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Consultation length, process quality and diagnosis quality of primary care in rural China: A cross-sectional standardized patient study

Qingzhi Wang[a], Sasmita Poudel Adhikari[a], Yuju Wu[a], Thankam S. Sunil[b], Yuping Mao[c], Ruixue Ye[a], Chang Sun[a], Yaojiang Shi[d], Chengchao Zhou[e], Sean Sylvia[f], Scott Rozelle[g], Huan Zhou[a,*]

[a] Department of Health Behavior and Social Medicine, West China School of Public Health and West China Fourth Hospital, Sichuan University, Chengdu, China
[b] Department of Public Health, University of Tennessee, TN, USA
[c] Department of Communication Studies, California State University, California, USA
[d] Center for Experimental Economics in Education, Shaanxi Normal University, Xi'an, China
[e] Institute of Social Medicine and Health Administration, School of Public Health, Shandong University, Jinan, China
[f] Department of Health Policy and Management, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, NC, USA
[g] Freeman Spogli Institute, Stanford University, California, USA

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ABSTRACT

Objective: Consultation length, the time spent between patient and health care provider during a visit, is an essential element in measuring quality of health care patients receive from a primary care facility. However, the linkage between consultation length and process quality and diagnosis quality of primary care is still uncertain. This study aims to examine the role consultation length plays in delivering process quality and diagnosis quality, two central components of overall primary care quality, in rural China.

Methods: We recruited unannounced standardized patients (SPs) to present classic symptoms of angina and tuberculosis in selected healthcare facilities in three provinces of China. The consultation length and primary care quality of SPs were measured and compared with both international and national standards of care. Ordinary Least Squares (OLS) regressions for process quality (continuous dependent variable) and Logistic regressions for diagnosis quality (binary dependent variable) were performed to investigate the relationship between consultation length and primary care quality.

Results: The average consultation lengths among patients with classic symptoms of angina and those with symptoms of tuberculosis were approximately 4.33 min and 6.28 min, respectively. Providers who spent more time with patients were significantly more likely to complete higher percentage of recommended checklist items of both questions and examinations for angina (β = 1.39, 95%CI 1.01–1.78) and tuberculosis (β = 0.89, 95%CI 0.69–1.08). Further, providers who spent more time with patients were more likely to make correct diagnosis for angina (marginal effect = 0.014, 95%CI 0.002–0.026) and for tuberculosis (marginal effect = 0.013, 95%CI 0.005–0.021).

Conclusions: The average consultation length is extremely short among primary care providers in rural China. The longer consultation leads to both better process and diagnosis quality of primary care.

Practice Implications: We recommend primary care providers to increase the length of their communication with patients. To do so, government should implement healthcare reforms to clarify the requirements of affordable and reliable consultation length in medical care services. Moreover, such an experience can also be extended to other developing countries.

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1. Introduction

Consultation length is defined as the time providers and patients spend during a patient's visit. It is a quality indicator of promoting safe and cost-effective use of drugs around the world as suggested by the World Health Organization (WHO) and the International

* Corresponding author.
E-mail address: zhouhuan@scu.edu.cn (H. Zhou).

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Network for the Rational Use of Drugs (INRUD) [1]. Consultation is a crucial component of primary care practice, and the length of consultation is an important determinant and proxy for quality of health care in healthcare assessment [2,3]. A review of studies involving 67 countries reported that the average consultation length ranged from 48 s in Bangladesh to 22.5 min in Sweden. In 18 countries composing approximately 50% of the global population, patients spent only 5 min or less in average with their primary care providers [4]. The significant variations in consultation length among countries were primarily due to patients' different ways of seeking primary care and primary care providers' varying role in a society. Following the INRUD method of measuring consultation, British Royal College of General Practitioners has stated that by 2030 face-to-face primary care consultations will be at least 15 min [5]. In Egypt, the optimum consultation length is set to be 30 min in primary care settings [6].

