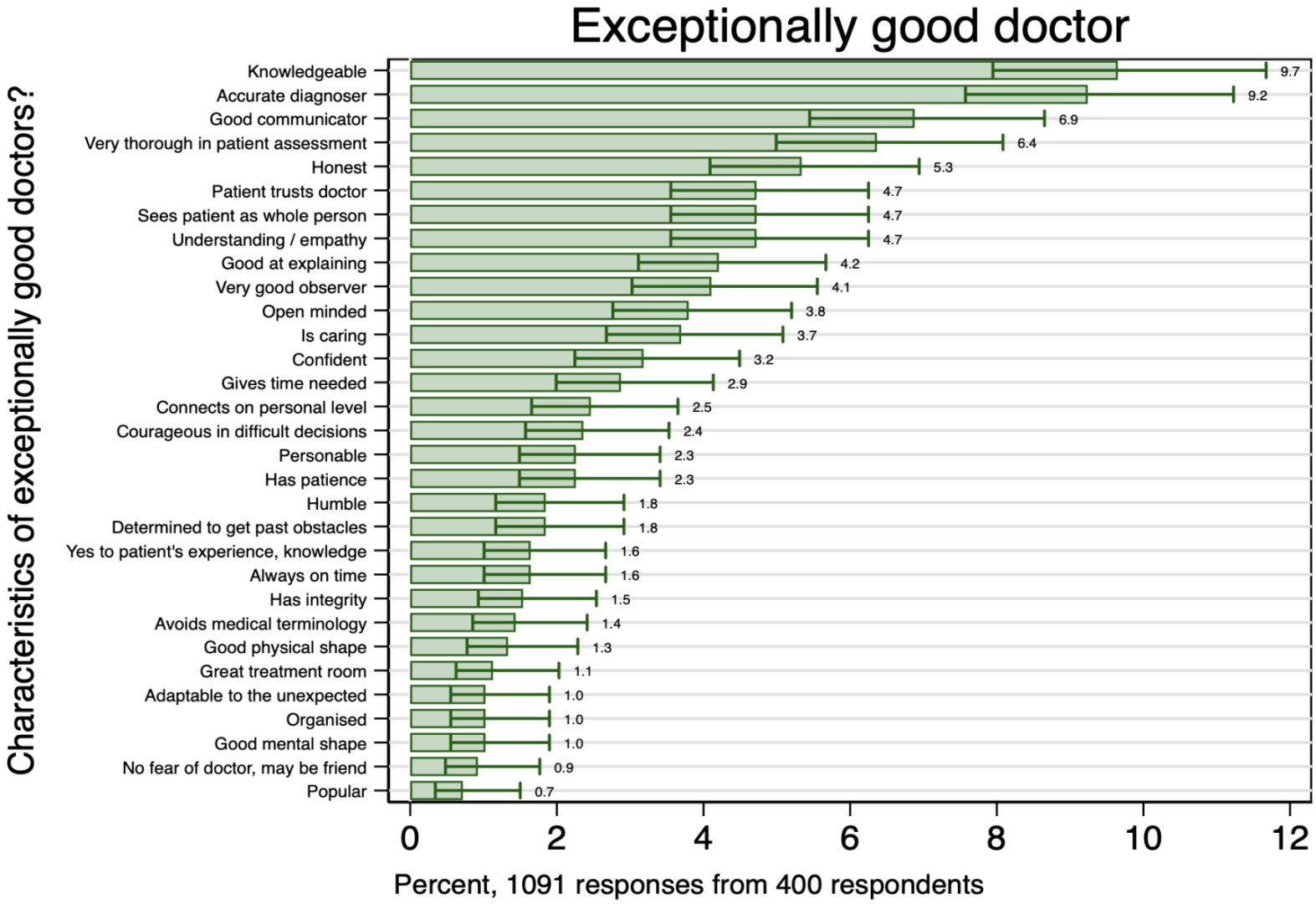

Exceptionally good doctor
How did you meet this doctor?
General health check-up
48.
Single health event
30.0
Multiple health events
11.9
Patient for a long time
6.0
Other
3.7
0
10
20
30
40
50
Percent, 513 responses
Number of visits to exceptionally good doctor in previous 12 mo
How many times did you visit the exceptionally good doctor in the previous 12 months?
Not at all
13.5
1-2 times
28.1
3-5 times
36.5
6-10 times
16.4
11-20 times
4.7
21-50 times
0.8
51+ times
0.2
0
10
20
30
40
Percent, 513 responses

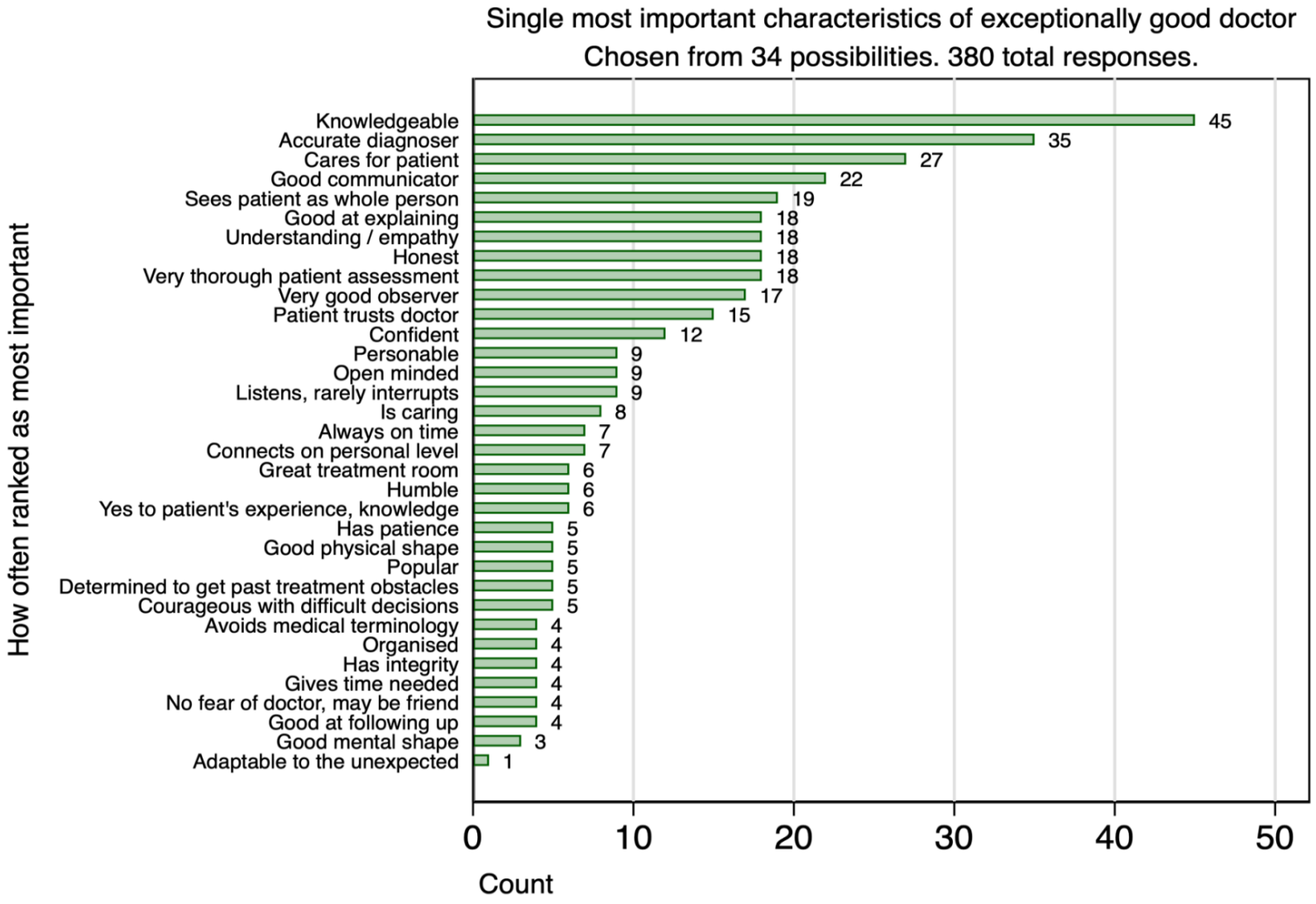

Requirement to be an exceptionally good d
What is needed to be an exceptionally good doctor?
Outstanding in a single item
21.4
Outstanding in 2 or more areas
20.0
Surgeon one area-others multiple
12.9
Outstanding in everything
29.1
Above average in everything
15.8
Other
0.8
0
10
20
30
40
Percent, 513 responses

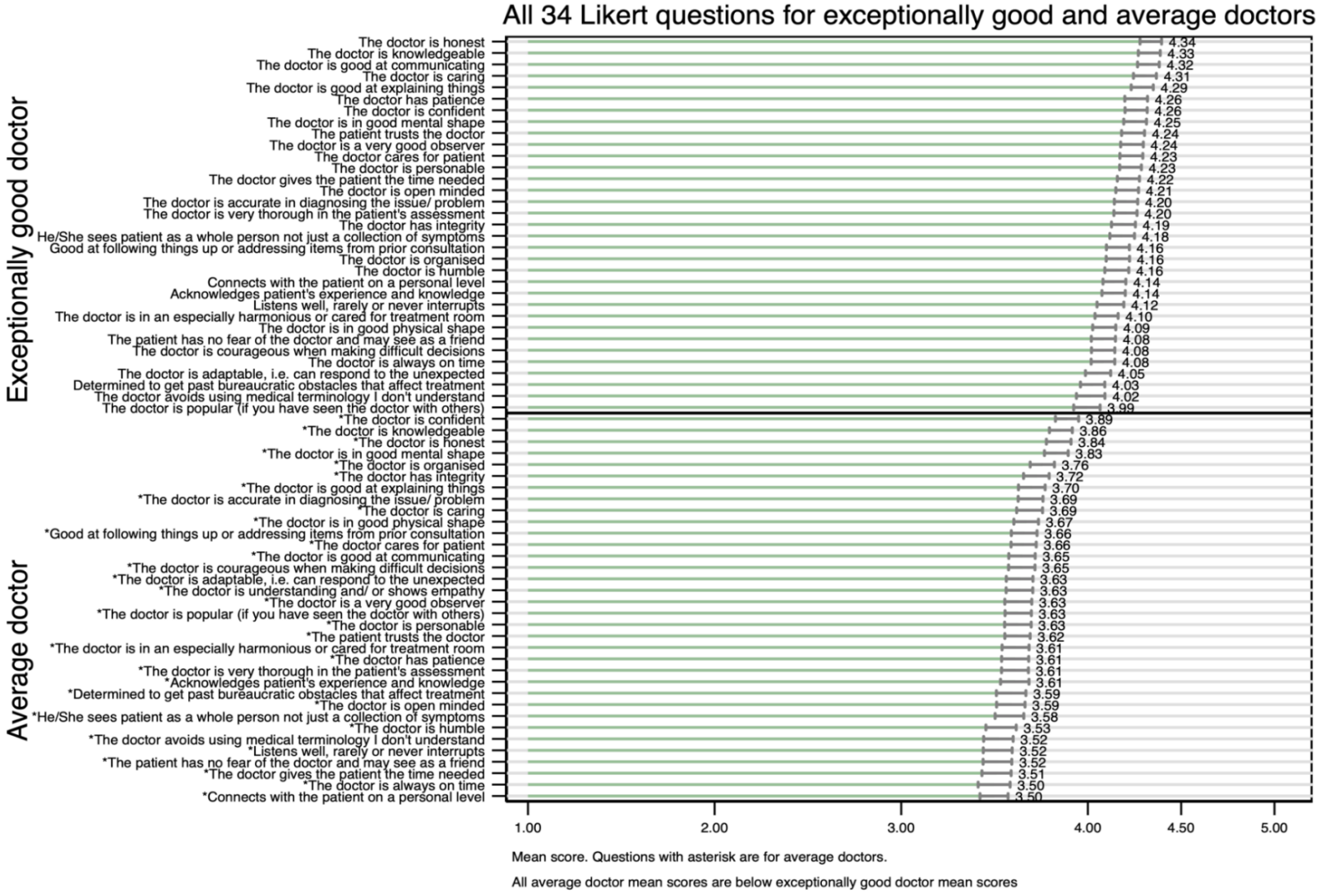

Why in particular is this doctor exceptionally
The doctor gave me a different treatment that worked very well
The doctor changed my medication with a big beneficial effect
16.4
I had a diagnosis that transformed my life for the better
12.9
Difficult diagnosis as my symptoms were obscure/hidden/unusual
10.8
I had a diagnosis that other doctors missed
9.8
Doctor removed medication or other treatments and I was much better
9.2
I had a dangerous or difficult operation and it went well
9.0
I was not expected to recover a from a terminal illness but did
5.9
I was not expected to recover from a non-terminal illness but did
5.1
Other
1.3
0
5
10
15
20
Percent, 925 responses from 175 respondents


Exceptionally good doctor
Speciality of Doctor?
Cardiologist 15.2
All Surgeons (aggregate) 8.7
Emergency physician 8.5
Community child health 8.2
Psychiatrist 7.2
Dermatologist 5.6
Neurologist 3.1
Addiction medicine 2.9
Hospitalist /Internal Medicine 2.9
Surgeon, general 2.9
Not sure or not listed 2.9
Obstetrician and gynaecologist 2.2
Oncologist 2.2
Gastroenterologist / hepatologist 1.9
Immunologist 1.9
Medical administrator 1.9
Public health physician 1.9
Paediatrician 1.7
Surgeon, orthopaedic 1.7
Surgeon, cardio-thoracic 1.4
Urologist 1.4
Endocrinologist 1.2
Geriatrician 1.2
Gynaecological oncologist 1.2
Intensive care physician 1.2
Nephrologist 1.2
Surgeon 1.2
Anaesthetist 1.0
Neurosurgeon 1.0
Pain medicine physician 1.0
Ophthalmologist 0.7
Surgeon, paediatric 0.7
Immunologist and allergist 0.5
Surgeon, otolaryngologist 0.5
Infectious diseases physician 0.2
Respiratory and sleep medicine 0.2
Rheumatologist 0.2
Surgeon, plastic 0.2
1 2 3 4 5 10 15 20
Percent, 378 responses


Exceptionally good doctor
What made you think this doctor is exceptionally good?
It was an overall impression, there are multiple reasons
15.3
I trust this doctor more than other doctors
11.7
I feel safe with this doctor, different to other doctors
10.2
Because of this doctor am *healthier* than I would otherwise be
9.4
The doctor listens to me willingly to the end
8.3
This doctor definitely or probably saved my life
8.1
I had an outstanding outcome, unexpectedly successful operation or recovery
7.5
I know the doctor will do whatever is needed to help me or has done so
7.4
Because of this doctor I am *much healthier* than would otherwise be
6.0
The doctor allows me to make my own decisions
5.8
The doctor treats financially poor patients at a discount or for free
4.3
Empowered me in my healing/treatment process much more than I thought possible
3.7
The doctor is ready to extend guidelines and go off-label
2.3
0
5
10
15
20
Percent, 1910 responses from 506 respondents


Exceptionally good doctor
Characteristics of exceptionally good doctors?
Knowledgeable 9.7
Accurate diagnoser 9.2
Good communicator 6.9
Very thorough in patient assessment 6.4
Honest 5.3
Patient trusts doctor 4.7
Sees patient as whole person 4.7
Understanding / empathy 4.7
Good at explaining 4.2
Very good observer 4.1
Open minded 3.8
Is caring 3.7
Confident 3.2
Gives time needed 2.9
Connects on personal level 2.5
Courageous in difficult decisions 2.4
Personable 2.3
Has patience 2.3
Humble 1.8
Determined to get past obstacles 1.8
Yes to patient's experience, knowledge 1.6
Always on time 1.6
Has integrity 1.5
Avoids medical terminology 1.4
Good physical shape 1.3
Great treatment room 1.1
Adaptable to the unexpected 1.0
Organised 1.0
Good mental shape 1.0
No fear of doctor, may be friend 0.9
Popular 0.7
0
2
4
6
8
10
12
Percent, 1091 responses from 400 respondents


Single most important characteristics of exceptionally good doctor
Chosen from 34 possibilities. 380 total responses.
How often ranked as most important
Knowledgeable 45
Accurate diagnoser 35
Cares for patient 27
Good communicator 22
Sees patient as whole person 19
Good at explaining 18
Understanding / empathy 18
Honest 18
Very thorough patient assessment 18
Very good observer 17
Patient trusts doctor 15
Confident 12
Personable 9
Open minded 9
Listens, rarely interrupts 9
Is caring 8
Always on time 7
Connects on personal level 7
Great treatment room 6
Humble 6
Yes to patient's experience, knowledge 6
Has patience 5
Good physical shape 5
Popular 5
Determined to get past treatment obstacles 5
Courageous with difficult decisions 5
Avoids medical terminology 4
Organised 4
Has integrity 4
Gives time needed 4
No fear of doctor, may be friend 4
Good at following up 4
Good mental shape 3
Adaptable to the unexpected 1
0
10
20
30
40
50
Count


