**International variations in primary care physician consultation time: A systematic review of 67 countries**

Irving Ga,, Neves ALb,c, Dambha-Miller Ha, Oishi Ad, Tagashira Ae, Verho Af and Holden Jg

a University of Cambridge, UK

b University of Porto, Portugal

c Imperial College, London

d University of Edinburgh,UK

e Horton General Hospital, Oxford, UK

f University of Helsinki, Finland

gGarswood Surgery, Wigan, UK

Correspondence to: Dr Greg Irving, Primary Care Unit, Department of Public health and Primary Care, Forvie Site, Robinson Way, Cambridge CB2 0SR, UK; Email; [gi226@cam.ac.uk](mailto:gi226@cam.ac.uk)

**Objective**

To describe the average primary care physician consultation length in economically developed and developing countries, and to examine the relationship between consultation length and organisational level economic, and health outcomes.

**Design and outcome measures**

A systematic review of published and grey literature in English, Chinese, Japanese, Spanish, Portugese and Russian languages from 1946-2016, for articles reporting on primary care physician consultation lengths. Data were extracted, analysed for quality and linear regression models constructed to examine the relationship between consultation length and health service outcomes.

**Results**

179 studies were identified from 111 publications covering 28,570,712 consultations in 67 countries. Average consultation length differed across the world ranging from 48 seconds in Bangladesh to 22.5 minutes in Sweden. We found that 18 countries representing about 50% of the global population, spend five minutes or less with their primary care physicians. We also found significant positive associations between consultation length and health care spending per capita, admissions to hospital with ambulatory sensitive conditions such as diabetes, primary care physician density, physician efficiency and physician satisfaction.

**Conclusion**

There are international variations in consultation length and it is concerning that a large proportion of the global population have only a few minutes with their primary care physicians. Such a short consultation length is likely to adversely affect patient health care and physician workload and stress.

**Article Summary**

* As the demand for primary health care increases worldwide, the length of the consultation is also increasingly under pressure and there are concerns about the impact of less time with the physician
* This is the largest international review of consultation length to date and includes six languages, 67 countries and 111 publications that represents 28 million primary care consultations worldwide
* Limitations of the review include the fact that differences between rural and urban, public and private practices were not be taken into account, and the analyses relies on average consultation lengths
* As with many comparisons of international data, the associations comparing consultation length with outcome data contained a relatively small number of data points

**Background**

Primary care driven health systems are effective at reducing disease, mortality, expenditure and promoting a more equitable distribution of health worldwide.[1] As the global population increases, the demand for primary care is also growing in both economically developed and developing countries. This is leading to an array of different consultation lengths with concerns amongst primary care physicians worldwide about the impact of shorter consultations. [2]. A recent survey of primary care physicians in Australia, Canada, France, Germany, Netherland, New Zealand, Norway, Sweden, the UK and the USA reported that over one third of all primary care physicians are dissatisfied with the time available per patient [3]. Surveys of primary care physicians suggest that shorter consultations compromise the care provided [4]. For example, shorter consultation length can reduce the range of services provided in primary care [5,6]. Meanwhile stress scores are particularly high among slower doctors with high booking rates, with many reporting they often feel rushed at the end of the consultation [2].

.

Average consultation length is also a quality indicator used by the World Health Organisation (WHO) and International Network for the Rational Use of Drugs (INRUD) to promote the safe and cost-effective use of drugs around the world. Several countries who follow the INRUD method for measuring consultation have set their own optimum consultation length as a quality standard. For example, Egypt recommends 30 minutes per patient as the optimum consultation length in primary care [7]. Average consultation length is also used in the primary care monitoring tool as an outcome indicator [8]. The monitoring tool suggests that at a system level change in consultation length depend on a range of other structural and process variables such as the number of primary care physicians [9]. It is widely believed that longer consultations are better and that more primary care physcians will be required to give patients more time [10,11]. However, a cochrane systematic reviews of clinical trials reported that there is insufficient evidence to say whether increasing consultation length provides patient benefit [12]. The review did however, highlight that there is some evidence to suggest that longer consultations improve health promotion, patient enablement, and the quality of record keeping. Other reviews suggests that longer consultations lead to a more accurate diagnosis of mental health problems and that time pressures can be a major barrier to treating depression [13]. There is also trial evidence that in patients with multimorbidity, longer consultations lead to an improved quality of life and patient enablement [14,15]

It is important that the methods used by researchers to measure consultation length are representative of the true consultation length i.e. the time that doctors and patients spend together. There is a challenge of how to accurately and precisely measure consultation length and avoid systematic errors [16]. For those methods involving direct observation researchers also need to considered how the different forms of reactivity will influence results i.e. whether knowing one is being measured affects performance, a ‘Hawthorne effect’ [17]. To date, only awareness of video recording has been shown *not* to influence consultation length and is considered as a reference standard for direct observation. Indirect approaches such as simply calculating the length of session and dividing it by the number of patients seen often lead to overestimation of consultation length, for example by ignoring administrative work [18].

Yet in the face of increasing demand for primary care globally and the need for better outcomes, to date, there have been no comprehensive high quality reviews that collate consultation lengths worldwide, and examine how these relate to organisation level economic and health outcomes. Such information remains vital if nations are to learn from each other. Previous reviews have been limited by focusing on a small number of countries; no assessment of the methods used to measure consultation length; adopting unsystematic approaches or mixing primary and secondary care consultations [19][9][20]. The aim of this study was to undertake a systematic review of the literature to describe the average primary care physician consultation length on as wide a number of reports as we could find worldwide. We also identified methods used to measure consultation lengths, and examined the association between consultation length and organisational level economic and health outcomes.

**Methods**

We searched the following electronic databases from January 1946 - 2016. English language (Medline, Embase), Chinese (CNKI, Wanfang, VIP), Japanese (Ichushi), Russian (Yandex, Rambler) and Spanish and Portugese (SciELO). The search strategy was based on the Medline search described by Wilson et al (excluding steps 24-34). Sample search strategy can be found in the supplementary file. Searches were supplemented by a survey of national representatives from the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (WONCA) who were asked to search the grey literature in their respective country for evidence relating to consultation length in either English or their native language. The grey literature search also included the WHO/INRUD database (2000-2016) and Robert Graham data repository (2009-2016). One author (GI) screened all references and excluded duplicate records and those that were not eligible based our selection criteria for considering studies. Two authors (GI and AN) then applied the criteria to the shortlisted references for full-text screening.

*Study selection criteria*

We included observational studies including cross sectional studies, surveys and cohorts of consultation length with primary care physicians. Primary care physicians were defined broadly as any medically qualified physician who provides primary care. Terms for primary care physicians differ according to different settings and include general practitioners, family doctors, family practitioners and other physicians working in primary health care settings and who perform primary healthcare task [12]. Studies set in secondary care and randomised controlled trials were excluded.

*Data extraction*

One author (GI) extracted data into Excel based on study characteristics using the agreed criteria; this was then independently reviewed by another author (AN) for consistency with disagreements resolved by discussion. Data was extracted based on the approach described by Wilson et al [9]. This included location, duration, design, number of consultations measured, mean consultation length, method for measuring consultation length, approach to analysis. Publically available data was used to calculate the mean consultation length for the NAMCS. Here only data related to ‘General/family physicians’ was included and the mean consultation length calculated using the ‘timemd’ variable in STATA 13.1. [21]

*Quality assessment*

We assessed the quality of included studies independently using the NIH quality assessment tool for observational studies [22]. Where data was missing we attempted to contact the authors. We did not plan to conduct a subgroup analysis and did not conduct a subgroup analysis a posteriori. Survey data was only considered reliable if they had at least 30 unweighted records and a relative standard error less than 30%.

*Data synthesis*

*Structural associations:* Organisation-level rather than patient level analysis was undertaken. Where there were at least ten data points, trends in changes in average consultation length were described. Linear regression models were constructed to examine the association between average consultation length and 1) the number of primary care physicians per 1000 population and 2) Per capita health care spending 3) average consultation rate per patient per year. The data for determining the number of primary care doctors per 1000 came from the OECD health care dataset and EFMA membership survey. [23,24] Per capita health care spending data came from the World Bank and the control variable was gross domestic product per capita purchasing power parity in US dollar. Consultation rate came from the NIVEL primary care database [25]. Consultation rate Analyses were complete using STATA 13.1. An association was termed significant if the P value was <0.05.