It is generally believed that longer consultation is an important aspect of patient-provider interaction and could provide more useful information to both health care providers and patients [7]. Primary care providers around the world are concerned about the negative effects of short consultation length such as reducing the range of services provided in primary care, adversely affecting patients' health outcome, and leading to patient dissatisfaction that could result in poor patient-provider relationship [8,9]. Consultation length is extremely important for providers to accurately diagnose the causes of the signs and symptoms patients experience, from which providers can suggest treatment and health management plans [10,11]. Studies have shown that sufficient consultation length has favorable effects on primary care processes and efficiency of treatment and diagnosis [12,13]. However, it is inconclusive whether altering the length of consultation leads to changes in the primary care provider's performance [14]. Although existing literature suggests a potential association between longer consultation time and better quality of care, the strength of this association remains unexplored and unclear which needs to be further explored [15].

To study the association between consultation time and quality of care, one methodological challenge is the way of accurately measuring the length of consultation without any systematic errors [16]. Some studies have used the average length of consultation estimated by providers, which may be overestimated because the provider knows that they are being observed (Hawthorne effect) [17]. On the other hand, the time estimated by the patient is subject to recall bias [18]. The mean length of consultation in some research was calculated by dividing the total time a provider spent in consultation services by the number of patients seen [19,20], which likely overestimates the length of the consultation by including the interruption period [16]. In comparison, videotape or audiotape that does not alter providers′ behavior in consultations could be the most valid measurements of consultation length [19]. Furthermore, most studies examining the link between consultation length and quality of primary care have not adjusted for the case-mix of the patients, characteristics of the healthcare providers, and features of the practices [14]. Standardized patients (SPs) method can accurately measure consultation length without the influences of the aforementioned methodological issues. SPs method is known as the "gold standard" for measuring the medical practice of providers and can avoid the "Hawthorne effect" [21]. In SPs method, people are recruited from local communities and extensively trained to portray/present a specific medical case consistently to multiple unsuspecting health care providers with a single-blind process [22]. Through this procedure, SPs could avoid the influence of case-mix of patients, patient characteristics, and recall bias when comparing the quality of health service from different providers.

Although several existing studies have focused on consultation length of community health service centers in urban areas [20,23–25], there is sparse and limited attention to consultation length of primary care providers in rural China. Different from European countries, Australia and the United States, there is no need to make an appointment in advance for primary health care services in China. Whether in urban or rural areas, patients often queue up to register and see a doctor on the same day [4].Township health center (THC) providers offer basic medical services to more than 564 million rural residents [26]. They are responsible for a large share of treatment for general diseases in vast rural areas and serve as health gatekeepers [27]. With the increasing demand for primary care with better outcomes, this study examines the association between consultation length and the quality of primary care to get new insights for potential policies and practices that could improve health service quality in rural China.

2. Methods

2.1. Ethics statement

Approvals for this study were obtained from the institutional review boards (IRBs) of Sichuan University, China (protocol number: K2015025) and Stanford University, USA (protocol number: 25904). Informed consent from all THCs providers was obtained verbally as part of the facility survey approximately five weeks before SP visits. All individuals who participated as SPs were trained to protect themselves from any invasive tests or procedures.

2.2. Setting and study design

This study is part of a large cross-sectional standardized patient study on quality of care in rural China [21,28]. We conducted this study in rural areas from three provinces: Anhui, Shaanxi, and Sichuan, which are located in eastern, central, and western China, respectively. The THCs included in this study were selected from one prefecture (the administrative level below the province and above the county) in each of the three provinces. The prefectures included in this study from each province were chosen for having a predominantly rural population in consultation with local authorities.