All 34 Likert questions for exceptionally good and average doctors
Exceptionally good doctor
Average doctor
The doctor is honest 4.34
The doctor is knowledgeable 4.33
The doctor is good at communicating 4.32
The doctor is caring 4.31
The doctor is good at explaining things 4.29
The doctor has patience 4.26
The doctor is confident 4.26
The doctor is in good mental shape 4.25
The patient trusts the doctor 4.24
The doctor is a very good observer 4.24
The doctor cares for patient 4.23
The doctor is personable 4.23
The doctor gives the patient the time needed 4.22
The doctor is open minded 4.21
The doctor is accurate in diagnosing the issue/ problem 4.20
The doctor is very thorough in the patient's assessment 4.20
The doctor has integrity 4.19
He/She sees patient as a whole person not just a collection of symptoms 4.18
Good at following things up or addressing items from prior consultation 4.16
The doctor is organised 4.16
The doctor is humble 4.16
Connects with the patient on a personal level 4.14
Acknowledges patient's experience and knowledge 4.14
Listens well, rarely or never interrupts 4.12
The doctor is in an especially harmonious or cared for treatment room 4.10
The doctor is in good physical shape 4.09
The patient has no fear of the doctor and may see as a friend 4.08
The doctor is courageous when making difficult decisions 4.08
The doctor is always on time 4.08
The doctor is adaptable, i.e. can respond to the unexpected 4.05
Determined to get past bureaucratic obstacles that affect treatment 4.03
The doctor avoids using medical terminology I don't understand 4.02
The doctor is popular (if you have seen the doctor with others) 3.99
*The doctor is confident 3.89
*The doctor is knowledgeable 3.86
*The doctor is honest 3.84
*The doctor is in good mental shape 3.83
*The doctor is organised 3.76
*The doctor has integrity 3.72
*The doctor is good at explaining things 3.70
*The doctor is accurate in diagnosing the issue/ problem 3.69
*The doctor is caring 3.69
*The doctor is in good physical shape 3.67
*Good at following things up or addressing items from prior consultation 3.66
*The doctor cares for patient 3.66
*The doctor is good at communicating 3.65
*The doctor is courageous when making difficult decisions 3.65
*The doctor is adaptable, i.e. can respond to the unexpected 3.63
*The doctor is understanding and/ or shows empathy 3.63
*The doctor is a very good observer 3.63
*The doctor is popular (if you have seen the doctor with others) 3.63
*The doctor is personable 3.63
*The patient trusts the doctor 3.62
*The doctor is in an especially harmonious or cared for treatment room 3.61
*The doctor has patience 3.61
*The doctor is very thorough in the patient's assessment 3.61
*Acknowledges patient's experience and knowledge 3.61
*Determined to get past bureaucratic obstacles that affect treatment 3.59
*The doctor is open minded 3.59
*He/She sees patient as a whole person not just a collection of symptoms 3.58
*The doctor is humble 3.53
*The doctor avoids using medical terminology I don't understand 3.52
*Listens well, rarely or never interrupts 3.52
*The patient has no fear of the doctor and may see as a friend 3.52
*The doctor gives the patient the time needed 3.51
*The doctor is always on time 3.50
*Connects with the patient on a personal level 3.50
1.00
2.00
3.00
4.00
4.50
5.00
Mean score. Questions with asterisk are for average doctors.
All average doctor mean scores are below exceptionally good doctor mean scores

Appendix 2 Respondents' experiences in their own words ordered by category and length

Question 16: Would you like to tell us about your experience with this exceptionally good doctor in your own words? (Optional) That would be very helpful because every individual experience can be very different and currently little is known about exceptionally good doctors.

Respondents' own statement of what is needed to be an exceptionally good doctor

Answer 1: She was very patient in listening and also communicating with me about my father. She gave me a clear understanding of what the situation was and what to look for in the future. My dad was being treated in a hospital and she was overseeing things as she was a friend of my friend. Doctors usually have massive egos that is sometimes not earned by them. They don't like being asked questions. They have their juniors to block these types of communication. They also follow protocols blindly most of the time without using their common sense or really observing the patients. This neurologist was really exceptional because she liked discussing things and was open to questions. She also had the acumen to change course in treatment as the patient showed different symptoms or improved without just sticking to "protocols". I had a really bad experience with incompetent doctors so this was really refreshing to see. It was not about money at all as I didn't pay her much. She had a sense of humanity and a genuine sense of caring nature. It made me feel secure and I could explore information myself and consult her. Some of the doctors, especially during and post corona have lost their focus and their ethics. They do not question or even care to question anything. This is very unscientific and makes me nervous for other people as well. A doctor without common sense can be dangerous.

They ought to have discipline and dedication regardless of the circumstances. They can't give up easily and shouldn't, just because there is some pandemic or the statistics suggests that humans die after all. Doctors should be inventive, treat people as humans who are owed dignity and have a right to live. They should be updated with technology.

Respondents' own statement of what is needed to be an exceptionally good doctor

I saw hospitals that had really low level sensors and gadgets. This is embarrassing. Doctors who mundanely do duty just to make money can never be good doctors. They should try and strive to make the medical industry better. They should have enough courage to question things. It is not just about cramming antiquated books. Right now, I am thoroughly disappointed with the general set of doctors we have. Some of them are downright immoral and bereft of any guilt. A great doctor would do justice to the oath they took.

Answer 2: Patients don't care about their physician's medical school grades or other accolades—they want to feel that they are in good hands. A good doctor knows how to make a patient feel as though they are being cared for, that their concerns are valid, and that they are being heard.

Answer 3: this doctor was really good nature. the good physician treats the disease, the great physician treats the patient who has the disease. this doctor treat the patient, not the disease.

Answer 4: I just think what makes him exceptional is his ability to really listen to the issues I have and how he helps with those issues.

Answer 5: Good doctors will provide good tips and manage all the health care.

Answer 6: Good doctors are good communicators

Category 2: Treatment examples given by respondents

Treatment examples given by respondents

Answer 1: The man remembers me from past visits and remembers my past history (although he could be checking a laptop to refresh his memory). He asks questions, and if I have any complaints, he explores them. He takes his time with me and isn't in a rush to get to the next room/patient. He tailors my treatment (i.e. prescriptions, recommendations) to my personal situation at that time, not a generic "do this."

He schedules whatever tests (i.e. lab work) he thinks are necessary. He monitors my progress on various prescriptions. He knows what he's doing. If a follow-up is necessary, he schedules it. He is friendly and has a good sense of humor, but he doesn't clown around. He cares about my well-being; I'm not just another name on his laptop. He follows up on my needs. If one of my problems/ailments is outside of his specialty (i.e. when I had an ear problem which turned out to be trivial), he sends me to specialist.

Answer 2: He was my pediatrician/primary care doctor from around 6 years old until I went off until college. He was intelligent, knowledgeable, had a great sense of humor, and as I got older, respected my privacy and knew what he should and shouldn't share with my parents. There seemed to be mutual trust and respect.

I have not had that kind of relationship with any doctor I've had as an adult. I think my esteem for him has only grown as I've gotten older and experienced the dreck that passes as fully licensed physicians

For example, my current primary care doctor is mediocre at best and I feel makes a lot of assumptions that lowers the standard of care provided. I am hesitant to even see him at this point. We are not on the same wavelength and I have started to believe googling symptoms wouldn't get any worse results than seeing him.

Treatment examples given by respondents

Answer 3: He is the kind of doctor that likes to solve puzzles. So if a patient comes to him with an illness he won't just rule things out and make a quick diagnosis, he will try his best to figure out the cause of the problem. He spends time with his patients and doesn't have his hand on the doorknob ready to leave the exam room and get to the next patient.

I'd say that he is a doctor for the right reasons, he really cares about taking care of his patients. When he came up with the right combination of medication to help me and I felt better, I was so happy that I bought him a bottle of wine and he was very appreciative. I had been misdiagnosed by other doctors so I really appreciated that he kept on trying different things until something worked.

Answer 4: I first met this doctor when I interviewed for a job at her clinic, I later became her patient, and worked for her for 26 years. We are both retired now. I think she was an exceptional because she was truly caring to every patient. She spent time with each patient and listened to each of them. Sometimes she spent so much time with patients that others got impatient, but when it was their turn they received the same care and time as the one before them, and they ended up coming back to see her for many years. When difficult cases came up, she did not give up. She would call specialists in the area for advice or send the patient to them.

Answer 5: I met her 30 years ago. My regular physician was too busy to get in to see so I took an appointment with the "new kid" at my group of doctors. In the first appointment she started listening and helping me with multiple issues I could never get help with. I still remember her listening to my symptoms and educating me on what I needed to do to feel better. Getting me to take the medicine that would eventually make it easier for me to breathe, sleep and thrive. No one had ever helped me so much. She is an expert communicator, detective and so very caring. She continues to take good care of me after all these years I trust her completely.

Treatment examples given by respondents

Answer 6: Although I have had the good fortune to have received treatment from several good doctors my family practitioner is exceptional. From the very first meeting, his easy-going personality and obvious knowledge of current healthcare practices put me at ease. I was especially impressed with his thoroughness and the way he made me feel like my concerns were important. As an older male patient, I especially liked the way he targeted in on those things they may affect men of a certain age and made sure any related testing was either immediately conducted or referred out. Each time I've visited him I expect and receive a pleasant experience that has satisfied my healthcare concern.

Answer 7: Whenever I see him, it is just for a health checkup, but he is also extremely nice and personal. He likes to talk about my personal life and what is going on with it. He asks important questions about how I've been feeling, and he always has a friendly demeanor about him. He actually cares about my well-being and it shows. I am almost the most comfortable I've been with a doctor when I see him. Some just want to get you in and out, but I never got that feeling with him. He seems like he is just as much a friend as he is a doctor.

Answer 8: Every time I visit with my doctor, I hardly have to wait for too long. My doctor is very personable. He takes the time to ask about the symptoms I may be experiencing. Then he gives me a thorough checkup. He always explains my symptoms in language I can understand. He's never in a rush. It's like I am the only patient. He's caring and very passionate. He discusses the treatment options and I always trust his opinions about what I should do. He always answers all my questions or concerns. I feel I am in good hands with my doctor and wouldn't think about changing.

Answer 9: I have had my doctor for 23 years and I am still seeing her to this day. She belongs with my health network. Found her 23 years ago. She has been the best doctor that I have had my entire

life. Dr. before her was a quack. She has been able to identify all of my ongoing health issues. And she keeps in contact with me especially if she has heard from me in a few months. She makes me feel so calm and peaceful each time I leave from visiting her. She listens, and is very sympathetic and empathetic to my health needs.

Answer 10: I don't have much to say, the Doctor is excellent. I am the mother of 2 boys and 1 girl and they all went through the hands of this doctor. I remember that once one of my children had a more serious problem and the doctor gave him weekly follow-up care, and this was not mandatory on his part, he was always very nice, polite, and really knew what to do in any situation, no matter how difficult it seemed to be, and the most important thing is the tranquility and security that he passed to everyone. He was very reliable and friendly.

Answer 11: I made an appointment with this doctor shortly after moving to Connecticut. He was more outstanding than I can express in words. I have 5 children and he treated all of us. He was incredibly talented at making an accurate diagnosis and encouraged me to contact him at any time - day or night if something was wrong. He attended to me while I was in the hospital and carefully reviewed the work of any specialists. He was caring, compassionate and truly dedicated himself to the health of his patients. I was lucky to have him for 10 years before he retired.

Answer 12: He was the father of one of my best friends growing up and reached out to my parents to tell them he could see me as my primary if they wanted. He was always very nice and professional. He passed away when I was about 17, but I always remember him as kind of the template of what I think a doctor should be: smart, caring, personable, and he never treated me like a child, even though I was one. He just gave off this calm, confident air of authority that made me feel safe and well taken care of.

Treatment examples given by respondents

Answer 13: Dr. C. was one of those doctors that made you feel very comfortable when you were in his office, he knew what he was talking about and he was always right. He took the time to listen to you and let you ask as many questions as you needed to. He wasn't one of those that looked at his watch and only let you talk about what problem you were there for. He even made my husband look forward to going to the doctor and if you knew him you would know that is surprising.

Answer 14: To me it is hard to explain but I will try. Seeing this doctor was not stressful at all. I never felt as if I was being talked down to or against or anything like that. I felt as if the doctor and I were on the same team. They explained everything they where doing and allowed for questions. They carefully answered any concerns and were happy to discuss anything. I was very nice. The most comfortable experience with a professional that I do not know personally. I wish all doctors were like that.

Answer 15: I had a harder time responding to a few of the prior questions because of the nature in which I met this doctor. I worked for the same hospital that this doctor worked at. However, my role was to assistance patients from developing countries through their appointments. I met this doctor as she was the pediatric surgeon that I often interacted with. I saw the impact she made through not only her exceptionable work, but through her kindness, understanding, and respect for every patient.

Answer 16: This doctor has been treating me for various health problems for almost 4 years. He remembers even the details about my home life I have told him before. When I expressed anxiety over a procedure, he ordered a prescription to calm me down the day of the procedure. He returns calls when I call with a question or a refill. He offered an alternative for another procedure that I was dead-set against. He seems genuinely concerned with my concerns, and addresses them.

Treatment examples given by respondents

Answer 17: I first met Dr. S. while working as a floor nurse in an oncology unit in my city. I noticed that he was the only doctor who routinely called (at 7:15 am) wanting to know how his patients were doing. He would ask for specific lab work and was always polite and caring. It was over many years that I learned his patients seemed to get well and discharged faster than other oncologist's patients. His patients also had a higher cure rate.

Answer 18: Dr. B was a very intelligent and caring doctor with a great deal of experience. I was surprised to find him in such a small town. I think he liked it that way. He was patient with me, took his time, and was thorough. He was able to come up with quick and correct diagnoses. In addition to all of that, he had a great bedside manner and joked around a bit. It was a pleasant experience in an unpleasant circumstance.

Answer 19: Both me and my wife have the same doctor, Dr. J. He is very approachable and tells me a lot of things. If we come to him and need a specialist, he is very willing to do whatever it takes to get us to see someone. He has told me about the non-medical things, like he really likes motorcycles. He also told me about some of the research that he does. Very easy to talk to.

Answer 20: I have been going to this doctor for over 40 years. I met her when she was just starting her practice in ob/gyn. She delivered all 3 of my children and I still go to her for annual checkups. Her manner is exceptional and she is truly caring. When she found me crying because of something a nurse did, she took over and did the procedure herself, although it was a traditional nurse job to complete.

Answer 21: my doctor is exceptional because he is good cardiologist. about 1 year ago my heart was blocked and my doctor treated me very well. and he has enough knowledge for this diseases. now taking this treatment and advice i am much better than previous days. i also go to the doctor for regular check up and he told

everything after the test. and he also has a good prediction about the diseases. what will happened.

Answer 22: Some years later my mother was dx with colon cancer and I mentioned she should go to Dr. S. He cured my mother and she has been cancer free for over 15 years. I have never met a more exceptional doctor. I saw daily how he cared about all of his patients and seemed to be born for what he does. He is also very involved in our community. He is one of a kind.

Answer 23: This exceptionally good doctor is a specialist in his field of neurology and otolaryngology. he is a surgeon and also teaches in the hospital where he is employed. he is extremely kind and has an exceptional bedside manner. he is extremely conscientious about his work and highly particular in his work. he has treated me for my condition for 30 years. i especially enjoy conversations with him and appreciate his kindness.

Answer 24: I saw a psychologist (psychiatrist was the closest option) for about 4 years following a severe bout of depression caused by overlapping losses and uncertainty. He really helped me to find myself during trying times, and always remembered details about my experiences despite having many clients and being a professor. He was always on time with his appointments, and was always curious about my life when I met with him.

Answer 25: My experience with this doctor is that she takes the time to go over my file with me in detail. She asks me questions about my lifestyle and is willing to work with me to help me achieve my goals. One of my goals was to get off of my blood pressure medication. She listened and agreed with me and I succeeded in being able to get off of them.

Answer 26: He is a very capable doctor, and he listens to what his patients have to say. He is nice and kind ,and he keeps up with the latest information in his field. He pays attention when I ask him a

question and if he is not sure of the answer, he will research it and get back to me. He never makes me feel like I am unimportant to him.

Answer 27: The exceptional doctor I am referring to helped/is helping me through several medical issues. She is a great listener, and I feel as if I am the only patient she is treating - she never "hurries" through an appointment. This in of itself makes me feel as though she really cares about me. She explains/communicates very well, and is not bothered if I ask her the same questions several times.

Answer 28: I went to him because he was recommended to me by a friend of mine. The thing that made him stand out for me is that he listened to me and didn't make me feel like I was wasting his time. He made me feel like he was there for me. I felt like he really cared about and listened to what I had to say.