*Outcome associations:* Age adjusted data on hospital admission for ambulatory sensitive conditions (diabetes, asthma and chronic obstructive pulmonary disease (COPD)) per 1000 population were taken from the WHO hospital morbidity database and was adjusted for disease prevalence, the availability of hospital beds, density of primary care physician and per capita health spending. Data on patients reporting spending enough time with their regular doctor were taken from OECD report on health care quality indicators and was adjusted for per capita health spending. Data on burnout among family doctors was taken from a publication by Soler et al [26]. Chance of visiting an emergency department was taken from a publication by van den Berg et al as part of the QALYCO-PC (Quality and Costs of Primary Care in Europe) study [27]. Data for primary care doctors being somewhat or very disatisfied with the time they spend with their patient was obtained from the Commonwealth Fund and was adjusted for per capita health spending [28]. Data on the patients having an X-ray, Ultrasound or other scans in the last 12 months was taken from the EU Eurobarometer [29]. An association was considered significant if the p value was <0.05.

**Results**

Initial searches identified 1,016 records of which 838 were excluded. We included 178 studies in 111 publications. Fourty three (39%) of which were identified from the grey literature. The flow of information through our systematic review is shown in figure 1. The earliest study was in 1952 in the UK. The largest study was that by Hobbs et al which used a dataset of comprising of 101,818,352 from consultations 2007-2014 [30]. The country with the largest number of studies was the USA (26) followed by Australia (16) and the UK (16).

*Average length of primary care physician consultations*

The average consultation length was available in 67 different countries (table 1) covering over 28,530,712 consultations. Average consultation length varied from 48 seconds in Bangladesh to 22.5 min in Sweden figure 2). There were 15 countries with their most recently reported consultation length at < 5 min, 25 countries with a consultation length 5-9.9 min, 11 countries with 10-14.9 min, 13 countries with a consultation length of 15-19.9 min and three countries with a consultation length ≥ 20 min. Three countries had sufficient data points to determine long-term trends; Australia, UK and USA. In Australia consultation length was relatively stable, in the USA consultation length was increasing (by 12 seconds a year), in UK consultation length was increasing (by 4.2 seconds a year). These trends are shown graphically in figure 3.

*Methods used to measure consultation length*

These were variable and included calculates based on electronic patient record data, estimates based on the length of session and number seen, physician surveys, observer with stop watch, physician with stop watch, audio tapes, video and SMS text messages.

*Quality Assessment*

The quality of studies was judged to be good in 40% of studies, fair in 36% and poor in 24%. The most common reason for a poor rating was a failure to clearly define the outcome measures of consultation length ensure this measure was valid, reliable, and implemented consistently across all study participants.

*Structural associations*

There was a statistically significant relationship between consultation length and health care spending per capita (P=<0.001, R2 = 0.40 (figure 4)). This remained significant after adjusting for GDP per capita purchasing power parity (p=<0.001, R2 = 0.37). There was no significant relationship between the consultation length and the number of consultations per patient per year (P=0.19, R2 = 0.14). There was a statistically significant relationship between consultation length and the number of primary care physicians per 1000 population (P = <0.001, R2 = 0.21 (figure 5)). This remained significant after adjusting for per capita health spending (P = 0.001, R2 = 0.24)

*Outcome associations*

There was a significant association between the consultation length and primary care physicians reporting being satisfied with consultation length after adjusting for health spending per capita (P = 0.04, R2 = 0.80, 7 observations). There was also a significant association with physician burnout relating to reduced personal accomplishment (P=0.03, R2 = 0.99, 5 observations) but not emotional burnout (P=0.98, R2 = 0.14, 5 observations) or depersonalisation (P=0.50, R2 = 0.84, 5 observations) items after adjusting for physician density and average number of visits per patient per year. There was no significant association between the consultation length and the patients receiving an X-ray, ultrasound or other scan in the last 12 months (P = 0.86, R2 = 0.001, 22 observations). There was statistically significant reduction in hospital admissions for diabetes (P=0.04, R2 = 0.27, 23 observations) but not asthma (P=0.30, R2 = 0.17, 16 observations) or COPD (P=0.35, R2 = 0.22, 11 observations). There was no significant relationship between consultation length and Accident & Emergency (A+E) department attendance (P = 0.75, R2 = 0.01, 22 observations). There was no significant association between average consultation length and patient satisfaction with consultation length after adjusting for per capita health spending and physician density (P=0.09, R2 = 0.86, 7 observations).

**Discussion**

*Main Findings and comparison to the literature*

This review demonstrates that consultation length of primary care physicians varies markedly across the world. It is concerning that 18 countries covering ~50% of the world’s population have a latest reported mean consultation length of five minutes or less. Such a short consultation length is likely to adversely affect not only on patient care but also the workload and stress of the consulting physician. The reasons for such striking differences may reflect a number of factors including issues relating to governance, workforce, access, continuity, comprehensively, and coordination. For example, in countries such as Pakistan, Bangladesh and China, there is no appointment system and individual primary care physicians may undertake over 90 consultations a day with a considerable amount of time taken up providing repeat prescriptions [10] [31] [32] [33].

Many of the studies included in this review also found that short consultation length was responsible for driving polypharmacy, over-use of antibiotics and poor communication with patients [34][11][32]. This supports the argument that there is a practical limit to how short a consultation can be for routine appointments. Little can be achieved in less than five minutes unless the focus is largely upon the detection and management of gross disease. An average of 5 min may be the limit below which consultations amount to little more than triage and the issue of prescriptions. A lack of time in the consultation is a key constraint to delivering expert generalist care [35]. The finding of the association between shorter consultations and physician burnout due to a lack of personal accomplishment may indicate that doctors feel less productive and competent at managing complex multimorbid patients in those settings with short consultation lengths. Addressing this limitation is necessary if with complex needs and multimorbidity are to be effectively managed within primary care [36].

There was considerable difference in the trends of consultation length over time between the USA, Australia and the UK. In USA the average consultation length has increased steadily to over 20 minutes -– this despite the countries having a relatively stable proportion of primary care physicians per 1000 population. Consultation length in the UK has also increased steadily over time although the methods used were heterogenous. Changes here predate the introduction of the quality standard of 10 minutes for routine booked appointments and reflect the low starting point of consultation length and a steady increase in the density of primary care physicians over time [37]. It is also interesting to note that at the current rate of change, the consultation length in the UK would only reach 15 minutes in 2086. Consultation length in Australia was stable at just under 15 minutes reflecting the popular book length of 15 minutes which avoids the increased charge for 20 minute appointments.

The countries with the greatest health needs would be expected to have the greatest need for longer consultations but their consultation lengths were generally low. The association between average consultation length and per capita health care spending supports the claims that shorter consultation length is a good measure of poverty, even in the industrialised world. Whilst this association does not necessarily imply causation, it does suggests that the inverse care law may be an international phenomena. It was concerning that in some developing countries average consultation length appeared to be shortening suggesting that progress is not inevitable and if resources are not put into primary care then expanding populations and rising treatment possibilities could overwhelm us.

The absence of a statistically significant relationship between consultation length and consultation rate per patient per year suggests that if the consultation length increases, it does not necessarily follow that the number of visits per year will decrease. The number of consultations per patient per year can vary widely from country to country the total time a patient spends with their primary care physician is also likely to vary widely [38]. For example, in 2008 it was estimated that the mean number of consultations with a GP in the UK was 3.23 per year and average consultation length was 11.7 minutes so the total time spent with any GP per year was estimated to be 37.8 minutes per patient. In 1997 the a total time was 27.8 minutes, a 10 minute increase in 11 years. [38]

Large variations in the number of primary care physicians per capita are known to exists between countries [24]. The review found a statistically significant association between unadjusted average consultation length and the number of primary care physicians per capita. This remained significant after adjusting for per capita health care spending. The USA appeared to be an outlier in this relationship, achieving a relatively long consultation length with only a modest primary care physician density – this may be due to the ready availability of specialists in this country.

The association between consultation length and the saturation of primary physicians in consultation length supports findings from national studies [4]. There was also an association with primary care physician burnout on items relating to efficiency, supporting reports that increasing workload may be a key contributing factor [26]. There was an association identified between longer consultation length and reduced hospital admission for diabetes. This reflects findings elsewhere that strong primary care can reduce admissions for ambulatory sensitive conditions [5]. The lack of association between consultation length and the requesting of scans support findings from other studies that long consultations do not necessarily result in more test requests [12]. There was no association between A+E admission rates; however, this data was not adjusted for ambulatory sensitive conditions.