The representative sample of rural primary care in each of the three chosen prefectures was selected using the following procedure showed in Fig. 1. First, across 3 prefectures, we randomly sampled 21 of 24 rural counties. Next, 10 townships were randomly sampled within each county, and the primary THC in each sampled township was included in our study. One county only had 9 rural townships, yielding a sample of 209 of the total 311 THCs in the 21 sample counties. Finally, the primary care providers who were on duty were randomly selected as the sample on the day of the survey. During the facility and provider survey in June 2015, there were two THCs without primary care providers working that week, so 414 providers with 207 THCs were included in the sample. During the SP visit in August 2015, 206 SPs presenting angina pectoris completed the provider consultation (1 sampled provider was not on duty), and 207 SPs presenting tuberculosis completed the provider consultation.

2.3. Case selection and script development

In this study, angina and tuberculosis, two common diseases in rural areas, were selected as cases for standardized patient methods. These cases were chosen based on two reasons. First, the two diseases are common and well-represented among the population in rural China. Second, the standardized patient visits are feasible with the two diseases. Angina and tuberculosis have no obvious clinical physiological characteristics when they do not attack, and the risk of exposure to invasive procedures or tests is low. Therefore, these two diseases are convenient and safe for SPs to present. In collaboration with TB experts from China TB-CDC, the tuberculosis case in this study was adapted to the Chinese context from an earlier validation study in India [21,29]. Angina case had been tested and improved

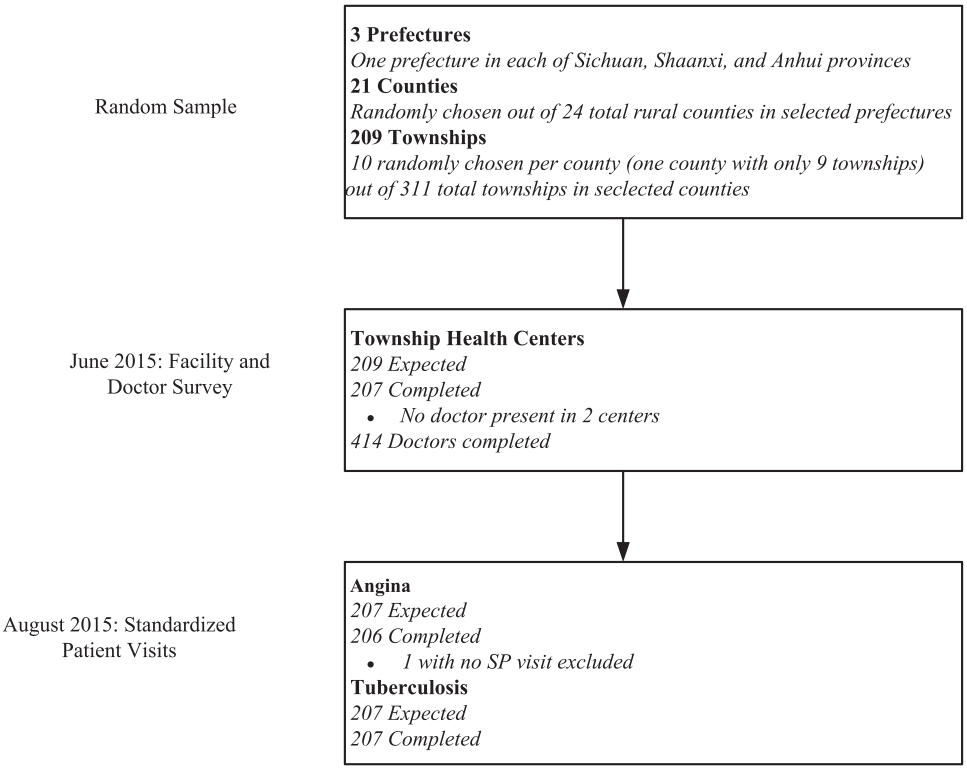

Fig. 1. Flowchart.

from a previous pilot study conducted in China [28]. Domestic medical experts were invited to revise the cases to ensure the symptoms of the two cases were consistent with the actual situation in rural China.