Answer 29: My doctor listens to any concerns I have and carefully explains any recommended suggested medications, tests, or procedures. She answers my questions fully, and returns my messages via the electronic care system promptly. I have given her feedback about medications, and she was receptive to my ideas as far as increasing or decreasing dosages based on how I felt.

Answer 30: The doctor is efficient, quick, and knowledgeable. He is able to dance around and get approval for medications which my insurance uses many forms of bureaucracies that bog down other doctors in other fields. He knows immediately what treatments I need, what conditions to treat, how to treat, and is very quick in deciding and expert in administering treatments.

Answer 31: I have nothing but good words for him. He is a very exceptional medical practitioner. He's patients come first. He makes good sure that I'm aware of whatever he is doing by passing deep and intellectual knowledge. He handles everything with care and purpose. He is such a kind heart. He is also very smart at everything he does.

Treatment examples given by respondents

Answer 32: My current doctor has always gone out of his way to help me (and listen to my concerns). Oftentimes, he has been ahead of the specialists I have seen. More than anything though, he is available. Last year, I needed to see this doctor immediately. He made time for me the very next day despite his full schedule.

Answer 33: I found him by chance and on the first visit immediately adapted to him as a person and a doctor as he was friendly, appeared to be honest, and was very upfront in his conversation with me. My wife and daughter soon went to him and both felt he was the best doctor they have ever visited with.

Answer 34: THE BEST DOCTOR WHO IS OF WELL AGED AND EXPERIENCED IN GYNAECOLOGY. AN EXPERT IN BRINGING ANY COMPLICATED SITUATION TO A NORMAL ONE. A LUCKY CHARM WHO IS FILLED WITH COMPASSION TO TREAT THE NEEDY AND THE POOR TO FROM HER OWN EXPENSE. A GUARDIAN ANGEL TO MANY AND A BIGGEST TO HER ORGANISATION. STAY BLESSED MA

Answer 35: He is always personable and greets you when he comes into the room. He remembers what care has been given in the past and is willing to discuss ongoing care options. He can explain everything in a manner that I can understand so I can communicate his care to any specialists that I may need to update.

Answer 36: I found my doctor a few years ago. He’s with a small practice so he can spend more time with me when I make an appointment. He’s great, nice and friendly and listens to my concerns with compassion. He has helped me with minor and major ailments and he’s very quick about referring me to specialists.

Answer 37: they are very caring that you can tell by the things they say and do. They started a charity for abused children and when the police or social services have a child they know of in that situation they call her and she helps the child and does other things like find therapists for the child

Treatment examples given by respondents

Answer 38: All I have to say about that doctor is that he is my alumnus. I could not recognize him but he recognized me. I am more proud that he is my student than that I am a teacher to him. A physician has the patience to care for patients and have all the professional devotion

Answer 39: He has really great communication skills and adapts his level of medical information based on what he knows I will understand. He never assumes something is too complicated for me to grasp. He has also helped me thru some significant health problems and brought me though them with complete frankness about my situation.

Answer 40: I am now 73 years old. I am acquainted with him about 20 years. I like him very much for his very friendly approach. He is a very good listener and very much empathetic to patient. He is very much sensible and knowledgeable and a good stress manager. He also follows strong ethics.

Answer 41: The doctor is great person who cares about more than just my health. He is genuinely interested in me as a person. He always is eager to talk to me about anything. This doctor wants to know about my life and habits and basically as much as he can about me.

Answer 42: He has been my doctor for more than ten years. I chose him as an option when I select a PC from my healthcare plan. Although I had the option to change my PC I have never felt the need to change. He has guided me through a few serious issues.

Answer 43: He is Really an exceptionally Good Doctor, He Treated me Like as Colleague Not Only Me, He Treated and Gained Their Medical History Like the Next Door Boy and His Prescription Selection was Too Good for all People, It Cures all of Petient’s Disease within Couple of Days.

Answer 44: I have been with my doctor for 25 years and he has saw me thru many difficult medical situations in my life. Taking the time to

actually talk and explain anything you ask him is a very important part of his doctoring. Friendly and a great bedside manner.

Answer 45: She is a very caring person. She is easy to talk to and always answers question in a very under stable way. It is obvious that she cares about you as a person and not as somebody that is only a source of income for her.

Answer 46: I met this general practioner doctor in a community where I'd moved to about 9 years ago. I really liked him. He had a great sense of humor, spent time with me, and was very knowledgeable. He didn't immediately shunt me off to a specialist.

Answer 47: Every visit my doctor is attentive. She listens to what concerns I have and answers to the best of her abilities. If she is not sure of something, she gives me websites and places on where I can find the best information on the subject.

Answer 48: i would like to say. the doctor would often come to my house to give me and my husband medical treatment. man of good character and good patience. patience can only be learned from him. he forgets that we are patients and treats us.

Answer 49: All of the people (about 3 I think) I have sent to him speak just as highly of him as I do. I cant imagine having more confidence in any doctor. I look forward to having him as my doctor for many more years

Answer 50: My primary doctor is patient, exceptionally up to date on the latest trends in medicine, conservative but proactive, never rushed, honest and forthright without being harsh, a very good listener, very good at follow up and knows how to navigate the medical world

Answer 51: She is a really good listener, and is willing to listen and understands things that I tell her or ask her about. She personally answers her messages very quickly and gets back to me promptly with great answers and suggestions.

Treatment examples given by respondents

Answer 52: As a child, my pediatric doctor made me feel like I was going to be ok, no matter how many stitches I needed at the time. He still has my old drawings hanging in his office, 20 years later.

Answer 53: Instead of just telling me what medications I should take, this doctor listens to my concerns and we then decide together. He always takes his time with me, so I don't feel rushed into making any decisions.

Answer 54: He didn't seem to be bothered by time. He patiently answered all my questions and we discussed medical treatments. He was never judgmental and never told me my problems all come from needing to lose weight.

Answer 55: My personal doctor was treating me very well. He asked all types of my issues in by body oriented and gave the treatment. Then I feel very relaxed. He helps me a lot. I like him.

Answer 56: She always makes me feel better before I leave her office. She shows concern for me as an individual. She doesn't make me come in for every little thing as she knows my health history.

Answer 57: he's deceased now. He was great! Was always ready to listen and actually took the time to answer my questions. He'd been at it for 30+ years. My doctor now sucks compared to him.

Answer 58: When I approach the doctor he will give me a good treatment. Only when I go to him will I be at peace. Only when I go to him will I be at peace

Answer 59: I am HIV pos., this doctor is a local doctor and I was just paired with them when signed up for appointment. The doctor is skilled and community minded. I'm lucky to have her.

Answer 60: He was an oncologist of sorts at John Hopkins. He was very knowledgeable, friendly, empathetic, and communicated each step well. He explained the procedures, and helped her overcome her fear of MRIs.

Answer 61: He is friendliness.He was willingness to invest time with me.HE was so caring and treated me good. He has perfectly

common scense to comminucated with someone. He was a knowledgeable person.

Answer 62: this doctor is very friendly and take time to listen to my medical problems The doctor tale as a person and does not treat me as someone who is an idiot

Answer 63: She is very understanding. She listens to me and what I have to say. She recommended things but let me decide what to do. She encourages me to have better health.

Answer 64: I have been a patient of this doctor for many years. We have become friends. I trust his judgment and his expertise and that he has my best interests at heart.

Answer 65: Thorough describes this physician. It amazes me how she remembers conversations we've had during prior visits. She is full of compassion, understanding and patience. She always asks about my family.

Answer 66: I visited this doctor for the past 25 years, he was down to earth, realistic on expectations and knowledgeable for both general practitioners and female issues as I aged.

Answer 67: kind and thoughtful concern in regard to my health and providing me with excellent medical and physical care. I am most grateful for your kindness whenever I see you.

Answer 68: They were very kind and empathetic to my situation. I was certainly afraid of being in the hospital at that time and they made my stay much less terrifying.

Answer 69: The doctor is very kind and very understanding my situation of the treatment. He really very calm and hear my all Sad situation in my life and treat me.

Answer 70: The doctor I'm referring to retired a couple of years ago, but was an exceptional doctor. He took time to listen and was always polite and professional.

Answer 71: MY EXPERIENCE WITH THE DOCTOR WAS TOO GOOD. HE WAS SO PASSIONATE. HE UNDERSTOOD MY

Treatment examples given by respondents

PROBLEMS AND THE WAY HE COMMUNICATE WITH PATIENTS WAS ALSO SO GOOD

Answer 72: My Family Doctor Very Good & Comfortable Person. My Family Health issue any One coming Time I am Fist get To my family Doctor Appointment Order .

Answer 73: Better Experience for Doctor. Because I am very fear so I am Not Going Mostly Hospital. But Now Going To Hospital . Its ok Very Comfortable.

Answer 74: The doctor is a helping human being the very excellent human being and patients are care very super but he is great man of the doctor

Answer 75: I liked the guy from the start of our relationship, as he seemed like a good old southern boy, with a genuine smile and real laugh.

Answer 76: My doctor is such a kind heart person some time he will not ask fee to me when i am not in good financial conditions.

Answer 77: My Doctor is very kindhearted person. Even he cannot asked me fees when I have not enough money. So I like him very much.

Answer 78: Treating the patients very honestly and take care of the patient health and giving valuable tips to improve our daily life health care.

Answer 79: The doctor could take care on my health and treated me as her family member. Apart from money she spread love on patients

Answer 80: My doctor is kind heart some time he will not ask fee to me when i am not good in a financial conditions.

Answer 81: The services that i receive from excellent.Wonderful experience, Great medical office, Wonderful and great experience as a first timer.This practice is terrific.

Answer 82: The services that i receive from excellent Doctor. wonderful experience,great experience as first timer, this practice is terrific and Great medical office.

Treatment examples given by respondents

Answer 83: My primary doctor is very caring and honest. I like him and he always gives me his undivided attention with my health.

Answer 84: My doctors is kind hear some time he will not ask fee to me when I am not in a financial conditions

Answer 85: My Family health Issue Any one coming Time Always going To My family Doctor. That Person very comfortable & Good Person

Answer 86: THIS DOCTOR TREATMENT IS REALLY GOOD. BECAUSE MY PROBLEMS IS COMPLETELY CURE.SO I SUGGESTION FOR OUR FAMILY AND FRIENDS.

Answer 87: kind and thoughtful concern in regard to my child health and providing me with excellent medical and physical care.

Answer 88: From the beginning when I started to see my doctor, I noticed he always smiled and shook my hand.

Answer 89: SHE TREAT ME VERY HUMBLE AND GOOD. SHE RESPECT ME A LOT. I LIKE THE DOCTOR AND HER TREATMENT.

Answer 90: This doctor always took time to listen to my concerns; she was also non-judgmental. She explained treatment very well.

Answer 91: I EXPERIENCE A PROUDNESSN REGARDING THE DOCTOR BECAUSE HE IS SUCH A TALENTED PERSON I WOULD EVER MET

Answer 92: This doctor is meticulous in prescribing not only a suitable drug but the best drug for my condition

Answer 93: Yes he consult me calmly and he speak very friendly and he talk and care about my health

Answer 94: My Family doctor Very Comfortable Person Because Mostly Patients Going to the Hospital Comfortable place & Vibes

Answer 95: he is so kind and down to earth and gives exact medications and advices without any exaduration.

Answer 96: Lots of Thanks for such an excellent treatment. most importantly he is a a great human..

Treatment examples given by respondents

Answer 97: This Doctor seems to know what specialist to send me to if I have a problem.

Answer 98: THIS JOURNAY VERY GOOD EXPERIENCE FOR ME AND I AM SO PROUD ABOUT THAT DOCTOR

Answer 99: He is good person and take care of all the patient good human being

Answer 100: He spends extra time with me and make sure all my questions are answered

Answer 101: Great medical office, wonderful and warm experience from start to finish. ...

Answer 102: They taking care of patience healthcare and give best treatment to everyone.

Answer 103: esse médico me atendeu muito bem com atenção e dedicacão e respeito

Answer 104: THE DOCTOR IS VERY GOOD AND HE USE TO GIVE GOOD ADVICE

Answer 105: reat medical office, wonderful and warm experience from start to finish.

Answer 106: If you go to them, the disease will get better soon

Answer 107: This doctor is one of the best that have treated me

Answer 108: friend of docter and helping hand and most sweet person

Answer 109: they treat all are equal and they are very humble

Answer 110: She was very friendly and she handled me very well.

Answer 111: I like him very much for the above mentioned qualities.

Answer 112: She always listens to my concerns and gives informed advice.

Answer 113: The doctor is very good person and good treatment.

Answer 114: The taplets he gives is a low dose taplets.

Answer 115: he was soo carying and good at his work

Answer 116: THE FEES COLLOTIONS IS OUR PATIENT STIUTAIONS UNDERSTANDING HER.

Treatment examples given by respondents

Answer 117: He treating his patience very empathy and respect.

Answer 118: He is very open minded and very humble

Answer 119: THE DOCTOR IS EXCELENT TREAMENT AND CARRING PETIEANT,

Answer 120: She is very humble and very loyal

Answer 121: the best person i have ever met

Answer 122: Great experience as a first timer

Answer 123: the best and the caring person

Answer 124: She is very humble and honest

Answer 125: She is very humble and honest

Answer 126: The fees him will be less

Answer 127: He seemed to be genuine.

Answer 128: He is a good doctor.

Answer 129: VERY KNOWLEDGABLE AND KINDFUL PERSON

Answer 130: He will look patiently

Answer 131: he is treated good

Answer 132: She is good doctor

Answer 133: I AM VERY PLEASED

Answer 134: Doctor Exceptionally good.

Category 3: Respondents' description of the exceptionally good doctor

Respondents' description of the exceptionally good doctor

Answer 1: A colleague at work went to him for gynecological surgery and was impressed with his willingness to treat her when others refused. Her surgery went flawlessly and she recommended that I see him to get another opinion, as she had. I made my appointment and brought my husband along as a second set of ears. The doctor walked in with his hand extended and making direct eye contact with both of us. He introduced himself by saying "Hi, I'm M. How can I help you?". We had a lengthy conversation, about one hour, where he said that my condition was challenging but he believed he could do what I need laparoscopically, avoiding the major surgery and lengthy recovery I was told by six previous doctors that I needed. He met with me once a week for 8 weeks to personally treat me so that my body would be ready for the surgery. When I arrived at the hospital on the day of my surgery he was there waiting for me, not in the OR, but in my room to answer any questions - he didn't allow the nursing staff or residents to reassure me, he did that himself.

I was prepped for surgery and walked to the OR, he told me later he thinks people are more comfortable when they feel somewhat in control of the situation, and he was waiting for me in his scrubs outside the OR doors to walk me into the OR himself. He left me only to get prepared for the surgery, came into the OR and asked me what my favorite music was. I told him and he directed someone to please play it for him, he then told me it was his favorite too and then waved at me and said "Good Night". I saw him after my surgery when he was there to make sure I was comfortable, checked if I needed any pain meds, and then said he'd see me in the morning before he'd discharge me.

He was at my bedside at 7am the next morning to make sure I was ready to go home, went over the instructions for my follow-up care personally, and then said to behave and not think I didn't have surgery because I felt fine. He explained what was necessary to make sure I didn't do anything to slow the healing, even though I couldn't feel any pain I had still had surgery and internally I had to heal. Then, when he was satisfied that I had heard him and understood what I was to do/not to do he told me he'd call the next day to check on me, which he did. I was back at work in 10 days rather than the 6 weeks that the other doctors said I'd need for a totally different procedure which I was glad I avoided.

I have since recommended many friends, family members, and neighbors to him. One coworker, who was terrified of developing ovarian cancer asked me for his name. She said her doctor, and several others, refused to do a hysterectomy which she requested due to her age - she was 38 and had one adopted son. Her mom had just died from second site ovarian cancer, her first site was breast cancer, and my coworker had just completed chemotherapy for breast cancer. She was terrified for her son's and her future. I called my doctor, I had an appointment for a follow-up the next day, and asked if he would fit her in and talk to her. He said "absolutely, bring her along". He spent an hour with her and agreed that this was the best thing for her to do, if only for her mental health. She was delighted, relieved, and scheduled her surgery with him. To this day she is alive, well and cancer free. This doctor is a very successful department Chair in a very prestigious NYC hospital. At his level you usually find doctors to be rushed and impersonal. Not my doctor.