*Quality of the evidence*

The quality of studies was graded ‘good’ in less than half of the included studies. 43% of the included studies were identified in the grey literature and not published in peer-reviewed journals. 50 studies had links to the WHO/ INRUD which includes average consultation length as a quality indicator for rational prescribing. Many studies failed to provide a definition of consultation length leading to uncertainty as to what was actually measured. Despite evidence to show that awareness of video recording does not alter consultation length relatively few studies followed this approach [18]. The use of other techniques such as self timing, observer timing with a stop watch or by sending an SMS message; are likely to be influenced by various forms of reactivity, changing ones behaviour when it is known one is being observed.

Although the response rate was satisfactory in some surveys others had a high proportion of missing values for consultation length items. For example the NAMCS survey had ~26% missing. Samples were often non-random, or quasi randomised and clustering effects were likely. Several studies had a sample size of less than 30 and as a result are likely to be unreliable. Self-reporting is likely to result in reporting bias. Inspection of data sets indicated that reporting in surveys tended to round to the nearest 5 minute (or an even number). Simply calculating the length of session and dividing by the number seen likely to lead to overestimation of consultation length [16].

Populations were poorly described in many studies. Gender of the consulting doctor, age of the doctor, country of graduation, qualification, location of practice (rural or urban), socioeconomic status, services provided and proportion of chronic disease management, proportions of children, number of largely administrative consultations e.g. consultations principally used to issue repeat prescriptions are all known to influence consultation length, yet were seldom reported. Key summary statistic such as mean, median, mode, standard deviation and 95% confidence intervals were inconsistently reported in the many of the poorer quality studies.

*Strengths and weaknesses*

This is the largest international review of consultation length to date. The search utilised not only English language studies but also Chinese, Japanese, Spanish, Portuguese and Russian databases. Several of the identified studies were found in the grey literature from the survey of WONCA representatives. It is important to highlight that the findings presented here are intended to be illustrative. No weights were added to sample data to produce national estimates or to accurately assess the sampling error for consultation length. Given that many of the analyses use average consultation length rather than original data then the variance will be suppressed. As with many comparisons of international data the associations comparing consultation length with outcome data contained a relatively small number of data points and is likely to be underpowered, running the risk of a Type I error [39]. Differences between rural and urban, public and private practices were not taken into taken into account which could explain some of the variation identified.

*Implications for research*

The Australian BEACH system is an excellent example of what consistently high quality reporting of key summary statistics including a large sample size, and a standardised method for collecting data that enabled annual comparisons [40]. Unfortunately the Canadian physician survey missed opportunities to collect consultation length data along with the UK where reporting has been infrequent and inconsistently measured. The American NAMCS was another good example of an open approach to sharing anonymised data on consultation length [41]. It was concerning that data was only available for the remaining countries were the remaining 24% the world population live. It is vital that organisations such as the OECD, WHO and WONCA encourage measurement of consultation length and rates in countries that currently have no data. At present this is reported by the WHO / World Bank only in relation to all doctors. This data should be disaggregated further to evaluate primary care physicians. Novel approaches to measuring consultation length e.g. SMS, hold promise but the accuracy of such approaches need to be validated against the reference standard of video consultations and evaluated to see if awareness of their use influences physicians consultation length.

*Implications for policy*

Policy makers can compare their country with others and consider both what a desirable and mean consultation length should be, and also how administrative requirements can greatly influence how scarce time is spent when patients consults physicians. The very short consultation length in some countries contrasts markedly with the effort and expense used in reaching the facility. Instead of simply calling for longer consultation lengths, the focus should be on precisely *how* longer consultations can be achieved considering systems that have achieved this goal. Increasing the number of primary care physicians is likely to help the situation in many countries.

Average time is an established measure of quality and used by the WHO and International Network for the Rational Use of Drugs (INRUD) as a measure to promote the safe and cost-effective use of drugs - it should be universally and regularly reported and over time be accepted as an essential measure on the quality of health services around the world. Those countries with sufficient resources should considered adopting an approach similar to the Australian BEACH studies which in our view represents the gold standard for consistent reporting.

*Conclusion*

There are international variations in consultation length and it is concerning that a large proportion of the global population have only a few minutes with their primary care physicians. Such a short consultation length is likely to adversely affect patient health care and physician workload and stress.

**Acknowledgments:** We would like to thank Kathy Holloway of the WHO for providing data from the INRUD database. We would also would lie to thank WONCA members for helping to with the grey literature search. Special thanks also goes to and Luisa Pettigrew (WONCA Executive and WHO liaison), Ryuki Kassai (Fukushima Univeristy), Faisal Al Nasir (Arabian Gulf University) and Shlomo Vinker (Tel Aviv University). We would also like to thank Jean Soler and members of the European Burnout Study for sharing their data and Michael van den Berg for sharing data on emergency department use.

**Ethical Approval:** Not required for this systematic review

**Funding:** GI is an NIHR Clinical Lecturer and HDM is an NIHR Doctoral Research Fellow who are funded by the National Institute for Health Research (NIHR). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR, or the Department of Health. However, this research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**Competing interests:** We have read and understood the policy on declaration of interests and declare that we have no competing interests**.**

**Author Contribution:** GI designed of the review, extracted data, wrote the protocol, conducted the analysis, drafted and revised the paper. AN extracted data, drafted and revised paper. HDM revised the paper. AO extracted data. HT extracted data. AV extracted data. JH designed the review, drafted and revised paper. GI is guarantor.

**Data sharing statement:** No additional data are available.

**References:**

1 Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;**83**:457–502. doi:10.1111/j.1468-0009.2005.00409.x

2 Wilson A, McDonald P, Hayes L, *et al.* Longer booking intervals in general practice: effects on doctors’ stress and arousal. *Br J Gen Pract* 1991;**41**:184–7.

3 Osborn R, Moulds D, Schneider E *et al.* Primary Care Physicians in Ten Countries Report Challenges Caring for Patients with Complex Health Needs. *Health Aff* 2015. **34**.2104-12

4 Mercer SW, Hasegawa H, Reilly D, *et al.* Length of consultations. Time and stress are limiting holistic care in Scotland. *BMJ* 2002;**325**:1241.

5 Kringos DS. *De sterkte van de eerste lijn in Europa*. 2012.

6 Mercer SW, Fitzpatrick B, Gourlay G, *et al.* More time for complex consultations in a high-deprivation practice is associated with increased patient enablement. *Br J Gen Pract* 2007;**57**.http://bjgp.org/content/57/545/960 (accessed 8 Jun2017).

7 Akl OA, El Mahalli AA, Elkahky AA, *et al.* WHO/INRUD drug use indicators at primary healthcare centers in Alexandria, Egypt. *J Taibah Univ Med Sci* 2014;**9**:54–64. doi:10.1016/j.jtumed.2013.06.002

8 Kringos D, Boerma W, Bourgueil Y, *et al.* The strength of primary care in Europe: an international comparative study. *Br J Gen Pract* 2013;**63**:e742-50. doi:10.3399/bjgp13X674422

9 Wilson A, Childs S. The relationship between consultation length, process and outcomes in general practice: a systematic review. *Br J Gen Pract* 2002;**52**:1012–20.http://www.ncbi.nlm.nih.gov/pubmed/12528590 (accessed 25 Oct2016).

10 Prescription and Dispensing Practices in Public Sector Health Facilities in Pakistan: Survey Report.

11 Chattopadhyay A, Mondal T, Saha T, *et al.* An audit of prescribing practices in CGHS dispensaries of Kolkata, India. 2013.

12 Wilson AD, Childs S. Effects of interventions aimed at changing the length of primary care physicians’ consultation. *Cochrane database Syst Rev* 2006;:CD003540. doi:10.1002/14651858.CD003540.pub2

13 Hutton C, Gunn J, AP H, *et al.* Do longer consultations improve the management of psychological problems in general practice? A systematic literature review. *BMC Health Serv Res* 2007;**7**:71. doi:10.1186/1472-6963-7-71

14 Mercer SW, Fitzpatrick B, Guthrie B, *et al.* The CARE Plus study – a whole-system intervention to improve quality of life of primary care patients with multimorbidity in areas of high socioeconomic deprivation: exploratory cluster randomised controlled trial and cost-utility analysis. *BMC Med* 2016;**14**:88. doi:10.1186/s12916-016-0634-2

15 Mercer SW, Watt GCM. The inverse care law: clinical primary care encounters in deprived and affluent areas of Scotland. *Ann Fam Med* 2007;**5**:503–10. doi:10.1370/afm.778

16 McWhinney IR, Stewart M. Innovative consultation time as a common European currency. *Eur J Gen Pract* 2009;**1**:175–175. doi:10.3109/13814789509161634

17 Holden JD. Hawthorne effects and research into professional practice. *J Eval Clin Pract* 2001;**7**:65–70.

18 Pringle M, Stewart-Evans C. Does awareness of being video recorded affect doctors’ consultation behaviour? *Br J Gen Pract* 1990;**40**:455–8.