2.4. Data collection

We conducted two separate waves of data collection as showed in Fig. 1. An initial facility and provider survey were conducted to collect the basic information (region, age, gender, work year, education level, income, certification) of primary care providers in selected THCs in June 2015. Meanwhile, primary care providers were informed that there would be a return visit survey of standardized patients at any time in the next six months, and written informed consent was obtained. The second round of investigation – actual SP visits – started five weeks after the initial facility and provider survey in August 2015.

All SPs included in this study were recruited from the local community. Each SP was trained intensively to present a case of angina or tuberculosis consistently and covertly. The SPs were randomly assigned to facilities and visited the providers following the normal procedures for any walk-in patient. During the visit, SPs made an opening statement of the primary symptom of the disease case (chest pain for angina and fever and cough for tuberculosis) to the providers. The SPs responded to all questions by the providers following a predetermined script and purchased all medications prescribed. As soon as possible after each visit, SP completed a structured reporting form to debrief specified visit attributes. Each SP response was confirmed by an audio recording of the interaction taken using a concealed recording device.

2.5. Measurement of consultation length and the primary care quality

To ensure accurate estimates of time spent in consultation, we calculated visit time by subtracting the end time of the consultation from its start time, indicated by the SPs making an opening statement of the primary symptom of the disease case, or the provider asking, 'what's wrong with you?' or similar. The length of the consultation should the actual time provider and patient spent together for the consultation service. We divided the visit time into four durations: consultation duration, examination duration, waiting duration for medicine, and interrupt duration according to the recording of each visit. Among these four durations, the consultation duration was defined as the consultation length in this study.

We examined the primary care quality based on process quality and diagnosis quality. Process quality was assessed by grading recorded interactions according to 'clinical checklists' of recommended questions to be asked to the patient and any physical exams to be performed. These recommended condition-specific checklists were based on the checklists used in the study by Das and colleagues on quality of care in rural India [29], and revised according to national and international guidelines [30–32] and tested in a pilot study in rural Chinese context [28]. The completion rate of each checklist item, namely "% of questions and examinations", was an indicator measuring the process quality. Diagnosis quality of cases was assessed with national standards in China and International Standards [30–32].

2.6. Statistical analysis

We described the basic characters of primary care providers by calculating proportion or mean. We also calculated the proportion or mean and 95% CI of consultation length as well as the process and diagnosis quality of disease cases (angina and tuberculosis) for. We ran ordinary least squares (OLS) regressions for process quality and logistic regressions for diagnosis quality with indicator variables of each provider as additional controls to assess the association between consultation length and primary care quality. All regressions were adjusted for key covariates (age, sex, work years, medical education level, and certification) that are known to be predictive of

Table 1
Characteristics of primary care providers by two cases in rural China.

Characteristics	Angina (n = 206)		Tuberculosis (n = 207)		Total (N = 413)	
	n/Mean	%/SD	n/Mean	%/SD	n/Mean	%/SD
Region						
Yulin, Shaanxi province	78	37.86	78	37.68	156	37.77
Yibin, Sichuan province	69	33.5	70	33.82	139	33.66
Chuzhou, Anhui province	59	28.64	59	28.5	118	28.57
Sex						
Male	179	86.89	178	85.99	357	86.44
Female	27	13.11	29	14.01	56	13.56
Age (years)	42.55	10.10	44.38	10.46	43.47	10.31
Work years	20.18	10.89	21.95	11.28	21.07	11.11
Medical education level						
College or high	129	62.62	123	59.42	252	61.02
Below college	77	37.38	84	40.58	161	38.98
Monthly income (1000 Chinese Yuan)[a]	3.42	1.13	3.43	1.12	3.42	1.14
Certification						
Yes	175	84.95	175	84.54	350	84.75
No	31	15.05	32	15.46	63	15.25

Note: Data are mean (SD) for continuous variables and number (%) for dummy variables.
[a] 1$ = 6.68 CNY.

one or more primary outcomes, and robust coefficients was obtained by adjusting for clustering at the city level. We report coefficients (β) with accompanying 95% CI in OLS regressions and odds ratio (OR) with accompanying 95% CI in logistic regressions. We converted the OR value into a marginal effect value. We conducted statistical analyses using Stata version 14.2 (Stata Corporation, College Station, TX, USA) and considered p values less than 0.05 to be statistically significant.