Answer 2: She was very patient in listening and also communicating with me about my father. She gave me a clear understanding of what the situation was and what to look for in the future. My dad was being treated in a hospital and she was overseeing things as she was a friend of my friend. Doctors usually have massive egos that is sometimes not earned by them. They don't like being asked questions. They have their juniors to block these types of communication. They also follow protocols blindly most of the time without using their common sense or really observing the patients. This neurologist was really exceptional because she liked discussing things and was open to questions. She also had the acumen to change course in treatment as the patient showed different symptoms or improved without just sticking to "protocols".
I had a really bad experience with incompetent doctors so this was really refreshing to see. It was not about money at all as I didn't pay her much. She had a sense of humanity and a genuine sense of caring nature. It made me feel secure and I could explore information myself and consult her. Some of the doctors, especially during and post corona have lost their focus and their ethics. They do not question or even care to question anything. This is very unscientific and makes me nervous for other people as well. A doctor without common sense can be dangerous. They ought to have discipline and dedication regardless of the circumstances. They can't give up easily and shouldn't, just because there is some pandemic or the statistics suggests that humans die after all. Doctors should be inventive, treat people as humans who are owed dignity and have a right to live. They should be updated with technology.
I saw hospitals that had really low level sensors and gadgets. This is embarrassing. Doctors who mundanely do duty just to make money can never be good doctors. They should try and strive to make the medical industry better. They should have enough courage to question things. It is not just about cramming antiquated books. Right now, I am thoroughly disappointed with the general set of doctors we have. Some of them are downright immoral and bereft of any guilt. A great doctor would do justice to the oath they took.

Answer 3: After having my right hip replaced by an exceptionally BAD doctor resulting in permanent sciatic nerve damage, I was quite scared and apprehensive when, years later, I needed my left hip replaced. My primary care physician recommended that I go to an orthopedic practice in a nearby hospital, and based on online reviews I chose Dr. H. I was frank with him about how the other hip operation had permanently altered my life with terrible repercussions. He listened and I felt he truly understood what had happened to me. He was honest with me and said in his years of practice he had performed one operation which resulted in sciatic nerve damage, and I was surprised that he revealed that. I was very overweight at the time and my health insurance required me to get to a certain BMI before it would pay for elective surgery, so I saw Dr. H. several times over a period of months while I worked on losing weight. He was always encouraging,

I eventually lost 68 pounds and the operation was authorized. Actually, when I went in for the last weigh-in, I was 3 pounds short of my goal, but he told me I'd made it. His attitude on every visit was kind and personal. Despite being a busy surgeon, he allotted as much time as I wanted to visits, explained everything carefully, answered all my questions, and never acted like he was too important to bother with me. After the operation I went to a rehab and every time a nurse changed my dressing they would remark how beautiful the incision was, clean and precise. Every time I mentioned that he was my surgeon, nurse, therapists, and other doctors gushed effusively about how great he is and what a wonderful reputation he has. On my post-surgical visit I told him that, and he blushed like a schoolboy. My hip healed with minimal pain, and has been perfect ever since. In short, Dr. H is a highly-skilled, well-respected, busy surgeon, but he treated me extremely well.

Answer 4: I've had foot problems my entire life. I was pigeon-toed and flat-footed as a child. Of course this carried through my adult life. I've spent much time and money on shoe inserts and other orthopedic doctors. I had one foot surgeon actually tell me I had "ugly monster feet". He was trying to joke, but it brought me to tears after having a lifetime of foot issues. It was the last time I saw him. I put up with the pain for years until I couldn't stand it any further. I asked my primary care doctor for a referral and he referred me to this surgeon whose office is out of town, in a larger city about 40 miles away. I immediately liked this guy. They did x-rays and he explained what was going on with my feet. One was quite severe and he said he could fix it. He said it would be a challenge, but he could fix it. He didn't tell me my feet were monstrous. He was caring and wanted to help.

As a result, I had my first surgery in September 2016 on my right foot. He built an arch, shifted my heel, and grafted a bone in it. It was 8 weeks non-weight bearing, then therapy to learn to walk on my new foot. My left foot wasn't as painful so I put that surgery off until this year as it was getting progressively worse. On March 28, 2022 I had my left foot operated on and he did the same thing, but this time there was no bone graft needed. I'm currently half way through my 8 weeks of non-weight bearing. I started therapy this past week to help move my toes in a non-weight bearing way. It's a long process. I've said many times to many people that this man changed my life. I believe he's the top of his field and would recommend him in a heartbeat.

Answer 5: I needed a hernia surgery (I had an obvious bump above my belly-button, and my self-diagnosis was confirmed by my Primary Care Physician). I searched online for hernia-surgery specialists near where I was living at the time. I found the doctor who performed my surgery via Google. I saw that he was written up in a local magazine as being the best overall doctor in the area (granted, he was 40 minutes away from me). I could see from my online research that he had many years of experience performing ABDOMINAL hernia surgeries specifically, so I knew that he was knowledgeable and had real-world experience. I didn't want him to come across something he had never seen before while operating on me and then not know what to do! I had one consultation with him for him to look at my abdomen, and he confirmed that I should get surgery.
He was very friendly and smiled a lot. He answered my questions with just the right amount of detail. His assistant was also friendly. Right before the operation, as I was getting wheeled into the OR, he was reassuring (as were his assistants). After the operation, when I was awake for 10 minutes, he came to check up on me. He continued to smile and helped me to get out of bed and walk for a minute or so. He said that the operation took longer than he thought because I had a lot of fatty abdominal tissue that he needed to excise or tuck back in place. I liked hearing this, because it meant that he cared enough about doing a good job that he took the extra time needed to do so.

Answer 6: On my way to work in the morning a year or so ago, my phone lit up with an unknown number and I dismissed it several times. When I did answer it was my mother's doctor. He was calling to tell me that if I wanted to see my mother before she passed, I needed to come now. This is during the height of the pandemic. My mother is in isolation. She can only see us thru the glass. I met with and spoke to the doctor for the first time. He told me how he has been seeing my mother for several years and I thanked him and told him I appreciated him.

I added that I would like to see her, too, one more time before she passes. That was not in the protocol for the hospital and this ward. I then heard him in the background on the phone and directing nurses and his entire focus was arranging a way for us to be in the room with her and hold her. It required special masks not available on that floor and gowns and gloves and he made it happen. We were allowed into her room and I had a chance to speak with her moments before she passed. "No regrets, no regrets." She responded the same. For me and my family this was the most precious moment that I could have had and I will be forever indebted to that doctor. If not for this doctor, this man, we would have had to watch her pass thru a window. There would have been no touch and no conversation. He's on my Christmas card list, just so you know.

Answer 7: My experience with an exceptionally good doctor was many years ago when I was suffering from extreme contact dermatitis on my hands. I was becoming increasingly debilitated and tried every remedy without relief. During a routine gyno exam, she saw my hands and referred me to a dermatologist. I completed the usual paperwork, then the elderly doctor walked in and sat down next to me. He peered skeptically over his spectacles, wiggled his white whiskered moustache, looked briefly at my hands, then starting reviewing my history.

I was preparing to answer standard questions and receive routine prescriptions but was surprised when the doctor began slowly asking different kinds of probing questions that weren't even on the history. He delved into my lifestyle, personality, environment, life stage and several other areas that seemed fairly irrelevant. As he gathered more information, he began to construct a profile of circumstances that had contributed to the condition, and didn't just right away start to treat the condition itself. He had a specific treatment regimen but more importantly, an overall strategy for me to implement on an ongoing basis. That day, I gained not only supportive and responsive care, but more importanty, tools and pearls of wisdom from his keen insights and guidance. The results not only led to the swift, total cure of my hands but provided me with deeper insights into myself and have stayed with me throughout my life, helping me to avoid many other skin eruptions, discomfort and pain.

Answer 8: I met Dr. C 28 years ago, This woman is a exceptional doctor. She had the training in oncology and knew the latest ways to tackle my disease. Se works still to this day at the same learning teaching hospital, Being affiliated with this hospital gave way to the latest in her field and was and is accredited with the american cancer society and trials. Se is exceptional for her expertise and knowledge. She is also excpetional as she works with a team of dcotors, She is compassionate with her patients and with her field of medicine. She is kind and thoughtful. I can remember her holding my hand and encouraging me. Always giving me hope and comfort. Made sure I got the care I needed. It wasnt easy back then and without her care I wouldnt be here today I am quite sure.

Proud to say I am in remission 28 years for leukemia, She performed my third bone marrow transpamnt using stem cells from my brother which was new back then. I had my previous 2 transplants done at a different hospital and they didnt work as they didnt know what needed done. I left their due to an arrogant doctor who told me I am the doctor and I am going to do what I want to do. So dont be an arrogant doctor is my advise to you also.

Answer 9: I went to this particular doctor after an ER visit for a dislocated finger discovered that I had extremely high blood pressure. I needed a GP that accepted Medicare, so I called around until I found one. In consideration of my age at the time (65) and the fact that I had not seen a doctor in years, she went about diagnosing and treating my condition systematically, looking for possible causes and effects. She took X-rays and an ultrasound and discovered I had an impacted kidney stone that had caused one of my kidneys to swell. In short order, over the next three months, she referred me to a urologist (who performed surgery on the stone), ophthalmologist, and neurologist to determine how, if at all, the hypertension had adversely affected other organs in my body. Since I had never had a colonoscopy, she referred me to a gastroenterologist for that procedure;

I have also seen a cardiologist (for heartbeat irregularities), a nephrologist (for concerns about kidney disease, ruled out for the moment), and a dermatologist (I needed plastic surgery on a large patch of basal cell carcinoma on my face). She continues to monitor me closely. She is warm and compassionate, communicates well, and doesn't leave a stone unturned when it comes to my health.

Answer 10: I had my regular check-ups and during one of those, it emerged that there was something wrong with my left breast, the ultrasound technician said that I had an adenoma. Since I knew nothing about it, I went to my GP to ask some more questions but, she didn't took her time to explain the issue and discuss the topic, she was a sloppy doctor and I fired her ass right after the episode.

I went to this specialist, a friend of mine told me about him, and I was extremely worried and scared, didn't know what to do, what to think. He was kind and nice, he took the time to explain the matter to me with simple words, he showed me he cared about me, he was human, less of a doctor and more like a caring friend. My GP triggered my Anxiety while he shut it off. Some people should be banned from attending med school because they don't fit, they are

after the money. Some other should be rewarded because they not only share their knowledge, they treat you like a human being, not just a cash machine.

Answer 11: This doctor was the pediatrician for my children. He was enormously kind and exceptionally intelligent. My daughter had a couple of very rare problems when she was a toddler. One of them was a cholesteatoma in her inner ear that required major surgery, and if left untreated could have resulted in her becoming deaf or worse case scenario death. He was checking her ear and said,"I'm not sure what I'm seeing. Let's make an appointment with an ENT. He'll have a more powerful scope to see in there." So, he actually referred her to someone else. And for that I am thankful. The other one was bladder reflux. And we worked together on that was also was referred for the necessary tests. Through all of this is was calm and pleasant and cheerful. He was wonderful and made daughter loved him, even though she went through a lot. All of this required bi-weekly checks, and he only took whatever my insurance would pay. I did not have to pay anything out of pocket. I will always be appreciative of how he took care and seemed to love my children!

Answer 12: I had fallen and hurt my wrist. The next day when the wrist was swollen I went to emergency. At the time I was pretty well know bar owner so I was treated very well by the staff and put into a emergency room. I think it was the cardiac unit. The attending doctor,

female was also fantastic and would be the doctor specific to this study if not for the resident who actually set my wrist. This guy was as I said a resident and the doctor he worked under was a jerk. (I believe the jerk was the attending bone guy but he was terrible). In any case this resident showed sympathy for my injury, explained more the well what he was going to do. We had fun (including the ward doctor) while setting the wrist. I won't go through all that was done lets just say they all were impressed with my pain tolerance during the procedures. All in all it was a fine experience getting my wrist set and those two doctors were perfect!

Answer 13: This doctor was a young man (not much older than myself) who had previously treated both my mother and brother before we ever met. I had developed a rather nasty case of bacterial cellulitis owing to a spider bite while I was outdoors camping in the summer time. By the time I had returned from my trip three days later, I was in immense pain and could barely walk as my feet were too swollen to fit my shoes. Dr. B was very professional, he did not make me wait for longer than a few minutes. While examining me, he told stories of his own mishaps while outdoors which calmed me down considerably. He explained the mechanism by which the infection had spread (at this point I realized how serious the bite had actually been) but indicated it was no great cause of concern. I was given a prescription antibiotic and instructed to stay off my feet for the next couple days. I have continued visiting him ever since - as he is now my GP.

Answer 14: I didn't have a physician (my longtime family doctor had just retired) but I suspected I had bronchitis and/or pneumonia and searched for a doctor in my insurance provider's network. I picked one who was close to my home and right away I could tell she was exceptional. We instantly developed a good rapport, she was easy to talk to and took her time to field all my questions. She was very patient and understanding through all my coughing! She seemed to genuinely care about making me well. She even called me at home

later to see how I was feeling. Just before my follow-up visit, my mom passed away. I kept my appointment even though I had just suffered a significant loss the day before. She sat with me for an hour while I cried and grieved. When I left her office, I felt cared for. She was a rare breed, the opposite from other experiences I'd had before with doctors.

Answer 15: I had a really bed springboard accident and broke my neck, shoulder, and wrenched my ribs away from my spine. I went to doctors for ages and each one told me my pain was in my head and nothing was wrong with me. Turned out some of my ribs had dislocated from the spine, and with his help, we were able to relax the muscles and after working with me for a while they finally went back in place. I can't even tell you first, what a relief it was to find a doctor that didn't make me feel I was just trying to get meds, and then helped solve the problem that the other doctors never bothered to find,. The relief from the pain was truly profound when the problem was finally fixed, and even though I have pain from the arthritis these breaks caused, it is nothing like the pain I felt then with those ribs being misplaced.

Answer 16: I was very pleased with my experience at Doctors Care. I can be a hard critic of emergency care places and the people employed by them. Combine that attitude with an innate crankiness when I'm not feeling at all well and the result can be much less than pleasant. This time (My first time at Doctors Care) was a world away from previous experiences elsewhere. It was good to be treated with professionalism and care. When I say the doctor and all the other employees of the Dorchester Doctors Care made me feel that I was in safe hands and even made me smile when I left, then you can believe they are the best. I am truly grateful and won't get that awful feeling of dread the next time I get sick and am unable to see my own physician. I appreciated their follow-up and willingness to answer questions also. A big thank you to all of them."

Answer 17: I first met the cardiologist when he saw my husband for the first time for chest pain. While in the exam room, my husband went into cardiac arrest and had to be revived several times. The doctor went in the ambulance with my husband to the hospital to keep him stable. The hospital was 40 miles away so it was not a short trip. He stayed with my husband for most of the day until he was stable. His office had patients waiting to be seen after my husband and everyone was sent home, as well as other patients on the schedule to be seen that day. This man did an extraordinary thing by taking care of my husband at the expense of losing money that day by not seeing his patient load. You do not find many like him. My family and I became his patients when we needed any procedures or tests related to the heart.

Answer 18: I suffered from kidney stones all of my adult life and usually had to pass them. The last time it they were problematic. Twice before I went through sonic wave, and in each time the procedure failed. The doctor decided instead of medicine they should just be removed because of their size. Extremely nervous because out of the two choices he seemed to bank on the one that was the most invasive. He actually explained the procedure extremely well, was honest about the any discomfort and recovery time while not minimizing my anxiety about an incision in my back. It didn't make any less nervous but I knew understood logically why it was the better choice. Having dealt with kidney stones for so long, I had always heard of the procedure but finally having someone take the time and answer all of questions meant I could finally have the best treatment that could handle my particular situation.

Answer 19: My doctor was recommended to me by a friend. I have seen her for several years now, but what I really noticed when I first met her was how warm and kind she is. I've had many doctors who were cold or seemed rushed and annoyed when I asked too many question. This doctor makes me feel like I matter. She listens to what I have to say and takes the time to answer my questions. She makes

me feel like I matter. She also seems reasonable. For instance, my blood pressure is almost always higher than normal when I go to a doctor. She knows this and will take it again later in the appointment when this happens. Inevitably, my reading will be much better after I've had a chance to relax. She always seems to be on time and I have never waited more than a few minutes after arriving.

Answer 20: For 20 yrs, I went to doctors with same symptoms. They would check calcium and it was sky high. Check parathyroid levels and it was normal and refuse to explore further. Repeatedly referred to therapy. I finally ended up with kidney stones from sky high calcium. Urologist said same thing, high calcium but normal parathyroid. Go to therapy. When I applied for aid to pay for surgery, hospital sent me to a brand new young and foreign born gen practitioner. She ordered the expensive test and found the largest parathyroid tumor ever seen by surgeon,. endocrinologist, imaging specialists. I'd had the tumor the whole time and was one of tiny percent of cases with sky high calcium and high hormone that test registered as normal. It was because she was a she, young and foreign that she bucked the system to track down real problem

Answer 21: Sadly after this great experience I was placed with the jerkie attending for additional x-rays and release. What an ass... this guy had an orderly wheel me up to x-ray while he went on a jaunt way ahead of us stopping and talking to people along the way. (It was clear the orderly didn't like him much). Then after I went into the x-ray room he placed my arm on the table then he left the area (without explanation) and I could hear him talking to some female about them going out to dinner. After about 45 minutes another person came in and took my x-rays. All the while the jerk never said a word to me, rather he guffawed around with the people in the x-ray booth. Later he said to me, well that's the best we could do... that was it.