19 Outomuro D, Actis AM. [Analysis of ambulatory consultation length in medical clinics]. *Rev médica Chile* 2013;**141**:361–6. doi:10.4067/S0034-98872013000300012

20 World Health Organization. The World Medicines Situation: Chapter 8. Rational use of medicines. 2004. Geneva. p 75 - 92

21 StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP.

22 NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort Last accessed 6.7.17

23 European Forum of Medical Associations and WHO. http://www.efma-forum.com/index.php/efma-members/national-medical-associations lasr accessed 6.7.17

24 OECD Health Care Resources. https://stats.oecd.org/Index.aspx?DataSetCode=HEALTH\_REAC last accessed 6.7.17

25 Nivel: Primary Care in Europe. https://www.nivel.nl/en/primary-care last accessed 6.7.17

26 Soler JK, Yaman H, Esteva M, *et al.* Burnout in European family doctors: the EGPRN study. *Fam Pract* 2008;**25**:245–65. doi:10.1093/fampra/cmn038

27 van den Berg MJ, van Loenen T, Westert GP. Accessible and continuous primary care may help reduce rates of emergency department use. An international survey in 34 countries. *Fam Pract* 2016;**33**:42–50. doi:10.1093/fampra/cmv082

28 Osborn R, Moulds D, Schneider EC, *et al.* Primary Care Physicians In Ten Countries Report Challenges Caring For Patients With Complex Health Needs. *Health Aff* 2015;**34**:2104–12. doi:10.1377/hlthaff.2015.1018

29 Eurobarometer. http://www.gesis.org/eurobarometer-data-service/home/ last accessed 6.7.17

30 Hobbs FDR, Bankhead C, Mukhtar T, *et al.* Clinical workload in UK primary care: a retrospective analysis of 100 million consultations in England, 2007–14. *Lancet* 2016;**387**:2323–30. doi:10.1016/S0140-6736(16)00620-6

31 Nizami S, Khan I, Bhutta Z. Paediatric prescribing in Karachi. *JOURNAL-PAKISTAN Med …* 1997.

32 Jin G, Zhao Y, Chen C, *et al.* The length and content of general practice consultation in two urban districts of Beijing: a preliminary observation study. *PLoS One* 2015;**10**:e0135121. doi:10.1371/journal.pone.0135121

33 Guyon AB, Barman A, Ahmed JU, *et al.* A baseline survey on use of drugs at the primary health care level in Bangladesh \*. *Bull World …* 1994;**72**:265–71.

34 Nizami SQ, Khan IA, Bhutta ZA. Drug prescribing practices of general practitioners and paediatricians for childhood diarrhoea in Karachi, Pakistan. *Soc Sci Med* 1996;**42**:1133–9.

35 Reeve J, Dowrick CF, Freeman GK, *et al.* Examining the practice of generalist expertise: a qualitative study identifying constraints and solutions. *JRSM Short Rep* 2013;**4**:2042533313510155.

36 ISRCTN - ISRCTN34092919: Living well with multiple morbidity. doi:10.1186/ISRCTN34092919

37 Collings J. GENERAL PRACTICE IN ENGLAND TODAY -A RECONNAISSANCE. *Lancet* 1950;**255**:555. doi:10.1016/S0140-6736(50)90473-9

38 Irving G, Reeve J. Do GPs really provide 47 minutes a year for the patient? *Br J Gen Pract* 2012;**62**:404–5. doi:10.3399/bjgp12X653499

39 Saunders CL, Elliott MN, Lyratzopoulos G, *et al.* Beyond the ecological fallacy: potential problems when studying healthcare organisations. *J R Soc Med* 2016;**109**:92–7. doi:10.1177/0141076815610574

40 Australian GP Statistics and Classification Centre. General practice activity in Australia 2006–07. 2006.

41 NAMCS/NHAMCS - About the Ambulatory Health Care Surveys. https://www.cdc.gov/nchs/ahcd/index.htm last accessed 6.7.17

42 Afghanistan Medicine Use Study: A Survey of 28 Health Facilities in 5 Provinces. 2009.

43 Britt H, Valenti L, Miller G. Time for care. Length of general practice consultations in Australia. *Aust Fam Physician* 2002;**31**:876–80.

44 Health Information Directorate. Health Statistics 2007. In: *Health statistics 2007*. Bahrain: : Arabian Printing Press 2007.

45 Hogerzeil H V, Bimo, Ross-Degnan D, *et al.* Field tests for rational drug use in twelve developing countries. *Lancet (London, England)* 1993;**342**:1408–10.

46 Ahmed SM, Islam QS. Availability and rational use of drugs in primary healthcare facilities following the national drug policy of 1982: is Bangladesh on right track? *J Health Popul Nutr* 2012;**30**:99–108.

47 Alamgir H, Ahmed M. Studies on Drug Use Pattern and Cost Efficiency in Upozila Health Complexes in Dhaka Division of Bangladesh. *Am Sci Res J …* 2015.

48 Deveugele M, Derese A. Consultation length in general practice: cross sectional study in six European countries. *Bmj* 2002.

49 INAMI/RIZIV. Register van de huisartsen: aantal en profiel van de huisartsen in 2005. 2005.

50 Santos V dos, Nitrini SMOO. Indicadores do uso de medicamentos prescritos e de assistência ao paciente de serviços de saúde. *Rev Saude Publica* 2004;**38**:819–34. doi:10.1590/S0034-89102004000600010

51 Lopes AEC, Teixeira ACA, Gurgel MLF MM. Drug use of evaluation in health services in Fortaleza, Brasil. *INRUD* 1996;**6**.

52 Cunha M, Zorzatto J, Castro L. Avaliação do uso de medicamentos na Rede Pública Municipal de Saúde de Campo Grande/MS. 2002.

53 Portela A da S, Silva PCD da, Simões MO da S, *et al.* Indicadores de prescrição e de cuidado ao paciente na atenção básica do município de Esperança, Paraíba, 2007. *Epidemiol e Serviços Saúde* 2012;**21**:341–50. doi:10.5123/S1679-49742012000200017

54 Marcondes NSP. A assistência farmacêutica básica e o uso de medicamentos na zona urbana do município de Ponta Grosssa, Paraná: estudo de caso. 2002.

55 Kringos DS, Boerma WGW, Spaan E, *et al.* Evaluation of the organizational model of primary care in Turkey: a survey-based pilot project in two provinces of Turkey. Published Online First: 2008.http://www.narcis.nl/publication/RecordID/publicat%3A1001602

56 Chareonkul C, Khun VL, Boonshuyar C. Rational drug use in Cambodia: Study of three pilot health centers in Kampong Thom province. *Southeast Asian J Trop Med Public Health* 2002;**33**:418–24.

57 Wolfe S, Badgley RF, Kasius R V, *et al.* The work of a group of doctors in Saskatchewan. *Milbank Mem Fund Q* 1968;**46**:103–29.

58 Collyer JA. A Family Doctor’s Time. *Can Fam physician Médecin Fam Can* 1969;**15**:63–9.

59 Stewart M, Brown JB, Weston WW. Patient-Centred Interviewing Part III: Five Provocative Questions. *Can Fam physician Médecin Fam Can* 1989;**35**:159–61.

60 Ugalde A, Homedes N. Estudio de consulta externa en Costa Rica. Development Technologies, San José, Costa Rica, 1988. 1988.

61 Ozvacić Adzić Z, Katić M, Kern J, *et al.* Patient, physician, and practice characteristics related to patient enablement in general practice in Croatia: cross-sectional survey study. *Croat Med J* 2008;**49**:813–23.

62 Embaye A. Drug Use Studies in Eritrean Health Facilities. 1999.

63 Tähepõld H, Maaroos H, Kalda R, *et al.* Structure and duration of consultations in Estonian family practice. *Scand J Prim Health Care* 2009.

64 Mulugeta T Angamo NTW and NJR. Assessment of Patterns of Drug use by using World Health Organization’s Prescribing, Patient Care and Health facility indicators in Selected Health Facilities in Southwest Ethiopia. *J Appl Pharm Sci* 2011;**1**:62–6.

65 Desta Z, Abula T, Beyene L, *et al.* Assessment of rational drug use and prescribing in primary health care facilities in north west Ethiopia. *East Afr Med J* 1997;**74**:758–63.

66 Srikanth B. A PROSPECTIVE STUDY ON EVALUATION OF USE OF DRUGS AT PRESCRIBER, DISPENSER AND PATIENTS LEVEL BASED ON ‘WHO’ CORE DRUG. *Editor BOARD*https://www.researchgate.net/profile/Akshaya\_Bhagavathula/publication/254559382\_A\_PROSPECTIVE\_STUDY\_ON\_EVALUATION\_OF\_USE\_OF\_DRUGS\_AT\_PRESCRIBER\_DISPENSER\_AND\_PATIENTS\_LEVEL\_BASED\_ON\_WHO\_CORE\_DRUG\_USE\_INDICATORS\_IN\_ETHIOPIA/links/0046351fcf7ade2310000000.p

67 Kuusela M, Vainiomäki P, Kiviranta A, *et al.* The Missing Evaluation at the End of GP’s Consultation. *Int J Family Med* 2013;**2013**:672857. doi:10.1155/2013/672857

68 Breuil-Genier P GC. La durée des séances des médecins généralistes. *Etudes Result* 2006;**481**:8.

69 Fry J. Hong Kong: Need for improvement in primary care. *Lancet* 1990;**336**:558–558. doi:10.1016/0140-6736(90)92104-P

70 Sharma J, Kataria M, Gandhi H. Quality of medical care by central government health scheme--a study. *Heal Popul …* Published Online First: 1978.http://europepmc.org/abstract/med/10247249

71 Sarwal R. Reforming Central Government Health Scheme into a ‘Universal Health Coverage’model. *Natl Med J INDIA* 2015.

72 Chaudhury RR, Parameswar R, Gupta U, *et al.* Quality medicines for the poor: experience of the Delhi programme on rational use of drugs. *Health Policy Plan* 2005;**20**:124–36. doi:10.1093/heapol/czi015

73 PROMOTING RATIONAL USE OF DRUGS IN INDONESIA.

74 WHO EMRO | Relationship between consultation length and rational prescribing of drugs in Gorgan city, Islamic Republic of Iran | Volume 18, issue 5 | EMHJ volume 18, 2012.

75 Omer W. Use of mobile phones to calculate consultation time and comparing with perceived time in private clinics in erbil city, Iraq. In: *141st APHA Annual Meeting and Exposition (November 2 - November 6, 2013)*. APHA 2013.

76 Vinker S, Nathan T. Annual accumulated duration of time of Primary Care visits and its association in preventive medicine: A cross-sectional study.

77 Ohtaki S, Ohtaki T, Fetters MD. Doctor-patient communication: a comparison of the USA and Japan. *Fam Pract* 2003;**20**:276–82. doi:10.1093/fampra/cmg308

78 Wooldridge AN, Arató N, Sen A, *et al.* Truth or fallacy? Three hour wait for three minutes with the doctor: Findings from a private clinic in rural Japan. *Asia Pac Fam Med* 2010;**9**:11. doi:10.1186/1447-056X-9-11

79 Mochizuki A. Conference proceeding of The 3rd JPCA academic conference. 258.

80 Evaluation of Drug Use in Jordan Using WHO Patient Care and Health Facility Indicators.

81 Performance of health providers in primary health care services in Jordan. 2004.

82 Awad A, Al-Saffar N. Evaluation of drug use practices at primary healthcare centers of Kuwait. *Eur J Clin Pharmacol* 2010.

83 Institution T personal health care. Year analysis of patients state fund of Vilnius Zone. 2008.

84 Sosola A. An assessment of prescribing and dispensing practices in public health facilities of southern Malawi. 2007.

85 Sciortino P. *A Service Profile of Maltese General Practitioners. A provider survey of the general practice component of the Maltese Health Care system.* 2002.

86 Dahal P, Bhattarai B, Adhikari D. Drug use pattern in Primary Health Care facilities of Kaski District, Western Nepal. *Sunsari Tech …* 2013;**1**:1–8.http://www.nepjol.info/index.php/STCJ/article/view/8652

87 Van den Berg MJ, Kolthof ED, De Bakker DH V der ZJ. Second Dutch National Study of diseases and procedurs in general practice. The workload of general practitioners. 2004.

88 Baker AS. What do New Zealand general practitioners do in their offices? *N Z Med J* 1976;**83**:187–90.

89 Chedi B. Drug use pattern in out-patient children: A comparison between primary and secondary health care facilities in Northern Nigeria. *African J …* 2015;**9**:74–81. doi:10.5897/ajpp2014. 4262

90 Mjell J. Pasientene tror vi har god tid. *Utposten* 1989;**4**:182–3.

91 Maya Eikeland Gadgil. *Average consultation length per GP, Norway*. 2009.

92 Thaver I. Prescribing patterns of primary care providers in squatter areas of Karachi. *JOURNAL-PAKISTAN Med Assoc* 1995.

93 Perú (AMF 2015) Ser médico de familia en... Published Online First: December 2015.http://amf-semfyc.com/web/article\_ver.php?id=1497

94 Pawlikowska TRB, Walker JJ, Nowak PR, *et al.* Patient involvement in assessing consultation quality: a quantitative study of the Patient Enablement Instrument in Poland. *Health Expect* 2010;**13**:13–23. doi:10.1111/j.1369-7625.2009.00554.x

95 Nogueira JD. *Duração da Consulta: Perspectivas dos Médicos e dos Pacientes, 2002*. 2002.

96 Granja M, Ponte C, Cavadas LF. What keeps family physicians busy in Portugal? A multicentre observational study of work other than direct patient contacts. *BMJ Open* 2014;**4**:e005026. doi:10.1136/bmjopen-2014-005026

97 Bener A, Almarri S, Ali B, *et al.* Do minutes count for health care? Consultation length in a tertiary care teaching hospital and in general practice. *Middle East J Fam …* Published Online First: 2007.http://www.mejfm.com/journal/Jan2007/MEJFM\_Jan2007.pdf#page=3

98 Tehepold H. *Patient consultation in family medicine. Dissertation of the degree of doctor of medical sciences.* 2006.

99 Evaluation of the organizational model of primary care in the Russian Federation. 2014.

100 Al-Shammari SAI. Factors associated with consultation Time in Riyad Primary Health Care Centres, Saudi Arabia. *Saudi Med J 12371-375* 1991;**12**:371–5.

101 James E, Assawaf K, Zarie AH, *et al.* Factors influencing rational drug use in primary health care centres in Qassim region, Saudi Arabia. Saudi Pharm. J. 2003;**11**:126–35.

102 El Mahalli AA, Akl OAM, Al-Dawood SF, *et al.* WHO/INRUD patient care and facility-specific drug use indicators at primary health care centres in Eastern province, Saudi Arabia. *East Mediterr Heal J = La Rev sante la Mediterr Orient = al-Majallah al-s.ih.h.iyah li-sharq al-mutawassit* 2012;**18**:1086–90.

103 Al-Abbad H. Gender Differences in Consultation Time and its Relation to Patient’s Satisfaction: a cross-sectional study at King Khalid University Primary Health Care Clinics. *From Ed* 2015.

104 Balbaid O, Al-Dawood K. Factors associated with patient’s care during consultation in ministry of health facilities, Jeddah city, Saudi Arabia. *J Fam community …* Published Online First: 1997.http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3437133/

105 Stojanović B, Janković S. An analysis of drug use indicators within primary care health facilities in Jagodina. *Medicus* 2002.

106 Voo YO. Consultation length and case mix in a general practice clinic. *Singapore Med J* 1999;**40**:13–7.

107 Švab I, Petek Šter M, Kersnik J, Živčec Kalan G CJ. cross sectional study of performance of Slovene General practitioners. *Zdr var 2005;44183 -192* 2005;**44**:183–92.