Answer 22: The doctor was a specialist pediatric surgeon who made the right calls for my 24 week old micro preemie triplet baby to be delivered since the other two triplets passed and a forced delivery

would inevitably happen. She made the right call to give the steroid injections for my baby to fully develop his lungs as much as possible before being born since he was only 24 weeks old when he was born and babies are generally still developing inside the womb during this time. A week later he was delivered and he came out very strong and bigger than they all expected. My doctor also made the decision to do a certain c-section to deliver him. She was so spectacular, compassionate, caring and understanding with me through the whole journey. She really is a special doctor.

Answer 23: Dr. N is good about connecting me to other specialists when needed. He has sensitively counseled me about the need to lose weight without fat shaming me. He shares with me some of his family's struggles with weight and the treatments that have worked for them. We commiserate over the care of aging parents, vaccine resistant friends, and crazy local politicians. I appreciate him sharing himself with me and it makes me trust him more. I never feel like he is pushing me to do anything, just making suggestions, and asking for my input. I like being treated like an adult and a collaborator in my healthcare. The only problem I see with Dr. N is that he is about my age, and will likely retire one day soon. That will be a sad day for me.

Answer 24: The first time I went to see this doctor, I sat in his waiting room for 45 minutes. Then they took me back to the exam room and I waited another 30 minutes. I got up and left at that point. That afternoon, Dr. N called me and apologized profusely. I decided to come back and I found a doctor who was an exceptionally good listener. (I think he lost track of time that day because he is a good listener and doesn't blow through exams as many other doctors have with me in the past.) Dr. N now has someone to transcribe his notes for him and his office staff seem to be much better at setting appointment times realistically. Depending on what's going on, the average time he spends with me is 20-30 minutes.

Answer 25: 25 years ago I had tri-geminal neuralgia. I first tried having it treated with carbetol, but it only worked slightly. Finally I

asked for a referral to a surgeon. I went and he explained about a new type of surgery that had avery high success rate so far of fixing the problem but there had only been about 200 surgeries performed world wide at that time and only in two places but he new he could do it. He was the top neurosurgeon in the state. Anyway he gave me tons of liturature and explained in all in several follow up visits and finally I had the surgery. 100% successful...His knowledge and communication skills were what convinced me to have the surgery rather than cutting the nerve as was done up to that time.

Answer 26: I met her 30 years ago. My regular physician was too busy to get in to see so I took an appointment with the "new kid" at my group of doctors. In the first appointment she started listening and helping me with multiple issues I could never get help with. I still remember her listening to my symptoms and educating me on what I needed to do to feel better. Getting me to take the medicine that would eventually make it easier for me to breathe, sleep and thrive. No one had ever helped me so much. She is an expert communicator, detective and so very caring. She continues to take good care of me after all these years I trust her completely.

Answer 27: After many years of suffering extremely debilitating headaches, nausea, vision loss and several other symptoms, I was again stricken with an episode. I had seen many doctors previously that dismissed my concerns and complaints as a migraine condition without further investigation of any kind. I was forced to continue to try to find a resolution for this problem because I was so debilitated. When I went to my first visit with this perceptional doctor he took my concerns seriously, listened to my complaints fully and did thorough testing. Through this testing and investigation of my symptoms he was able to promptly diagnose my medical condition. After years of suffering I finally had an answer, which saved my life and relieved my suffering.

Answer 28: My leg was blistering and swollen up due to the heat of an infection I had. The doctor listened to me and looked at my leg

thoroughly. He chose the course of treatment he thought best. He explained it in full to me and I agreed. It meant having 2 IV drips in me at the same time. I had a massive dose of both Penicillin and Fusidic Acid. He drew around my infection and said if it went out of the line he would have to put me in isolation. I had not to worry though because he too would be in isolation with me and he stayed with me for an hour until the drugs started to work

Answer 29: I was referred by my primary physician for a hysterectomy. Due to the reason for the surgery, when he recommended traditional abdominal surgery, I inquired about laparoscopic surgery as an alternative. He explained that he was not trained in the procedure and recommended that I proceed with abdominal surgery. I continued the discussion with him but, ultimately, scheduled the surgery. About a week later I received a call from him. He explained he considered my request, contacted an experienced surgeon, reviewed my case and, if I agreed, he wanted to proceed with assisting the experienced surgeon with the laparoscopic surgery. He indicated this would provide him with the opportunity to learn and assure I was treated by a seasoned surgeon.

Answer 30: He reiterated the post-surgery care that I needed to adhere to, and he said that he'd call me in two weeks. He did call me 2 weeks later, and when I expressed concerns about my mesh possibly moving out of place in the future, he said that he put tack welds onto the repair every centimeter, indicating that the repair was going to stay in place. We ended the conversation in a friendly manner. I think maybe one of his assistants called to check up on me several months later, which was nice. This surgeon possessed all 5 qualities which I expounded on at the beginning of this survey: friendly, willing to take time, not scolding, knowledgeable, good follow-up.

Answer 31: I was suffering from severe stomach pain. One of my friends suggested to me an exceptionally good doctor. The doctor was a good listener. He gave me an injection to relieve my pain as

soon as I arrived. He diagnosed me and prescribed medicine. He advised me to eat mostly home-cooked meals in the summer and drink filtered water only. He told me to call him if I need him again. He was very down to earth. He joked about a few things to make me feel better. I was relieved. I could feel he was genuinely concerned about treating me and not just charging me a hefty bill.

Answer 32: This doctor was just so amazing. He was so human and reachable in a real way, not just talking in terms of medical knowledge. He was interested in what was going on in my life. He was an osteopathic doctor, and so he was in tune with other forms of medicine as well. I think what I liked about him the most was his acceptance, his non judgemental way of approach and his caring attitude. I mean, he REALLY cared. He made me feel like I was just the most important patient he had, and I think that made a big difference in how I faced my medical challenges.

Answer 33: The doctor that I had was named M. W. He was an exceptional doctor because he was very kind to me during a rough patch in my life where I was very concerned with my mental stability. He gave me ways that I could improve my health and did things that no other doctor did during my visit. He took the time to listen to me, placing a stool next to me and listening to every single thing I had to say. He wouldn’t even let me leave until I was completely looked at. I think every doctor should be like him. Even his telehealth visits are exceptional.

Answer 34: I was having multiple issues occuring approximatly 10 years ago. I had gone to 4 other Doctors for issues due to itching on trunk, fatigue and generale malisse. This new Doctor ordered a Hep-C blood test where the previous for had only ordered generic blood tests. I had the Hep-C that showed treated and I am "cured" now. This Doctor also helped me get on SSDI and suggested outside medical help programs for me. He went above and beyond and has helped me through many other issues since. His name is Dr. M.

Answer 35: I had sores that would not heal. I wernt to my regular doctor and he just gave me some antibiotics that I should take without doing any testing. I was still bothered , so I got a second opinion from a new doctor. He took one look at tyhe sores and diagnosed it right away. He took a sample to have it tested to make sure and prescribed the correct antibiotics. The pain and sores went away very quickly. I have been going to him ever since and is a pleasure to have him as my personal physician

Answer 36: I was having difficulty seeing in the office, often having a glare on my computer screen. I wanted to wear sunglasses all the time. He found a difficult to diagnose type of cataract. Following surgery I not only no longer had this issue, I had near perfect vision. Moreover, my Mom was a patient of his fo decades with many vision problems. When she was on hospice, they declined to treat the eye which caused her great discomfort. I went to him and he was able to give me an RX and detailed instructions to alleviate her discomfort.

Answer 37: I found a lump in my breast. Was referred to this doctor. Not too long a wait for the appointment, and not too long a wait in the office at time of appointment. Doctor was matter of fact, kind and thorough. After a discussion of my family history, he examined me and recommended a breast biopsy. The lump was a benign tumor. He knew breast cancer ran in my family. After the biopsy I woke up and he was right there, saying "it’s benign". Followups every six months for several years with various tests. He was wonderful.

Answer 38: But what made them most exceptional was that they actively advocated for me with other health care providers. It was especially welcome in dealing with neurologists. On one occasion, they were forwarded a copy of a brain MRI that had been conducted by another doctor. That doctor indicated that there was nothing to be concerned about in the findings. This doctor looked at the report and pointed out that there were, in fact, a number of abnormal and concerning findings in it. They actively sought a referral to a different neurologist and flagged those concerns with them.

Answer 39: I was experiencing blood clots and no one could figure out why. I was also having extreme breakthrough bleeding and my original gynecologist scheduled surgery but opted out of my insurance provider network. My primary care doctor sent me to a new gynecologist and she was thorough and went through every test and record and I generated in the past year and also wanted to know why my pap smear was irregular - which was news to me. She found several things wrong and 2 surgeries later I was good as new and no problems since.

Answer 40: He was assigned to me as part of medical operation that involved the rupture of my intestine, which was a medical emergency. My original primary care doctor did not treat at the hospital I was taken to. From the time I met him he showed me how much he was interested in my care and always willing to help in any way possible. As, a result of this, I have been going to him as, my primary care doctor, for the last eight years. He is not only a good doctor, but an exceptional person.

Answer 41: Some time ago a knot was increased in the food pipe of my wife, she had trouble in swallowing food. An endoscopy and any tests showed she had cancer. A friend of my son who was treated by this doctor told us about this doctor. We went to this doctor who patiently hear us, examined my wife. And ask for some laboratory test. After two days we went to that doctor with that report. After carefully going through the reports he assured us that within some period my wife will be cured.

Answer 42: I had a bad case of pneumonia. I could barely make it to the phone to call my ex-wife. My doctor took me in immediately without having to wait in the waiting room. He told me he was going to give me a shot of something he called Rosephrine (I am guessing at the spelling). He said it was previously uses to treat horses and had been approved for human use. I made no objections because I would have done anything. I could hardly breathe and felt like I might die.

Answer 43: This doctor really listened to me. She spent an hour with me, going over and explaining exactly what was going on with my heart. Additionally, she prescribed tests which uncovered a condition my former cardiologist missed entirely, because he was so dismissive of my symptoms. The new doctor's physician assistant and cardiology nurse are on hand all the time to provide advice. They are really responsive when I call. They also set me up with a good nutritionist. They treat the whole patient, not just one symptom.

Answer 44: This doctor was my doctor when I was pregnant. He delivered my baby. I was young, ashamed and embarrassed at the time and he really was kind and gentle with me and took the time to make me feel comfortable on all of my visits. He took the time to thoroughly answer all of my questions without making me feel foolish. He was able to supply me with other resources that could help me also. He made me feel comfortable during a very scary experience.

Answer 45: This doctor became my oncologist after I was diagnosed and operated on for ovarian and endometrial cancer. Cancer is a very scary word, but he was such a cheerleader in helping me develop a "can-do" attitude. I visited him many times for check-ups and chemo infusions. Each time, he would talk to me about my concerns, how I'm coping and offer different strategies to keep myself positive. Every time, he made me feel as if I mattered as a human, not just as a patient!

Answer 46: I was referred to this surgeon by my GP when I needed to have my thyroid removed. She was very clear in explaining (with diagrams) what she could do and what my life would be like afterward. She told me without bragging that she is very good at what she does and she would do an excellent job for me. Everyone I met in the hospital from admitting to the nurses made a point of telling me what a good doctor she is.

Answer 47: I had pain in my legs when I walked for any amount of time. It became so bad that I had to quit my daily walks. He suspected that one of the veins in my leg had closed and the lack of

blood flow was causing my muscles to be oxygen starved. He scheduled a ultrasound test which would point out the area and, when it was determined that he was correct, he scheduled me for surgery and had a stent put in.

Answer 48: I first met Dr. S. while working as a floor nurse in an oncology unit in my city. I noticed that he was the only doctor who routinely called (at 7:15 am) wanting to know how his patients were doing. He would ask for specific lab work and was always polite and caring. It was over many years that I learned his patients seemed to get well and discharged faster than other oncologist's patients. His patients also had a higher cure rate.

Answer 49: I was operated on by this doctor after I suffered a broken neck. He gave me a 50/50 chance of being a quadriplegic or dying from the injuries and surgery. I felt a peace and calmness coming from him and put myself in his hands. After 9 long hours the surgery was complete and I was alive and completely mobile. I healed well and after more than 20 years I am still fully functioning. I credit it all to this fine neurosurgeon.

Answer 50: I was referred to him from my own doctor when I was younger. I needed a surgical procedure and it was rare and he was recommended. He was on the staff at UC medical center in San Francisco. He was great, I was younger and appreciated his calmness. He did the surgery and everything went well. I was in the hospital for 10 days after that and he or his students checked on me regularly. I had follow up visits with him.

Answer 51: His final surgery, 5/6/2021, with a west coast surgeon for 2 iliac aneurysms, was a horror with heavy bleeding, hemorrhagic shock, etc. The clotting factor led to incredible organ damage. He spent nine weeks in the ICU, 17 trips into the OR, before he finally caught the superbug and pulled the plug. By the time he died, the ICU doctor told me only his brain and his liver were functioning on their own, everything else was run by machine or medication.

Answer 52: I have small fiber neruopathy and have seen about 10 different doctors and have had several diagnosis but all were not correct and made no sense. This doctor helped me and performed multiple tests and surgeries to confirm whats wrong. Now this has been about a 5 year endeavor and after only 1 year he was able to diagnose me and its stuck and I have been receiving care and he's really helped me more than I could've ever imagined.

Answer 53: A few years back I showed up to the ER as a patient in need of emergency surgery with little to no ability to pay (and I looked the part) but the doctor that was assigned to be my surgeon treated me with the upmost respect and with a level of genuine caring that I was totally not expecting. His soothing presence and calming demeanor transformed what should have been a disastrous ordeal into only a minor medical setback.

Answer 54: My regular gynecologist was on leave, so this doctor was available to see me for my yearly exam. She talked to me as a human being, and I genuinely felt that rather than the professional demeanor that all doctors have to put on. Also, I was confident of her skills and knowledge because she is about my age -- 65 -- and she has been in practice a long time. I just was really impressed with her.

Answer 55: Some years later my mother was dx with colon cancer and I mentioned she should go to Dr. S. He cured my mother and she has been cancer free for over 15 years. I have never met a more exceptional doctor. I saw daily how he cared about all of his patients and seemed to be born for what he does. He is also very involved in our community. He is one of a kind.

Answer 56: He was chairman of the OB/Gyn department of a major teaching hospital. I worked for the department and chose him to do my annual pap smears and follow me during my two pregnancies. The first delivery was difficult but he took care of everything and all turned out fine. With anyone else it may have not turned out well. The second delivery he came in on his day off to perform it. Amazing man.

Answer 57: by the time we saw this doctor, he was my husband's only chance for survival. the dr. was direct and honest, very intelligent, and very serious while at the same time, he showed intense care and concern for what we were going through. he called me the day my husband died and asked me to come in so we could talk. I'm sure he was going to prepare me for the worst.

Answer 58: I found them to be exceptional for a number of reasons. Part of it was that we had the luxury of spending time to explore issues in depth - hourly sessions weekly or every other week were very helpful in taking the time to understand the problem. They were very empathetic and patient, but also challenged me to help me make sense of what was going on and develop tools I needed.

Answer 59: Yes, this doctor is the reason I'm writing to you now I was stabbed in my heart doctor did some little surgery right away then I was rushed into real surgeon surgery. Man I thank this doctor then after I was out of my crisis this doctor would do so many follow up with me to make sure I'm doing what I'm supposed to do to maintain the best man ever

Answer 60: My experience with this doctor is that she takes the time to go over my file with me in detail. She asks me questions about my lifestyle and is willing to work with me to help me achieve my goals. One of my goals was to get off of my blood pressure medication. She listened and agreed with me and I succeeded in being able to get off of them.

Answer 61: Dr. G. is, without doubt, a brilliant surgeon, with an excellent team. After his first reading of my son's ascending aortic artery film he called him, at 10:30pm on a Wednesday night and said, "You should be dead, I'd like to schedule your surgery on Friday!" Through his good efforts, including a dissection and an abdominal aorta aneurysm my son would live another nine years, dying at age 42.

Answer 62: I have MS but I am still quite active compared to some, but it does still cause me problems. My GP was very understanding

and sort of said there isnt a league table for problems and what is difficult for me isnt in competition with other peoples experience of MS and no matter how I suffer, it is still a big thing. It made me feel liek someone understood.

Answer 63: This doctor who takes care of my illness was introduced while I had been for a check up. He was someone who would not say medical terms which I had no knowledge of instead he would clearly give me in detail as to what what was my problems and make sure that I would not worry too much about my illness. He does not prescribe costly and heavy drugs.

Answer 64: At first I thought he seemed a like he wouldn't be friendly etc....all business. But he became warmer as time went on. He was so smart and knew exactly what the problem was after asking me a bunch of questions. He knew all along from the x-rays, but wanted to make sure I guess. Great job explaining things to me. I wasn't nervous at all about the surgery.

Answer 65: I found this doctor during a time in my life when I was at a crossroads whether to live or die. He was able to see me without an appointment and spent an hour with me, just talking and listening. He took care of me that day and for many years after that. He died a few years ago and I have not had a good doctor since.