108 Petek Ster M, Svab I, Zivcec Kalan G. Factors related to consultation time: experience in Slovenia. *Scand J Prim Health Care* 2008;**26**:29–34. doi:10.1080/02813430701760789

109 Hart JT. Primary medical care in Spain. *Br J Gen Pract* 1990;**40**:255–8.

110 P U, I. G. Estudio sobre el uso de los medicamentos en un área de salud por medio de una encuesta. *Ars Pharm* 2001;**42**:185–202.

111 Rational Use of Medicine Pratical Work Paper - Documents.

112 Andersson SO, Mattsson B. Length of consultations in general practice in Sweden: views of doctors and patients. *Fam Pract* 1989;**6**:130–4.

113 inrud news. *INRUD News* 1992;**3**:3.

114 Nsimba SED. Assessing prescribing and patient care indicators for children under five years old with malaria and other disease conditions in public primary health care facilities. *Southeast Asian J Trop Med Public Health* 2006;**37**:206–14.

115 Kringos DS, Boerma WGW, Spaan E, *et al.* A snapshot of the organization and provision of primary care in Turkey. *BMC Health Serv Res* 2011;**11**:90. doi:10.1186/1472-6963-11-90

116 Şensoy N. A Research on Patient Satisfaction with Primary Health Care in the Center of Afyonkarahisar. *J Clin Anal Med* 2014;**5**:29–34. doi:10.4328/JCAM.1173

117 Eczacının Sesi: Pratisyen Hekimlerin Reçete Yazımını Şekillendiren Faktörler.

118 Minstry of Health. Annual Health Report, Ministry of Health,. Abu Dhabi, United Arab Emirates: 2004.

119 A. AH. Consultation Length in Primary Health Care: Is It Getting Longer? | Amani Al Hajeri أماني الهاجري - Academia.edu.

120 Abdul Rasool BK, Fahmy SA, Abu-Gharbieh EF, *et al.* Prácticas profesionales y percepción sobre el uso racional de medicamentos según la metodología de OMS en Emiratos Árabes Unidos. *Pharm Pract*;**8**:70–6.

121 Fry J. A year in General Practice: a study of morbidity. 1952;**2**:249–52.

122 Watt C. A year of General Practice. *BMJ* 1952;**2**:115–6.

123 Mair A, Mair G. Facts of importance to the organisation of the national health service from a five year study of general practice. *Bmj* 1959;**1 (suppl)**:281–4.

124 CROMBIE DL, CROSS KW. The work-load in general practice. *Lancet (London, England)* 1964;**2**:354–6.http://www.ncbi.nlm.nih.gov/pubmed/14172341

125 Morrell DC. Expressions of morbidity in general practice. *Br Med J* 1971;**2**:454–8.

126 Scottish Home and Health Department. The study of consultations in general practice: Scottish health service statistics no.27. 1973.

127 Hughes D. Consultation length and outcome in two group general practices. *J R Coll Gen Pract* 1983;**33**:143–7.

128 Wilkin D, Metcalfe DH. List size and patient contact in general medical practice. *Br Med J (Clin Res Ed)* 1984;**289**:1501–5.

129 Department of Health and Social Security. General medical practitioners’ workload. A report prepared for the doctors’ and dentists’ review body. London: 1985.

130 Peter L, Tate JB, Catchpole PJ. Practice activity analysis: collaboration between general practitioners and a family practitioner committee. *J R Coll Gen Pract* 1989;**39**:297–9.

131 Ogden J, Bavalia K, Bull M, *et al.* &quot;I want more time with my doctor&quot;: a quantitative study of time and the consultation. *Fam Pract* 2004;**21**:479–83. doi:10.1093/fampra/cmh502

132 HSCIC. 2006/2007 GP workload survey. 2007.

133 Bwera A, Lamunu M. Survey of essential drug use in Rakai district Uganda, June, 1996. *J Clin …* Published Online First: 1997.https://scholar.google.co.uk/scholar?start=60&q=INRUD+AND+%22consultation+time%22+OR+%22+consultation+length%22+&hl=en&as\_sdt=0,5#0

134 Marvel MK, Epstein RM, Flowers K, *et al.* Soliciting the Patient’s Agenda. *JAMA* 1999;**281**:283. doi:10.1001/jama.281.3.283

135 Rhoades DR, McFarland KF, Finch WH, *et al.* Speaking and interruptions during primary care office visits. *Fam Med*;**33**:528–32.

136 Blankfield RP, Goodwin M, Jaén CR, *et al.* Addressing the unique challenges of inner-city practice: a direct observation study of inner-city, rural, and suburban family practices. *J Urban Health* 2002;**79**:173–85. doi:10.1093/jurban/79.2.173

137 PRESCRIPTIONPATTERNSF O. Micky Ndhlovu. Published Online First: 2009.http://146.141.12.21/handle/10539/8006

138 Public sector survey 2000. Harare, Directorate of Pharmacy Services Ministry of Health and Child Welfare. Zimbabwe,. 2000.

139 Trap B, Hansen E, Hogerzeil H. Prescription habits of dispensing and non-dispensing doctors in Zimbabwe. *Health Policy Plan* 2002.

Figure 1: PRISMA flow diagram

Figure 2: Average consultation length in each country based on most recent data

Figure 3: Consultation length over time in Australia, the US and the UK

Figure 4: Consultation length versus per capita health spending ($)

Figure 5: Average consultation length versus primary care physician density per 1000 population