Answer 66: Before he went in for this last surgery he called, wondering if he should fly back for a Doc G surgery. Alas, the pandemic was on and he, unvaxxed, was afraid to take the chance with flying. We discussed another surgeon, a west coast recommendation from G, but he opted out of that, not wanting to jump through the hoops of changing docs at the last moment.

Answer 67: The main thing was, she was very thorough in her examination of me. She took her time, explaining what she was looking for. I also felt very comfortable by her gentle manner. I could tell from what she was doing, and saying, that she was quite knowledgeable about women's health issues. She also had a

"calmness," about her, which was quite reassuring to me, as a patient.

Answer 68: The doctor was my surgeon during a gall bladder emergency surgery. They were very compassionate, understanding and considerate towards my needs. They went above and beyond to explain so many details and never got frustrated with all of the questions I asked. They made me feel like my health and life were of top concern and not just another routine emergency surgery.

Answer 69: This good doctor would do routine blood work at least twice a year. If there was something that showed up in the blood test that he felt was more critical, he would repeat in 3-4 months time. He was kind and caring on each visit. I never felt rushed where he failed to listen to what I needed to tell him.

Answer 70: Thanks for this survey, my son been gone almost a year now and you are the first medical person I have discussed this with! Dr. G is without doubt a fine person, a brilliant surgeon, an excellent manager of his team, his department. One of his residents told me, with awe, how fast he is as a surgeon!

Answer 71: By the next day, I was breathing much better and could take care of myself. I was still sick but the shallow breathing I had went away completely. He had saved my life. Later, he would do something similar for my daughter when she had a staph infection. He also probably saved her life.

Answer 72: He listens to me. He takes time to understand my concerns. He is ok with my checking his recommendations with my gf who is a pediatric anesthesiologist. Sometimes his orders include Talk to Elizabeth before deciding course of action. :-).. Empathy and taking the time to listen I think makes a huge difference.

Answer 73: JAN were all very friendly and helpful. I especially loved how Dr.J really took his time to explain my conditions with me as well as my treatment options. I had a great visit and the doctor’s demeanor has really put me at ease so I highly recommend this clinic.

Answer 74: He is very through and takes him time to check you out really well. The las time he scraped my foot for almost an hour taking a vey thick callus of my foot. Taking his time and getting debris and everything out to make it feel much better.

Answer 75: He is very kind. He explained my problem to me in a way that I and my son who was along for the visit that I can understand what is happening to me. Having dizzy spells is just terrible and I need to get this taken care of.

Answer 76: He was beginning his practice when I was a teenager and because of a car accident, I was thrown through front windshield headfirst and needed immediate surgery. He was one of the doctors who operated on me that day & the opthalmologist I saw over many years.

Answer 77: The most wonderful treatment. I well and truly admire the person that you are and the doctor in you is honorable. The brilliant treatment deserve immense thanks and appreciation. Sending over our most humble and heartfelt thanks for your immense care and comfort during the treatment.

Answer 78: He took the time to listen to me when I had my visit. I was not feeling well and he was gentle and patient with me. He didn't judge me at all and worked to make me comfortable while he was figuring out his diagnosis.

Answer 79: In the end, this resulted in a diagnosis of multiple sclerosis - a relief after years of seeking care for a range of symptoms but never receiving an accurate diagnosis. His persistence and advocacy made a huge difference in my life as a result.

Answer 80: Well he treated me for a accident I had at work he did a surgery on my right hand he took well care of me while I was at the hospital and when I went for my check up after the surgery.

Answer 81: I MEET THIS DOCOTOR BY MY FRIEND I HAD A DISK PROBLEM IN NECK AFTER A SMALL SURGERY IT HAS BEEN CLEAR, SHE IS VERY FRIENDLY AND SO EXPERIENCED IN THIS TYPE OF PROBLEM AFTER I MEET HIM I WAS CURED

Answer 82: I had a large bump on my head for years. I finally went to dr I at tufts. He had a good demeanor and listened. He evaluated me. I came back for a procedure to remove it. Then again for followup

Answer 83: My daughter was extremely sick and did not end up making it out of the hospital. During the period, the doctor was honest with me, but still empathetic and understanding of the tough times we were going through.

Answer 84: The doctor was very patient during the examination. He thoroughly explained the surgical procedure. He went above and beyond to remove cataracts from both eyes, and adjusted the sight in each eye. He was very warm and friendly.

Answer 85: He was aware of all alternate options for my treatment and was clearly up to date on what those options were. He was very interested in looking at life hollistically in addition to in a purely pharmaceutical sense

Answer 86: The doctor welcomed me happily. asked me about my day then offered a seat. The Doctor was so humble and listened to me with great keenness. He then promised to help me as much as he could.

Answer 87: I had a problem with my toenail (needed to have it removed) and was in really bad pain. Doctor treated me with care, asked for my input, gave advice and resolved the problem quickly and relatively painlessly.

Answer 88: I was requested for a two-hour observation in the emergency room after a fall. The doctor said that she need to confirm no bleeding in my head. She explained in detail and was knowledgeable in her field.

Answer 89: At the appointment, she was kind and compassionate. She had put all my imaging and chemistry studies together, studied them and came up with a plan to help me avoid more stones that included medications and diet.

Answer 90: Not sure if there is somewhere to state this later on, but my good doctor of 20+ years got sick 2 years ago and had to retire. Out of necessity I had to find another doctor.

Answer 91: When I handed her the stone I had passed, she was actually excited to see it! I knew that she was a nerd for her specialty. She truly loved the study of prevention of kidney stones.

Answer 92: This dr has a wonderful "bedside" manner. He's my knee nerve ablation dr. Ive had nerve ablations on both knees multiple times.He's not judgemental, he's a great listener and he's great at what he does.

Answer 93: He spoke with such concern, I felt some sort of guilty for my behavior. Since that day I never really cared about anything. We can rarely find such honest doctors now a days.

Answer 94: Was being screened for prostate cancer and the doctor was very kind and answered all of my questions. He was able to put me at ease while performing some rather invasive procedures.

Answer 95: This doctor took a lot of time with me. She listened carefully to my concerns. She did not dismiss my concerns as me being too paranoid as some doctors have done.

Answer 96: I'm also a firefighter lieutenant on injury retirement with exposure to 9/11. I have Wegner'sfrom that. So I have a lot of unique concerns and have done a lot of research.

Answer 97: Went to the doctor several times in the past year as part of an ongoing health problem. Procedure went well and doctor was great during all the follow-up visits.

Answer 98: I have visited an exceptionally good doctor. My experience to visit him is very nice. He is very caring to his patient. He is also very kind and empathetic.

Answer 99: I have migraine, and this doctor in question was the only one to solve my problem, today I have a quality of life like I never had before.

Answer 100: He was a God Send.He diagnosed me with NMO.When I met him I was in a wheelchair and could barely walk.Within a month he had me walking again.

Answer 101: I had a trimalleolar fracture of my right ankle. It was severe. He took care of it and I walk without a limp still over 30 years later.

Answer 102: They were actually listening, flexible with their treatment, and willing to learn about PREP which I asked for and asked genuine questions about my weight loss plan

Answer 103: I had a really bad injury and nearly died from a cut and this doctor repaired me over 4 surgeries and was just an amazing kind person

Answer 104: In the shift on duty about a relative of mine, the doctor explained thoroughly about the clinical detailing of the patient, with reception, clarifying all doubts.

Answer 105: When I had an episode of depression the doctor was kind and compassionate. He took time to listen to me and laid out steps for treatment.

Answer 106: I MEET THIS DOCTOR FOR SMALL SURGERY IN MY LEG, I HAD A GOOD OUTCOME, I FEEL SAFE WITH THIS DOCTOR DIFFERENT TO OTHER DOCTOR

Answer 107: They took a holistic approach to my issues - they understood that it would involve a combination of talk therapy, medication, and underlying medical issues.

Answer 108: This good doctor conducted an extremely delicate surgical operation to remove a kidney where a carcinogenic tumor had appeared that was endangering my life.

Answer 109: I was very pleased with my experience at Doctors Care. Doctor was very nice and helpful in explaining how to take the medicine prescribed.

Answer 110: I HAD A ONE TIME CARDIO ATTACT AT THAT TIME THE REPOSABLITY TO CARE ME IN EVERY SECOUNDS ITS ENCOURGAE TO SAY THESE

Answer 111: She welcomed me with pleasant smile , I have the great experience towards her. She cared me lot and communicate well

Answer 112: I made an appointment to see her and she ordered imaging and lab tests to be done prior to the appointment.

Answer 113: I am a kidney stone maker and was referred to this doctor because she specializes in prevention of kidney stones.

Answer 114: I had passed a stone before the appointment and was instructed to take it with me to my appointment.

Answer 115: He gave me a gastroscopy, without feeling pain and solved the problem only with the treatment of medicines.

Answer 116: I got full explanation what should I do to get this small (3mm) stone out of my body.

Answer 117: This doctor was a psychiatrist who I was referred to for treatment of on-going depression issues.

Answer 118: She reassured me that she would do everything possible to take care of me.

Answer 119: He asked some questions, and found out my diagnose very fast: kidney stone.

Answer 120: Very helpful for me during this pandemic time and given a best medication

Answer 121: he speak very friendly and he talk and care about my health

Answer 122: He pretty much ruined what was a rather beautiful, wonderful experience.

Answer 123: OK, that was quite emotional, good emotions. Thank You.

Answer 124: I had a strong pain on my low back.

Answer 125: I visited emergency room in my local hospital.

Answer 126: Doctor I had met was highly professional.

Answer 127: I believe he is exceptionally good doctor.

Answer 128: Yes he consult me calmly

Answer 129: Wonderful Experience with doctor

Appendix 3 Survey feedback

Question 35: (Optional) Would you like to comment on the survey? Anything that can be improved or your opinion or any feedback or anything you would like added or removed? Did you enjoy doing the survey? Was it difficult? Was it quick or did it take a long time? Is there anything else you would like to add? There were 221 answers

Most common survey feedback

Answer 1: Good survey or 'good' (63 times)

Answer 2: Nice survey or 'nice' (16 times)

Answer 3: No or nothing (27 times)

Answer 4: Gather more information (9 times)

Survey feedback: Other answers, sorted alphabetically

Answer 1: A good doctor is not condescending, and admits when they don't know something. They will team with your to address your health issues.

Answer 2: A very good study.

Answer 3: All are good. I like very much. Interesting survey. Beautiful experience.

Answer 4: All clear and easy to understand, thank you.

Answer 5: All clear, no problems.

Answer 6: All good - thank you.

Answer 7: Awesome survey.

Answer 8: Do you have any additional comments, questions, or concerns you would like to share? KU Employee Satisfaction Survey

Answer 9: Enjoyed

Answer 10: extremely well survey and i am very interesting that survey

Answer 11: For a period of 8 years, I asked different doctors about a spot on my thigh that just appeared one day and for those 8 years, I

Survey feedback: Other answers, sorted alphabetically

received the same response, "Looks good to me, no problem there, it's okay and if you are worried, just keep an eye on it."
8 years later I had class 2 melanoma surgery and wear an 8 inch scar on upper right thigh. At least 5 doctors did no more than a cursory glance and told me not to worry about it, that it was nothing. An excellent doctor listens to a patient's worries for we know our bodies better, first and that is why we seek medical help because we have been told our entire lives, ',if you see something funny, check it with your Dr, they are the experts. I do. Those experts are full of themselves too many times.

Answer 12: GOOD AND EASY

Answer 13: GOOD AND EASY

Answer 14: Good And Easy To Do

Answer 15: good care of human life.

Answer 16: Good hit good pay.

Answer 17: GOOD OPINION

Answer 18: GOOD SURVEY I VERY ENJOY

Answer 19: GOOD VERY LIKE

Answer 20: good work

Answer 21: GOOD, YES ENJOYED

Answer 22: GOOD, YES I ENJOYED

Answer 23: GREAT JOB

Answer 24: Health foundation care life.

Answer 25: healthy funditation care life

Answer 26: hospitals are businesses. I understand that. Just because a doctor has been doing it for a long time... doesn't mean they're a good doctor. There's so many factors. I'd rather have one that's experienced and isn't going to bs me. no sugar coating.

Answer 27: I appreciate the OBGYN's I've had in the past. I had normal births, with no complications. I also appreciate that the women OBGYN's gave me helpful ways to deal with menopause.

Survey feedback: Other answers, sorted alphabetically

I've had good internal medicine doctors in the past. They took the time to listen to me, treated me like a human.
These days, so often I feel the doctors are treating patients as how the insurance companies want.

Answer 28: I didn't have any problems with the survey, either technically or in understanding the questions. Good job. It was well done. Thank you for the opportunity.

Answer 29: I enjoyed sharing my thoughts and insights about what makes for an exceptional doctor.

Answer 30: I enjoyed the survey and I'm sorry that I wrote so much and in so much detail about the doctor, but I wanted to explain how skilled and personable he is.

Answer 31: I have met 2 great doctors One was extremely intelligent the other really is through and cares strongly for each of is patients.

Answer 32: I like a survey

Answer 33: i like that and i am very interesting that survey. Extremely very well project

Answer 34: i like this survey.

Answer 35: I REALLY ENJOYED AND INTERESTED THE SURVEY. AND NO COMPLICATED .

Answer 36: I really liked doing this one. I haven't thought about the doctor recently, but I truly appreciated all he did for me.

Answer 37: I think it is good that a researcher cares enough to research what patients believe is an exceptionally good doctor.

Answer 38: I think people are lucky to find a good doctor, we tend to stick to a good doctor for life.

Answer 39: i think this was very good

Answer 40: I thought that the survey was fine. It did take slightly longer than I thought it would though.

Answer 41: I would have liked the choice of "very skilled" or "experienced" in what makes a great MD.

Survey feedback: Other answers, sorted alphabetically

I did enjoy the study. It was not difficult. It took me longer because I really wanted to write more about the doctor and probably included too much!

Answer 42: I'm so grateful to have been involved in this fantastic survey

Answer 43: Interesting survey. It made me think about my reasons for staying with the doctor I now have. The survey was a reasonable-length, without excessive bubbles/choices.

Answer 44: Interesting survey. Not difficult. Took reasonably quick amount of time for length, easy to understand.

Answer 45: interesting.

Answer 46: IT VERY INTERESTING AND VERY KNOWLEDGEABLE QUESTIONS IT HAD

Answer 47: IT VERY KNOWLEDGEABLE AND IT VERY NICE

Answer 48: It was a bit long for the compensation.

Answer 49: It was a perfect survey for me because I got to give feedback with a expierence I had with a good doctor I finally got to tell my story which I appreciate you for this thank you have a blessed day.

Answer 50: It was a very satisfying survey, I enjoyed answering it and I thank you for that. It was good to relive some old memories that in the end worked out and made me happy. Simple and quick survey.

Answer 51: it was an intresting survey

Answer 52: It was clear enough, no errors seen. Maybe add a few small photos? It was about right time and length wise.

Answer 53: It was easy to recount and describe my experience with the exceptional doctor who treated me. She was a diamond in the rough, I had never before been to a doctor who acted like they genuinely cared. She was a good listener and allowed me to pour my heart out after my mom died. The only reason I stopped going to her was because she retired from family practice and began homeopathy and in-home care.

Survey feedback: Other answers, sorted alphabetically

Good luck with your study. Thanks for the opportunity to participate.

Answer 54: it was fun

Answer 55: it was fun to be answering

Answer 56: It was nice study and the things are highly relatable to me lot.

Answer 57: It was very repetitious with the same questions asked many times (although about a different person) and it got boring after awhile. I did want to mention the exceptional doctor took no credit for his skill. He owed everything to God that he did or said. In fact, he jogged everyday to the hospital from his home and stopped at a chapel to pray for guidance in his work for that day. He was very humble.

Answer 58: it would be great if all doctors were like the exceptional one that i know

Answer 59: its easy survey i loved it thanks for the survey i am happy.

Answer 60: its most useful survey

Answer 61: Its very useful survey

Answer 62: its very useful survey

Answer 63: its very useful survey

Answer 64: its very useful survey

Answer 65: its very useful survey and its better than my feedback

Answer 66: Like it survey

Answer 67: Ok Thank you.

Answer 68: Overall, I enjoyed participating in this survey. Thank you for the experience.

Answer 69: Research is very important to reflect on the health professionals who serve us. It didn't take long, all the aspects asked were important.

Answer 70: Survey was good, and I had no problems with it. Thank you!

Survey feedback: Other answers, sorted alphabetically

Answer 71: Thank you for allowing me to participate in this important research.

Answer 72: Thank you for providing us a 24-hour time, that is why I completed the optional fields too, you've been kind to us and I want to be considerate too of your time and patience. The survey was enjoyable, and I wish it could help to improve things on the topic, because there is room to improve. It is a bit personal but, I'm willing to share if it can change things. I wish you the best for your career. <3

Answer 73: Thank you, I thought all of the questions were well explained. I would perhaps add the option to describe additional physicians if there is more than one outstanding doctor. The time frame for the survey seemed ideal, just long enough to adequately describe the essential features of the experience.

Answer 74: Thanks for giving chance do to stuyd

Answer 75: thanks for the opportunity

Answer 76: Thanks!

Answer 77: The survey is all right. I enjoyed doing the survey. Thank you.

Answer 78: The survey was clear and concise. One thing I'd like to remark on, was that the exceptional doctor I had, got fed up, with all the red-tape she had to deal with, and retired early, which was a great loss to the medical community.

Answer 79: The survey was easy to complete. Thank you.

Answer 80: The survey was interesting. I enjoyed the survey. It was not difficult. It was pretty quick. My impression of doctors has really changed with covid.We moved and my long time doctor was in our old state. I had a zoom call with him my first few days of covid and he said I would be fine and just ride it out. The longer I rode it out the sicker I became. He had been my doctor for over 20 years and I felt that he did not care about me one bit.

Survey feedback: Other answers, sorted alphabetically

I submitted with my mturk id as the timer was expiring, I will message you the code, my internet had issues today and was down for quite awhile which is why my timer was expiring.

Answer 81: There were know problems. This was a very interesting study, I liked it. Made me smile thinking about my doctor cause he always has a few jokes to tell. So far it has taken me 22 min.

Answer 82: This is very interesting survey.

Answer 83: This subject is good but recalling doctor or hospitals are not enjoyable, but we cannot survive without them.

Answer 84: This survey is very interesting.

Answer 85: This survey was usefull and very enjoy.

Answer 86: This survey was very usefull and realy enjoy.

Answer 87: This was a great survey and first of it's kind that I have taken. Thank you for putting it together.

Answer 88: This was a very good survey and addressed topic which I feel should get more attention and it is unique among surveys, I have taken over 14,000. Might be interesting to throw in a few questions about the worst doctor experience too! - thanks.

Answer 89: Time was appropriate, wasn't too long, pay was good.

Answer 90: To find the mode: Look for the largest frequency and the corresponding value is the modal value or modal class

Answer 91: useful study

Answer 92: very good

Answer 93: VERY GOOD .I LIKE TO PARTICIPATE

Answer 94: VERY GOOD SURVEY

Answer 95: VERY INTERESTING

Answer 96: very interesting physician doctor this study

Answer 97: very interesting.

Answer 98: Very Nice and good

Answer 99: very nice survey

Answer 100: yes , thanks for this survey

Survey feedback: Other answers, sorted alphabetically

Answer 101: Yes its nice and not to much longer and its helps to know about the good doctors.

Answer 102: Yes its nice study and not to much longer and its helps to know about the doctor profile.

Answer 103: YES THIS SURVEY WAS VERY GOOD

Appendix 4 Regression analyses with mean of Exceptionally Good Doctor and Average Doctor Likert questions as dependent variable.

Exceptionally Good Doctor

Source	SS	df	MS	Number of obs	=	481
Model	43.0221951	8	5.37777439	F(8, 472)	=	23.61
Residual	107.508692	472	.227772652	Prob > F	=	0.0000
Total	150.530887	480	.313606014	R-squared	=	0.2858
				Adj R-squared	=	0.2737
				Root MSE	=	.47726

Exceptionally good doctor	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
The doctor does whatever is needed to help	.1022838	.0586812	1.74	0.082	-.013025	.2175925
The doctor listens to me willingly to the end	.4087488	.059405	6.88	0.000	.2920178	.5254799
At or above 55	.2647735	.0537432	4.93	0.000	.159168	.370379
Degree	-.0220227	.0580394	-0.38	0.705	-.1360703	.0920249
Respondent is female	.0526525	.0523077	1.01	0.315	-.0501322	.1554371
Specialist	.107637	.0441339	2.44	0.015	.0209138	.1943602
Doctor is female	.079503	.0526982	1.51	0.132	-.0240491	.1830551
Patient for a long time	.1443673	.067531	2.14	0.033	.0116688	.2770658
_cons	3.806906	.0690803	55.11	0.000	3.671163	3.942649

Average Doctor

Source	SS	df	MS	Number of obs	=	481
Model	24.8950797	8	3.11188497	F(8, 472)	=	7.93
Residual	185.208537	472	.392390968	Prob > F	=	0.0000
Total	210.103617	480	.437715868	R-squared	=	0.1185
				Adj R-squared	=	0.1035
				Root MSE	=	.62641

Average Doctor	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
The doctor does whatever is needed to help	-.1036575	.0770208	-1.35	0.179	-.2550035	.0476885
The doctor listens to me willingly to the end	-.259544	.0779708	-3.33	0.001	-.4127568	-.1063313
At or above 55	-.0962709	.0705395	-1.36	0.173	-.2348812	.0423393
Degree	.1251799	.0761784	1.64	0.101	-.0245108	.2748707
Respondent is female	.1584538	.0686553	2.31	0.021	.023546	.2933616
Specialist	.0207453	.057927	0.36	0.720	-.0930814	.134572
Doctor is female	.0346411	.0691679	0.50	0.617	-.1012739	.1705562
Patient for a long time	.2127108	.0886363	2.40	0.017	.0385403	.3868814
_cons	3.549528	.0906699	39.15	0.000	3.371361	3.727694

Appendix 5 Likert question linear regression analyses for exceptionally good and average doctors

Table 6a Summary of regression analyses in survey of 34 Likert questions Exceptionally Good Doctor, Survey of Adults Appendix

The questions are ordered by descending t-value for “Doctor listens willingly to end”, showing how much the 154 respondents whose doctors listen to them differ to the remainder of the respondents. **Exceptionally good doctor** Likert questions.

These tables show the results of the 34 linear regressions with each model having one of the Likert questions as the dependent variable. Table 6a shows the 34 regressions with exceptionally good doctor Likert questions, Table 6b with the average doctor.

We have highlighted the cases where an explanatory variable has either a t-value >= +2.5 (green) or <= -2.5 (red). We also highlighted the Likert question ‘The doctor is popular’ in Table 6a in yellow to show that patients whose doctors listen to them willingly to the end don’t see their doctor as more popular than other exceptionally good doctors do.

Question	Question text Exceptionally good doctor	R^2	N	Mean	SD	Doctor listens willingly to end	Does whatever is needed	Respondent over 55 years	Respondent degree	Respondent female	Doctor is specialist	Doctor female	Long term patient
				Likert score		(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)
q20_7	The doctor has integrity	0.28	505	4.19	0.73	(0.0000, 7.34)	(0.0309, 2.17)	(0.0001, 3.82)	(0.4044, -0.83)	(0.5106, -0.66)	(0.0412, 2.05)	(0.2558, 1.14)	(0.0215, 2.31)
q20_10	The doctor is personable	0.22	507	4.23	0.67	(0.0000, 6.94)	(0.3440, 0.95)	(0.0025, 3.04)	(0.5666, 0.57)	(0.0765, 1.78)	(0.3395, 0.96)	(0.7558, 0.31)	(0.0612, 1.88)
q21_11	The doctor is caring	0.24	505	4.31	0.7	(0.0000, 6.77)	(0.4180, 0.81)	(0.0000, 4.22)	(0.6279, -0.49)	(0.4812, 0.71)	(0.2608, 1.13)	(0.1505, 1.44)	(0.4351, 0.78)
q19_1	The doctor cares for patient	0.26	505	4.23	0.7	(0.0000, 6.73)	(0.0536, 1.94)	(0.0028, 3.00)	(0.1328, -1.51)	(0.2332, 1.19)	(0.0442, 2.02)	(0.9941, 0.01)	(0.0141, 2.46)
q21_7	The doctor is in good mental shape	0.25	499	4.25	0.69	(0.0000, 6.71)	(0.0739, 1.79)	(0.0000, 4.30)	(0.5876, -0.54)	(0.3900, -0.86)	(0.1250, 1.54)	(0.1685, 1.38)	(0.1989, 1.29)
q21_10	The doctor has patience	0.26	505	4.26	0.7	(0.0000, 6.56)	(0.0761, 1.78)	(0.0000, 4.34)	(0.6081, -0.51)	(0.6229, 0.49)	(0.0201, 2.33)	(0.0613, 1.88)	(0.4069, 0.83)
q19_11	The doctor gives the patient the time needed	0.28	505	4.22	0.68	(0.0000, 6.53)	(0.1702, 1.37)	(0.0000, 4.58)	(0.1079, -1.61)	(0.0323, 2.15)	(0.1260, 1.53)	(0.9148, 0.11)	(0.0621, 1.87)
q19_9	The doctor is very thorough in the patient's assessment	0.27	506	4.2	0.71	(0.0000, 6.48)	(0.0896, 1.70)	(0.0000, 5.10)	(0.7518, -0.32)	(0.8935, 0.13)	(0.0030, 2.98)	(0.2781, 1.09)	(0.1177, 1.57)

Question	Question text Exceptionally good doctor	R^2	N	Mean	SD	Doctor listens willingly to end	Does whatever is needed	Respondent over 55 years	Respondent degree	Respondent female	Doctor is specialist	Doctor female	Long term patient
				Likert score		(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)
q21_2	The doctor is accurate in diagnosing the issue/ problem	0.23	505	4.2	0.72	(0.0000, 6.41)	(0.1380, 1.49)	(0.0003, 3.66)	(0.5981, -0.53)	(0.7730, 0.29)	(0.0419, 2.04)	(0.1643, 1.39)	(0.8232, -0.22)
q21_4	The doctor is knowledgeable	0.24	506	4.33	0.67	(0.0000, 6.41)	(0.0542, 1.93)	(0.0004, 3.60)	(0.8149, 0.23)	(0.1792, 1.35)	(0.0285, 2.20)	(0.7193, -0.36)	(0.2760, 1.09)
q20_5	The doctor is honest	0.21	506	4.34	0.66	(0.0000, 6.11)	(0.2333, 1.19)	(0.0001, 3.85)	(0.5857, -0.55)	(0.8049, 0.25)	(0.8797, 0.15)	(0.3318, 0.97)	(0.2125, 1.25)
q20_3	The doctor is good at communicating	0.25	506	4.32	0.67	(0.0000, 6.01)	(0.2395, 1.18)	(0.0000, 5.12)	(0.4460, -0.76)	(0.5782, 0.56)	(0.0959, 1.67)	(0.2315, 1.20)	(0.2534, 1.14)
q20_12	The doctor is understanding and/ or shows empathy	0.24	507	4.25	0.7	(0.0000, 5.82)	(0.1398, 1.48)	(0.0002, 3.75)	(0.0947, -1.67)	(0.0754, 1.78)	(0.1204, 1.56)	(0.7450, 0.33)	(0.1052, 1.62)
q21_3	The doctor is good at explaining things	0.23	505	4.29	0.68	(0.0000, 5.71)	(0.0427, 2.03)	(0.0001, 4.03)	(0.6569, -0.44)	(0.6403, 0.47)	(0.0661, 1.84)	(0.2666, 1.11)	(0.1727, 1.37)
q19_7	The patient trusts the doctor	0.24	507	4.24	0.71	(0.0000, 5.71)	(0.0289, 2.19)	(0.0001, 3.99)	(0.5537, -0.59)	(0.1053, 1.62)	(0.2287, 1.21)	(0.3961, -0.85)	(0.2165, 1.24)
q19_5	Connects with the patient on a personal level	0.23	504	4.14	0.7	(0.0000, 5.59)	(0.4461, 0.76)	(0.0000, 4.41)	(0.3566, -0.92)	(0.2510, 1.15)	(0.0002, 3.73)	(0.4687, 0.73)	(0.1373, 1.49)
q20_1	The doctor is confident	0.18	505	4.26	0.68	(0.0000, 5.57)	(0.5721, 0.57)	(0.0021, 3.10)	(0.3949, -0.85)	(0.3759, 0.89)	(0.0122, 2.51)	(0.8262, 0.22)	(0.0575, 1.90)
q19_10	The doctor is a very good observer	0.21	506	4.24	0.7	(0.0000, 5.49)	(0.5717, 0.57)	(0.0000, 4.91)	(0.6617, -0.44)	(0.3354, 0.96)	(0.0780, 1.77)	(0.4496, 0.76)	(0.5818, 0.55)
q20_9	The doctor is organised	0.13	502	4.16	0.71	(0.0000, 5.30)	(0.7268, -0.35)	(0.0084, 2.65)	(0.7269, -0.35)	(0.7933, -0.26)	(0.0045, 2.85)	(0.4024, 0.84)	(0.0219, 2.30)
q20_8	The doctor is open minded	0.17	504	4.21	0.7	(0.0000, 5.28)	(0.4492, 0.76)	(0.0010, 3.30)	(0.9074, -0.12)	(0.4675, 0.73)	(0.4258, 0.80)	(0.0424, 2.03)	(0.0099, 2.59)
q19_8	He/She sees patient as a whole person not just a collection of symptoms	0.21	504	4.18	0.75	(0.0000, 5.14)	(0.0228, 2.29)	(0.0004, 3.56)	(0.3751, -0.89)	(0.6562, 0.45)	(0.1808, 1.34)	(0.4948, 0.68)	(0.0993, 1.65)
q19_4	Listens well, rarely or never interrupts	0.23	505	4.12	0.82	(0.0000, 4.92)	(0.0421, 2.04)	(0.0000, 4.51)	(0.0858, -1.72)	(0.6409, 0.47)	(0.2558, 1.14)	(0.3515, 0.93)	(0.1760, 1.36)
q20_4	The doctor is adaptable, i.e. can respond to the unexpected	0.17	493	4.05	0.76	(0.0000, 4.87)	(0.0507, 1.96)	(0.0081, 2.66)	(0.4159, -0.81)	(0.8140, -0.24)	(0.2278, 1.21)	(0.1504, 1.44)	(0.0285, 2.20)
q19_2	Acknowledges patient's experience and knowledge	0.17	504	4.14	0.71	(0.0000, 4.41)	(0.0557, 1.92)	(0.0125, 2.51)	(0.2400, -1.18)	(0.1079, 1.61)	(0.3702, 0.90)	(0.9285, 0.09)	(0.0587, 1.89)
q19_3	Good at following things up or addressing items from prior consultation	0.22	503	4.16	0.7	(0.0000, 4.11)	(0.0013, 3.24)	(0.0000, 4.22)	(0.8699, -0.16)	(0.1749, 1.36)	(0.0069, 2.71)	(0.0938, 1.68)	(0.2595, 1.13)
q20_2	The doctor is courageous when making difficult decisions	0.11	482	4.08	0.7	(0.0001, 3.97)	(0.5870, 0.54)	(0.0266, 2.22)	(0.8948, 0.13)	(0.4330, 0.78)	(0.0473, 1.99)	(0.2856, 1.07)	(0.0152, 2.44)

Question	Question text Exceptionally good doctor	R^2	N	Mean	SD	Doctor listens willingly to end	Does whatever is needed	Respondent over 55 years	Respondent degree	Respondent female	Doctor is specialist	Doctor female	Long term patient
				Likert score		(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)
q21_8	The doctor is in an especially harmonious or cared for treatment room	0.10	491	4.1	0.7	(0.0002, 3.74)	(0.6757, 0.42)	(0.0036, 2.93)	(0.0812, 1.75)	(0.5416, 0.61)	(0.1498, 1.44)	(0.1003, 1.65)	(0.2089, 1.26)
q20_6	The doctor is humble	0.11	501	4.16	0.73	(0.0003, 3.69)	(0.4561, 0.75)	(0.0106, 2.57)	(0.7172, 0.36)	(0.4116, 0.82)	(0.0250, 2.25)	(0.0128, 2.50)	(0.0858, 1.72)
q19_6	The patient has no fear of the doctor and may see as a friend	0.12	505	4.08	0.74	(0.0009, 3.36)	(0.0022, 3.08)	(0.1725, 1.37)	(0.9737, -0.03)	(0.4001, 0.84)	(0.0757, 1.78)	(0.4903, 0.69)	(0.4787, 0.71)
q21_1	The doctor avoids using medical terminology I don't understand	0.11	502	4.02	0.87	(0.0015, 3.19)	(0.1382, 1.49)	(0.0020, 3.10)	(0.9895, -0.01)	(0.9013, 0.12)	(0.2582, 1.13)	(0.0343, 2.12)	(0.2024, 1.28)
q20_11	Determined to get past bureaucratic obstacles that affect treatment	0.10	478	4.03	0.72	(0.0117, 2.53)	(0.8689, 0.17)	(0.0012, 3.26)	(0.0755, 1.78)	(0.1390, 1.48)	(0.1003, 1.65)	(0.3610, 0.91)	(0.0037, 2.91)
q21_6	The doctor is in good physical shape	0.10	501	4.09	0.7	(0.0338, 2.13)	(0.7147, 0.37)	(0.0008, 3.37)	(0.2845, 1.07)	(0.0535, 1.94)	(0.4297, 0.79)	(0.0325, 2.14)	(0.0247, 2.25)
q21_9	The doctor is always on time	0.05	499	4.08	0.72	(0.0651, 1.85)	(0.7146, -0.37)	(0.0086, 2.64)	(0.5298, 0.63)	(0.5541, -0.59)	(0.0298, 2.18)	(0.0375, 2.09)	(0.0530, 1.94)
q21_5	The doctor is popular (if you have seen the doctor with others)	0.11	465	3.99	0.78	(0.8253, 0.22)	(0.8011, -0.25)	(0.0000, 4.45)	(0.0594, 1.89)	(0.0143, 2.46)	(0.0015, 3.19)	(0.3930, 0.85)	(0.1884, 1.32)

Green: t-values >= 2.5. Yellow: Highlighting the Likert question where patients whose doctors listened to them willingly to the end see the least difference to other exceptionally good doctors.