Table 1: Summary of studies included in the review

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Country | Year | Method  of assessing consultation length | Person  Measuring time | Design | Mean duration (min) | No. of consultations | Quality |
| Afghanistan [42] | 2009 | iNRUD | Unclear | Cross sectional | 3.3 | 100 | Fair |
| Australia [40] | 2000 | Self recorded | Doctor | Cross sectional | 14.9 | 31734 | Good |
| Australia [40] | 2001 | Self recorded | Doctor | Survey | 15.0 | 36142 | Good |
| Australia [40] | 2002 | Self recorded | Doctor | Survey | 14.9 | 35861 | Good |
| Australia [43] | 2002 | Video | Researcher | Cross sectional | 14.8 | 926 | Fair |
| Australia [40] | 2003 | Self recorded | Doctor | Survey | 15.1 | 32839 | Good |
| Australia [40] | 2004 | Self recorded | Doctor | Survey | 15.2 | 31510 | Good |
| Australia [40] | 2005 | Self recorded | Doctor | Survey | 15.0 | 34111 | Good |
| Australia [40] | 2005 | Self recorded | Doctor | Survey | 14.9 | 33758 | Good |
| Australia [40] | 2006 | Self recorded | Doctor | Survey | 15.1 | 35201 | Good |
| Australia [40] | 2008 | Self recorded | Doctor | Survey | 14.6 | 34783 | Good |
| Australia [40] | 2009 | Self recorded | Doctor | Survey | 15.3 | 33613 | Good |
| Australia [40] | 2010 | Self recorded | Doctor | Survey | 15.0 | 32257 | Good |
| Australia [40] | 2011 | Self recorded | Doctor | Survey | 15.2 | 33096 | Good |
| Australia [40] | 2012 | Self recorded | Doctor | Survey | 14.8 | 31816 | Good |
| Australia [40] | 2013 | Self recorded | Doctor | Survey | 14.8 | 31816 | Good |
| Australia [40] | 2014 | Self recorded | Doctor | Survey | 14.7 | 33392 | Good |
| Austria [5] | 2010 | Unclear | Unclear | Unclear | 5 | Unclear | Poor |
| Bahrain[44] | 2007 | Unclear | Unclear | Unclear | 7.5 | Unclear | Poor |
| Bangladesh [33] | 1994 | INRUD | Unclear | Cross sectional | 0.9 | 28880 | Fair |
| Bangladesh [33] | 1994 | INRUD | Unclear | Cross sectional | 1 | 1440 | Fair |
| Bangladesh [33] | 1994 | INRUD | Unclear | Cross sectional | 0.8 | 1440 | Fair |
| Bangladesh [45] | 1993 | INRUD | Researcher | Cross sectional | 1.0 | Unclear | Fair |
| Bangladesh [46] | 2012 | INRUD | Researcher | Cross sectional | 3.8 | 1496 | Fair |
| Bangladesh [47] | 2015 | INRUD | Unclear | Cross sectional | 2.0 | 600 | Fair |
| Belgium [48] | 2002 | Video | Researcher | Cross sectional | 15.0 | 601 | Good |
| Belgium [49] | 2005 | Unclear | Unclear | Unclear | 10-30 | Unclear | Poor |
| Brazil [50] | 2004 | INRUD | Unclear | Cross sectional | 8.3 | 3326 | Fair |
| Brazil [51] | 1996 | INRUD | Researcher | Cross sectional | 5.8 | Unclear | Fair |
| Brazil [52] | 2002 | INRUD | Unclear | Cross sectional | 5.5 | 1456 | Fair |
| Brazil [53] | 2007 | INRUD | Unclear | Cross sectional | 7.13 | Unclear | Fair |
| Brazil [54] | 2002 | INRUD | Unclear | Cross sectional | 6.13 | Unclear | Fair |
| Bulgaria [55] | 2009 | Unclear | Unclear | Unclear | 20 | Unclear | Poor |
| Cambodia [56] | 2002 | INRUD | Unclear | Cross sectional | 4.43 | 60 | Fair |
| Canada [57] | 1968 | Unclear | Unclear | Unclear | 15.5 | Unclear | Poor |
| Canada [58] | 1969 | Stop watch | Doctor | Case series | 14.8 | 683 | Fair |
| Canada [59] | 1989 | Audio | Researcher | Cross section | 9 | 133 | Fair |
| Canada [59] | 1994 | Calculation | Researcher | Cross section | 15.8 | 424 | Good |
| China [32] | 2015 | Stop watch | Researcher | Cross sectional | 2 | 1135 | Good |
| Costa Rica [60] | 1988 | INRUD | Unclear | Cross sectional | 4.75 | Unclear | Fair |
| Croatia [61] | 2004 | Self reported | Doctor | Cross sectional | 11.5 | 5527 | Fair |
| Cyprus [5] | 2009 | Unclear | Unclear | Unclear | 15 | Unclear | Poor |
| Denmark [5] | 2009 | Unclear | Unclear | Unclear | 10-15 | Unclear | Poor |
| Egypt [7] | 2014 | INRUD | Researcher | Cross section | 7.1 | 300 | Fair |
| Eritrean [62] | 1999 | INRUD | Unclear | Cross sectional | 4 | 937 | Fair |
| Estonia [63] | 2003 | Video | Researcher | Cross sectional | 9 | 405 | Good |
| Ethiopia [64] | 2011 | INRUD | Unclear | Cross sectional | 5.47-6.50 | 322 | Fair |
| Ethiopia [65] | 1997 | INRUD | Unclear | Cross sectional | 5.8 | Unclear | Fair |
| Ethiopia [66] | 2013 | INRUD | Unclear | Cross sectional | 5 | 322 | Fair |
| El Salvdor [19] | 2013 | Unclear | Unclear | Unclear | Unclear | Unclear | Poor |
| Finland [5] | 2009 | Unclear | Unclear | Unclear | 20 | Unclear | Poor |
| Finland [67] | 2013 | Video | Researcher | Cross sectional | 17.9 | 20 | Good |
| France [68] | 2002 | Self reported | Doctor | Survey | 16 | 44000 | Fair |
| Germany [48] | 2002 | Video | Researcher | Cross sectional | 7.6 | 889 | Good |
| Hong Kong SAR [69] | 1990 | Unclear | Unclear | Unclear | 2-3 | Unclear | Poor |
| Hungary [5] | 2009 | Unclear | Unclear | Unclear | 6 | Unclear | Poor |
| Iceland [5] | 2009 | Unclear | Unclear | Unclear | 15 | Unclear | Poor |
| India [70] | 1979 | Stop watch | Researcher | Cross sectional | 1.9 | 2115 | Fair |
| India [11] | 2013 | Stop watch | Unclear | Cross sectional | 2.3 | 412 | Poor |
| India [71] | 2015 | Unclear | Researcher | Secondary analysis | 2 | Unclear | Poor |
| India [72] | 2005 | INRUD | Researcher | Cross sectional | 1.5 | Unclear | Fair |
| Indonesia [45] | 1993 | Unclear | Researcher | Cross sectional | 3.0 | 20 | Fair |
| Indonesia [73] | 1999 | INRUD | Researcher | Cross sectional | 3.0 | Unclear | Fair |
| Iran [74] | 2007 | iNRUD / Stopwatch | Researcher | Cross sectional | 6.9 | 620 | Good |
| Iraq [75] | 2013 | SMS | Researcher | Cross sectional | 6.3 | 168 | Good |
| Israel [76] | 2013 | Self reported | Doctor | Survey | 7.6 | 77247 | Good |
| Japan [77] | 2003 | Audio | Researcher | Cross sectional | 8.41 | 20 | Fair |
| Japan [78] | 2010 | Stopwatch | Researcher | Cross sectional | 6.12 | 263 | Fair |
| Japan [79] | 2012 | Stopwatch | Researcher | Cross sectional | 10.2 | Unclear | Fair |
| Jordan [80] | 2002 | INRUD | Researcher | Cross sectional | 3.9 | 629 | Fair |
| Jordan [81] | 2004 | INRUD | Researcher | Cross sectional | 3.07 | 1663 | Good |
| Kuwait [82] | 2010 | INRUD | Researcher | Cross sectional | 2.8 | 50 | Fair |
| Latvia [5] | 2008 | Unclear | Unclear | Unclear | 12 | Unclear | Poor |
| Lithuania [83] | 2008 | Unclear | Unclear | Unclear | 15 | Unclear | Poor |
| Luxemburg [5] | 2013 | Unclear | Unclear | Unclear | 15-20 | Unclear | Poor |
| Malawi [45] | 1993 | INRUD | Researcher | Cross sectional | 2.3 | Unclear | Fair |
| Malawi [84] | 2007 | INRUD | Unclear | Cross sectional | 2.1 | 727 | Fair |
| Malta [85] | 2008 | Unclear | Unclear | Unclear | 14 | Unclear | Poor |
| Nepal [45] | 1993 | INRUD | Researcher | Cross sectional | 3.5 | Unclear | Fair |
| Nepal [86] | 2012 | INRUD | Unclear | Cross sectional | 2.02 | 109 | Fair |
| Netherlands [87] | 1987 | Video | Researcher | Cross sectional | 9.93 | 422 | Good |
| Netherlands [87] | 2001 | Video | Researcher | Cross sectional | 9.81 | 2111 | Good |
| Netherlands[48] | 2002 | Video | Researcher | Cross sectional | 10.2 | 579 | Good |
| New Zealand [88] | 1976 | Stop watch | Researcher | Case series | 12 | 16 | Poor |
| Nigeria [45] | 1993 | Unclear | Researcher | Cross sectional | 6.3 | Unclear | Fair |
| Niger [89] | 2001 | INRUD | Unclear | Cross sectional | 5.4-6.1 | Unclear | Fair |
| Norway [90] | 1989 | Self reported | Doctor | Survey | 15 | Unclear | Poor |
| Norway [91] | 2009 | Self reported | Doctor | Cross sectional | 18.3 | 196 | Fair |
| Pakistan [34] | 1996 | Unclear | Researcher | Cross sectional | 3 | 996 | Fair |
| Pakistan [92] | 1995 | INRUD | Unclear | Cross sectional | 4.0 | Unclear | Poor |
| Pakistan [10] | 2016 | INRUD | Researcher | Cross sectional | 1.79 | 914 | Fair |
| Pakistan [31] | 1997 | INRUD | Unclear | Cross sectional | 3.4 | 1639 | Fair |
| Peru [93] | 2015 | Unclear | Unclear | Unclear | 15-20 | Unclear | Poor |
| Poland [94] | 2009 | Stopwatch | Doctor | Survey | 10.3 | 7924 | Good |
| Portugal [95] | 2002 | Stopwatch | Doctor | Survey | 14.4 | 274 | Good |
| Portugal [96] | 2014 | Stopwatch | Medical Student | Cross sectional | 15.2 | 155 | Good |
| Qatar [97] | 2007 | Video | Researcher | Cross sectional | 6.55 | 598 | Good |
| Romania [98] | 2009 | Video | Researcher | Cross sectional | 9.2 | 405 | Good |
| Russia [99] | 2014 | Self reported | Doctor | Survey | 18.1 | 528 | Poor |
| Russia [99] | 2014 | Self reported | Doctor | Survey | 17.2 | 701 | Poor |
| Saudi Arabia [100] | 1991 | Self reported | Doctor | Survey | 5.7 | 843 | Fair |
| Saudi Arabia [101] | 2003 | INRUD | Researcher | Cross sectional | 3.8 | Unclear | Fair |
| Saudi Arabia [102] | 2012 | INRUD | Researcher | Cross sectional | 7.3 | 300 | Fair |
| Saudi Arabia [103] | 2015 | INRUD | Researcher | Cross sectional | 16.28 | 200 | Fair |
| Saudi Arabia [104] | 2015 | INRUD | Researcher | Cross sectional | 17.78 | 200 | Fair |
| Saudi Arabia [104] | 1997 | INRUD | Researcher | Cross sectional | 5.94 | 400 | Fair |
| Serbia [105] | 2002 | INRUD | Researcher | Cross sectional | 2.8-7 | Unclear | Fair |
| Serbia [105] | 2002 | INRUD | Researcher | Cross sectional | 5.9 | 100 | Fair |
| Serbia [105] | 2002 | INRUD | Researcher | Cross sectional | 6.53 | 100 | Fair |
| Serbia [105] | 2002 | INRUD | Researcher | Cross sectional | 6.65 | 100 | Fair |
| Singapore [106] | 1994 | Unclear | Unclear | Cross sectional | 9.3 | 1667 | Poor |
| Slovakia [5] | 2009 | Unclear | Unclear | Unclear | 4-5 | Unclear | Poor |
| Slovenia [107] | 2005 | Stopwatch | Doctor | Survey | 7.08 | 12296 | Fair |
| Slovenia [108] | 2008 | Stopwatch | Nurse | Prospective survey | 6.9 | 12501 | Good |
| Spain [109] | 1990 | Unclear | Unclear | Unclear | 2-5 | Unclear | Poor |
| Spain [48] | 2002 | Video | Researcher | Cross sectional | 7.8 | 539 | Good |
| Spain[48] | 2002 | Video | Researcher | Cross sectional | 7.8 | 539 | Good |
| Spain [5] | 2009 | Survey | Unclear | Cross section | 13.4 | Unclear | Fair |
| Spain [110] | 1997 | INRUD | Researcher | Cross sectional | 9.59 | 600 | Fair |
| Spain 95] | 1998 | INRUD | Researcher | Cross sectional | 9.44 | 600 | Fair |
| Sudan [111] | 2011 | INRUD | Researcher | Cross sectional | 6.3 | 120 | Fair |
| Sweden [112] | 1989 | Stopwatch | Doctor | Cross sectional | 21 | 160 | Fair |
| Sweden [113] | 1992 | INRUD | Researcher | Cross sectional | 22.5 | 48 | Fair |
| Switzerland [48] | 2002 | Video | Researcher | Cross sectional | 15.6 | 620 | Good |
| Switzerland [5] | 2009 | Database | Researcher | Cross sectional | 17 | Unclear | Poor |
| Tanzania [45] | 1993 | INRUD | Researcher | Cross sectional | 3.0 | Unclear | Fair |
| Tanzania [114] | 2006 | INRUD | Researcher | Cross sectional | 3.8 | Unclear | Fair |
| Turkey [55] | 2007 | Self reported | Doctor | Survey | 11 | 78 | Poor |
| Turkey [115] | 2008 | Self reported | Doctor | Survey | 11 | 78 | Poor |
| Turkey [[116] | 2014 | Self reported | Doctor | Survey | 5 | 1227 | Poor |
| Turkey [117] | 2007 | INRUD | Researcher | Cross sectional | 8.24 | Unclear | Fair |
| UAE [118] | 2004 | Self reported | Doctor | Survey | 5.9 | 925 | Fair |
| UAE [119] | 2007 | Self reported | Doctor | Survey | 5.69 | Unclear | Poor |
| UAE [120] | 2010 | INRUD | Researcher | Survey | 10.7 | Unclear | Fair |
| UK [121] | 1952 | Self reported | Doctor | Audit | 5.0 | Unclear | Poor |
| UK [122] | 1952 | Self reported | Doctor | Audit | 7.2 | Unclear | Poor |
| UK [123] | 1959 | Self reported | Doctor | Audit | 8.3 | Unclear | Poor |
| UK [124] | 1964 | Self reported | Doctor | Cross sectional | 5.07 | Unclear | Poor |
| UK [125] | 1971 | Self reported | Doctor | Cross sectional | 5.2 | 548 | Poor |
| UK [126] | 1973 | Unclear | Unclear | Cross sectional | 5.0 | Unclear | Poor |
| UK [127] | 1983 | Unclear | Doctor | Audit | 8.1 | Unclear | Poor |
| UK [127] | 1983 | Unclear | Doctor | Audit | 5.3 | Unclear | Poor |
| UK [128] | 1984 | Stopwatch | Doctor | Cross sectional | 7.5 | 199 | Fair |
| UK [129] | 1985 | Self reported | Doctor | Survey | 8.25 | Unclear | Poor |
| UK [130] | 1989 | Self reported | Doctor | Survey | 9.8 | 76 | Poor |
| UK [48] | 2002 | Video | Researcher | Cross sectional | 9.4 | 446 | Good |
| UK [131] | 2004 | Stopwatch | Doctor | Cross sectional | 8.96 | 294 | Fair |
| UK [132] | 2006 | Self reported | Doctor | Survey | 11.7 | 1317 | Poor |
| UK [30] | 2007 | Calculated from record | Researcher | Cross sectional | 8.65 | 14294035 | Good |
| UK 118] | 2014 | Calculated from record | Researcher | Cross sectional | 9.22 | 13381772 | Good |
| Uganda [133] | 1996 | INRUD | Researcher | Cross sectional | 6 | 765 | Fair |
| USA [41] | 1993 | Self reported | Doctor | Survey | 15.56 | 2053 | Good |
| USA [41] | 1994 | Self reported | Doctor | Survey | 16.77 | 3060 | Good |
| USA [41] | 1995 | Self reported | Doctor | Survey | 16.77 | 3060 | Good |
| USA [41] | 1996 | Self reported | Doctor | Survey | 14.94 | 5366 | Good |
| USA [41] | 1997 | Self reported | Doctor | Survey | 16.30 | 3859 | Good |
| USA [41] | 1998 | Self reported | Doctor | Survey | 17.51 | 2507 | Good |
| USA [41] | 1999 | Self reported | Doctor | Survey | 17.67 | 3901 | Good |
| USA [134] | 1999 | Audio | Researcher | Cross sectional | 15.0 | 7989 | Good |
| USA [41] | 2000 | Self reported | Doctor | Survey | 16.20 | 3344 | Good |
| USA [41] | 2001 | Self reported | Doctor | Survey | 16,78 | 2884 | Good |
| USA [135] | 2001 | Audio | Researcher | Cross sectional | 11 | 60 | Good |
| USA [136] | 2002 | Stopwatch | Nurse | Cross sectional | 9.2 | 876 | Good |
| USA [136] | 2002 | Stop watch | Nurse | Cross sectional | 12.1 | 979 | Good |
| USA [136] | 2002 | Stop watch | Nurse | Cross sectional | 9.5 | 2599 | Good |
| USA [41] | 2002 | Self reported | Doctor | Survey | 15.77 | 5738 | Good |
| USA [77] | 2003 | Audio | Researcher | Cross sectional | 11.14 | 20 | Fair |
| USA [41] | 2003 | Self reported | Doctor | Survey | 17.36 | 4769 | Good |
| USA [41] | 2004 | Self reported | Doctor | Survey | 17.61 | 4023 | Good |
| USA [41] | 2005 | Self reported | Doctor | Survey | 18.97 | 4483 | Good |
| USA [41] | 2006 | Self reported | Doctor | Survey | 19.91 | 6536 | Good |
| USA [41] | 2007 | Self reported | Doctor | Survey | 18.29 | 7017 | Good |
| USA [41] | 2008 | Self reported | Doctor | Survey | 19.77 | 7037 | Good |
| USA [41] | 2009 | Self reported | Doctor | Survey | 18.57 | 7989 | Good |
| USA [41] | 2010 | Self reported | Doctor | Survey | 19.3 | 6237 | Good |
| USA [41] | 2011 | Self reported | Doctor | Survey | 20.55 | 6530 | Good |
| USA [41] | 2012 | Self reported | Doctor | Survey | 21.07 | 12897 | Good |
| Zambia [137] | 2009 | INRUD | Researcher | Cross sectional | 5.8 | 2354 | Fair |
| Zimbabwe [138] | 2000 | INRUD | Researcher | Cross sectional | 5 | Unclear | Fair |
| Zimbabwe [139] | 2002 | INRUD | Researcher | Cross sectional | 8.7 | Unclear | Fair |