Table 6b Summary of regression analyses in survey of 34 Likert questions Average Doctor, Survey of Adults Appendix

Qustn	Question text Average doctor	R^2	N	Mean	SD	Doctor listens willingly to end	Does whatever is needed	Over 55 years	Degree	Respondent female	Specialist	Doctor female	Long term patient
				Likert score		(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)
q23_1	The doctor is confident	0.04	503	3.89	0.71	(0.1113, 1.60)	(0.5945, -0.53)	(0.0283, 2.20)	(0.2467, 1.16)	(0.0407, 2.05)	(0.8071, 0.24)	(0.9015, -0.12)	(0.1969, 1.29)
q24_4	The doctor is knowledgeable	0.03	504	3.86	0.7	(0.6541, 0.45)	(0.2018, -1.28)	(0.4065, 0.83)	(0.5908, 0.54)	(0.0029, 2.99)	(0.8580, -0.18)	(0.1220, -1.55)	(0.5048, 0.67)
q23_9	The doctor is organised	0.03	497	3.76	0.74	(0.6880, 0.40)	(0.4472, -0.76)	(0.2827, -1.08)	(0.5809, 0.55)	(0.0122, 2.52)	(0.6440, 0.46)	(0.7475, -0.32)	(0.2566, 1.14)
q24_7	The doctor is in good mental shape	0.02	492	3.83	0.72	(0.9651, -0.04)	(0.8358, -0.21)	(0.4432, 0.77)	(0.7717, -0.29)	(0.3846, 0.87)	(0.6313, 0.48)	(0.1917, 1.31)	(0.0369, 2.09)
q23_5	The doctor is honest	0.03	498	3.84	0.75	(0.6914, -0.40)	(0.8652, -0.17)	(0.3431, -0.95)	(0.5468, 0.60)	(0.0315, 2.16)	(0.1340, 1.50)	(0.2422, -1.17)	(0.0127, 2.50)
q23_7	The doctor has integrity	0.02	499	3.72	0.78	(0.2915, -1.06)	(0.9718, -0.04)	(0.9192, 0.10)	(0.7386, 0.33)	(0.0498, 1.97)	(0.9368, 0.08)	(0.6674, -0.43)	(0.0414, 2.04)
q24_6	The doctor is in good physical shape	0.09	497	3.67	0.75	(0.2442, -1.17)	(0.2915, -1.06)	(0.0906, -1.70)	(0.1447, 1.46)	(0.0383, 2.08)	(0.8292, -0.22)	(0.1554, 1.42)	(0.0016, 3.18)
q22_1	The doctor cares for patient	0.05	503	3.66	0.77	(0.0607, -1.88)	(0.6805, -0.41)	(0.3913, -0.86)	(0.0236, 2.27)	(0.2500, 1.15)	(0.8347, 0.21)	(0.9488, -0.06)	(0.1561, 1.42)
q24_2	The doctor is accurate in diagnosing the issue/ problem	0.06	503	3.69	0.76	(0.0587, -1.89)	(0.6787, 0.41)	(0.0950, -1.67)	(0.3798, 0.88)	(0.0006, 3.47)	(0.9963, 0.00)	(0.9500, 0.06)	(0.1705, 1.37)
q23_2	The doctor is courageous when making difficult decisions	0.08	489	3.65	0.8	(0.0503, -1.96)	(0.6198, -0.50)	(0.0530, -1.94)	(0.4774, 0.71)	(0.0556, 1.92)	(0.1282, 1.52)	(0.6111, 0.51)	(0.0045, 2.86)
q22_10	The doctor is a very good observer	0.09	501	3.63	0.82	(0.0186, -2.36)	(0.1652, -1.39)	(0.2367, -1.18)	(0.0351, 2.11)	(0.0507, 1.96)	(0.8741, -0.16)	(0.9672, 0.04)	(0.0896, 1.70)
q23_4	The doctor is adaptable, i.e. can respond to the unexpected	0.06	487	3.63	0.8	(0.0173, -2.39)	(0.7041, -0.38)	(0.1550, -1.42)	(0.5279, 0.63)	(0.0893, 1.70)	(0.9989, 0.00)	(0.7574, 0.31)	(0.0277, 2.21)
q24_11	The doctor is caring	0.07	504	3.69	0.79	(0.0116, -2.53)	(0.2389, -1.18)	(0.9985, 0.00)	(0.1266, 1.53)	(0.0725, 1.80)	(0.4638, 0.73)	(0.3719, 0.89)	(0.2084, 1.26)
q24_3	The doctor is good at explaining things	0.10	505	3.7	0.82	(0.0046, -2.85)	(0.1383, -1.48)	(0.0540, -1.93)	(0.3699, 0.90)	(0.0029, 2.99)	(0.8640, 0.17)	(0.9694, -0.04)	(0.3759, 0.89)
q23_3	The doctor is good at communicating	0.11	503	3.65	0.81	(0.0041, -2.88)	(0.1001, -1.65)	(0.0620, -1.87)	(0.4775, 0.71)	(0.0097, 2.60)	(0.5726, 0.56)	(0.3769, -0.88)	(0.0063, 2.74)
q22_3	Good at following things up or addressing items from prior consultation	0.08	502	3.66	0.79	(0.0033, -2.95)	(0.2266, -1.21)	(0.8452, -0.20)	(0.0465, 2.00)	(0.2891, 1.06)	(0.8645, 0.17)	(0.4139, 0.82)	(0.4643, 0.73)
q24_5	The doctor is popular (if you have seen the doctor with others)	0.12	470	3.63	0.78	(0.0029, -3.00)	(0.0973, -1.66)	(0.0155, -2.43)	(0.0814, 1.75)	(0.0144, 2.46)	(0.6681, -0.43)	(0.6951, -0.39)	(0.1414, 1.47)
q22_9	The doctor is very thorough in the patient's assessment	0.09	503	3.61	0.82	(0.0028, -3.00)	(0.2754, -1.09)	(0.1959, -1.30)	(0.1463, 1.46)	(0.0256, 2.24)	(0.7754, 0.29)	(0.7464, 0.32)	(0.0875, 1.71)

Qustn	Question text Average doctor	R^2	N	Mean	SD	Doctor listens willingly to end	Does whatever is needed	Over 55 years	Degree	Respondent female	Specialist	Doctor female	Long term patient
				Likert score		(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)	(p-value, t-value)
q23_10	The doctor is personable	0.12	503	3.63	0.81	(0.0011, -3.29)	(0.2783, -1.09)	(0.1502, -1.44)	(0.0174, 2.39)	(0.0143, 2.46)	(0.2911, 1.06)	(0.7070, -0.38)	(0.0844, 1.73)
q22_7	The patient trusts the doctor	0.09	500	3.62	0.77	(0.0010, -3.32)	(0.8399, -0.20)	(0.6227, 0.49)	(0.0228, 2.28)	(0.0196, 2.34)	(0.9603, -0.05)	(0.9701, 0.04)	(0.0138, 2.47)
q24_1	The doctor avoids using medical terminology I don't understand	0.11	500	3.52	0.9	(0.0009, -3.34)	(0.1313, -1.51)	(0.7939, -0.26)	(0.3519, 0.93)	(0.0009, 3.33)	(0.6149, 0.50)	(0.3216, 0.99)	(0.1640, 1.39)
q24_10	The doctor has patience	0.11	503	3.61	0.83	(0.0006, -3.47)	(0.1353, -1.50)	(0.0787, -1.76)	(0.3628, 0.91)	(0.0340, 2.13)	(0.5243, -0.64)	(0.6323, 0.48)	(0.1278, 1.53)
q24_8	The doctor is in an especially harmonious or cared for treatment room	0.13	492	3.61	0.82	(0.0004, -3.55)	(0.2045, -1.27)	(0.0096, -2.60)	(0.6917, 0.40)	(0.0231, 2.28)	(0.5964, -0.53)	(0.4159, 0.81)	(0.0368, 2.09)
q23_8	The doctor is open minded	0.12	498	3.59	0.86	(0.0004, -3.58)	(0.3460, -0.94)	(0.1288, -1.52)	(0.2082, 1.26)	(0.0092, 2.62)	(0.9426, 0.07)	(0.9571, -0.05)	(0.0053, 2.80)
q23_12	The doctor is understanding and/ or shows empathy	0.11	502	3.63	0.81	(0.0003, -3.61)	(0.2508, -1.15)	(0.2405, -1.18)	(0.5247, 0.64)	(0.2508, 1.15)	(0.7478, 0.32)	(0.1759, 1.36)	(0.0403, 2.06)
q22_11	The doctor gives the patient the time needed	0.14	504	3.51	0.89	(0.0003, -3.64)	(0.0838, -1.73)	(0.0269, -2.22)	(0.2163, 1.24)	(0.7339, 0.34)	(0.5858, 0.55)	(0.3271, 0.98)	(0.0476, 1.99)
q23_11	Determined to get past bureaucratic obstacles that affect treatment	0.15	487	3.59	0.89	(0.0002, -3.71)	(0.0242, -2.26)	(0.0886, -1.71)	(0.2379, 1.18)	(0.0281, 2.20)	(0.3225, 0.99)	(0.5566, 0.59)	(0.0087, 2.64)
q22_2	Acknowledges patient's experience and knowledge	0.12	504	3.61	0.87	(0.0002, -3.74)	(0.0613, -1.88)	(0.4545, -0.75)	(0.0953, 1.67)	(0.4214, 0.80)	(0.8370, 0.21)	(0.6084, 0.51)	(0.0342, 2.12)
q22_5	Connects with the patient on a personal level	0.15	502	3.5	0.86	(0.0002, -3.76)	(0.1120, -1.59)	(0.1393, -1.48)	(0.0068, 2.72)	(0.4546, 0.75)	(0.2531, 1.14)	(0.6794, 0.41)	(0.0229, 2.28)
q23_6	The doctor is humble	0.17	499	3.53	0.92	(0.0000, -4.17)	(0.0376, -2.09)	(0.0342, -2.12)	(0.2254, 1.21)	(0.1227, 1.55)	(0.8464, 0.19)	(0.5508, 0.60)	(0.0132, 2.49)
q22_8	He/She sees patient as a whole person not just a collection of symptoms	0.14	502	3.58	0.88	(0.0000, -4.35)	(0.1271, -1.53)	(0.3922, -0.86)	(0.0503, 1.96)	(0.2102, 1.25)	(0.7110, 0.37)	(0.4166, 0.81)	(0.0285, 2.20)
q22_6	The patient has no fear of the doctor and may see as a friend	0.13	502	3.52	0.88	(0.0000, -4.39)	(0.2933, -1.05)	(0.9673, -0.04)	(0.0407, 2.05)	(0.8527, 0.19)	(0.3789, 0.88)	(0.1838, 1.33)	(0.0418, 2.04)
q22_4	Listens well, rarely or never interrupts	0.12	505	3.52	0.89	(0.0000, -4.49)	(0.5049, -0.67)	(0.1126, -1.59)	(0.2317, 1.20)	(0.0261, 2.23)	(0.9351, 0.08)	(0.7684, -0.29)	(0.0279, 2.21)
q24_9	The doctor is always on time	0.23	501	3.5	0.98	(0.0000, -5.60)	(0.0387, -2.07)	(0.0246, -2.25)	(0.1497, 1.44)	(0.3080, 1.02)	(0.3544, 0.93)	(0.0479, 1.98)	(0.0123, 2.51)

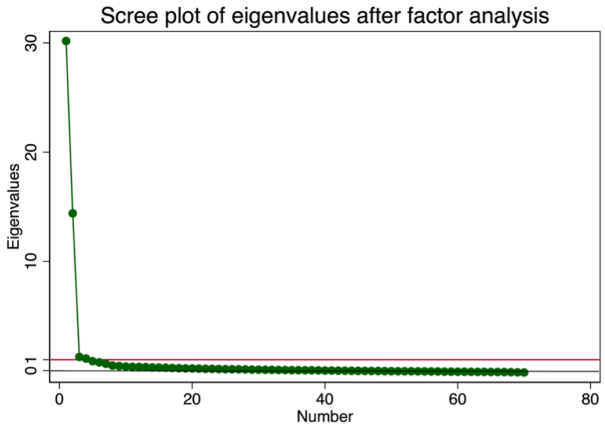
Green: t-values >= 2.5, red: t-values <= -2.5.

Appendix 6 Factor analysis

We investigated the survey data using factor analysis[81] of the correlation matrix of the analyzed variables to test the assumption that the Likert and other questions measure characteristics of exceptionally good doctors.

We found that the 34 Likert questions asking how much exceptional doctors fulfil 34 characteristics plus “I trust this doctor more than other doctors” and “The doctor listens to me willingly to the end” yield Eigenvalues of 20.9 and 1.2 for the first two factors, i.e. these questions overwhelmingly measure a single dominating underlying factor, presumably characteristics of an exceptional doctor.

Figure 6



We tested this by expanding the factor analysis by adding the 34 identical Likert questions where the respondents were asked how much the average doctor fits the 34 questions. In this case factor 1 had an Eigenvalue of 30.2, factor 2 of 14.4 and factor 3 of 1.3. See the scree plot on Figure 6. After varimax rotation, factor 1 was 23.1, factor 2, 21.1 and factor 3, 0.78, showing that two major underlying factors were measured. Every Likert question for exceptionally good doctors loaded on factor 2, and every Likert question for average doctors loaded on factor 1. All but one loading (0.52) were high at between 0.60 and 0.85 for the Likert questions. The two underlying factors seem to be general doctor characteristics measured in Factor 1 and exceptionally good doctor characteristics measured in Factor 2. See Table 5 for details.

The question “I trust this doctor more than other doctors” has a small loading (0.35) for Factor 2 and the question “The doctor listens to me willingly to the end” has, after rotation, the only moderately substantial negative loading of all variables, -0.38 for

Factor 1 and a positive loading of 0.46 for Factor 2. Therefore the quality of listening is a characteristic of exceptionally good doctors but seems to be negatively associated with the average doctor.

Table 7 Publication 5 Supplement Factor Analysis Rotated factor loadings (pattern matrix) and unique variances, Survey of Adults Appendix

	Exceptionally good doctor		Average doctor	
Question text	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
The doctor cares for patient		0.35	0.81	
The doctor listens to me willingly to the end	-0.38	0.46	0.85	
Good at following things up or addressing items from prior consultation		0.86	0.83	
Listens well, rarely or never interrupts		0.76	0.84	
Connects with the patient on a personal level		0.82	0.83	
The patient has no fear of the doctor and may see as a friend		0.73	0.79	
The patient trusts the doctor		0.78	0.81	
He/She sees patient as a whole person not just a collection of symptoms		0.71	0.83	
The doctor is very thorough in the patient's assessment		0.82	0.84	
The doctor is a very good observer		0.74	0.85	
The doctor gives the patient the time needed		0.83	0.86	
The doctor is confident		0.80	0.60	0.39
The doctor is courageous when making difficult decisions		0.85	0.82	
The doctor is good at communicating		0.82	0.86	
The doctor is adaptable, i.e. can respond to the unexpected		0.72	0.78	
The doctor is honest		0.84	0.76	
The doctor is humble		0.74	0.86	
The doctor has integrity		0.82	0.77	
The doctor is open minded		0.72	0.85	
The doctor is organised		0.80	0.74	0.31
The doctor is personable		0.77	0.85	
Determined to get past bureaucratic obstacles that affect treatment		0.77	0.86	
The doctor is understanding and/ or shows empathy		0.81	0.86	
The doctor avoids using medical terminology I don't understand		0.64	0.72	
The doctor is accurate in diagnosing the issue/ problem		0.81	0.77	
The doctor is good at explaining things		0.52	0.84	
The doctor is knowledgeable		0.77	0.65	0.30
The doctor is popular (if you have seen the doctor with others)		0.80	0.78	
The doctor is in good physical shape		0.81	0.72	
The doctor is in good mental shape	0.35	0.54	0.64	0.32
The doctor is in an especially harmonious or cared for treatment room	0.32	0.61	0.81	
The doctor is always on time		0.80	0.81	
The doctor has patience		0.69	0.85	
The doctor is caring		0.68	0.82	
Acknowledges patient's experience and knowledge		0.81		
Good at following things up or addressing items from prior consultation		0.80		