3. Results

3.1. Basic information of the primary care providers

A total of 413 providers from THCs were included in this study (Table 1). There were 357 (86.44%) male providers and 56 (13.56%) female providers. The average age was 43.47 years, and the average working year was 21.07 years; 252 (61.02%) providers had college degrees or above whereas 161(38.98%) providers had no college education. The average monthly salary was about 3420 yuan (approximately $501.47) and 255 (61.74%) were licensed primary care providers.

3.2. Consultation length and primary care quality

For SPs with angina, the average consultation length was approximately 4.3 min. The completion rate of recommended questions and examinations was 25.08%, and only 23.79% of the providers gave the correct diagnosis. For SPs with tuberculosis, the average consultation length was 6.28 min. The average percentage of providers who completed the recommended consultation and examination was 19.03%, and only 15.46% of providers gave correct diagnosis (Table 2).

Table 2
Consultation length and primary care quality of primary care providers in rural China.

Variables	Angina (n = 206)		Tuberculosis (n = 207)	
	Mean	95%CI	Mean	95%CI
Consultation length (minutes)	4.33	3.79–4.87	6.28	5.58–6.97
Process quality[#]				
% of questions and examinations	25.08	23.42–26.74	19.03	17.94–20.12
Diagnosis quality[#]				
Correct diagnosis	23.79	12.92–29.65	15.46	10.49–20.42

Note: [#] Process quality and Diagnosis quality was compared to national standards in China and the International Standards

3.3. The relationship between consultation length and primary care quality

Fig. 2 shows the non-parametric relationship between consultation length and the process quality in the two cases. These were estimated using local polynomial regressions with a bandwidth of 5 and were not adjusted for additional characteristics. At 0–10 min, the percentage of recommended questions and examinations provider completed slowly increased with increased consultation length; at 10–20 min, the percentage of recommended items increased rapidly with the increase of consultation length; after 20 min, the growth trend was stabilized or not increased.

Fig. 3 shows the relationship between consultation length and primary care quality for angina and TB after controlling the characteristics of the healthcare. The results showed that providers who spent more time with patients were significantly more likely to complete higher percentage of recommended checklist items for both questions and examinations in angina (β = 1.39, 95%CI 1.01–1.78) and tuberculosis (β = 0.89, 95%CI 0.69–1.08). Providers who took longer consultation time with patients were more likely to diagnose the disease correctly in both angina (marginal effect =

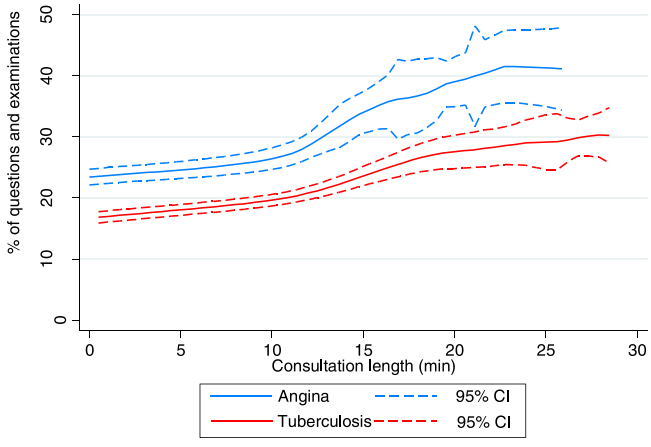

Fig. 2. Association between consultation length and the process quality (percentage of question and examination completed).

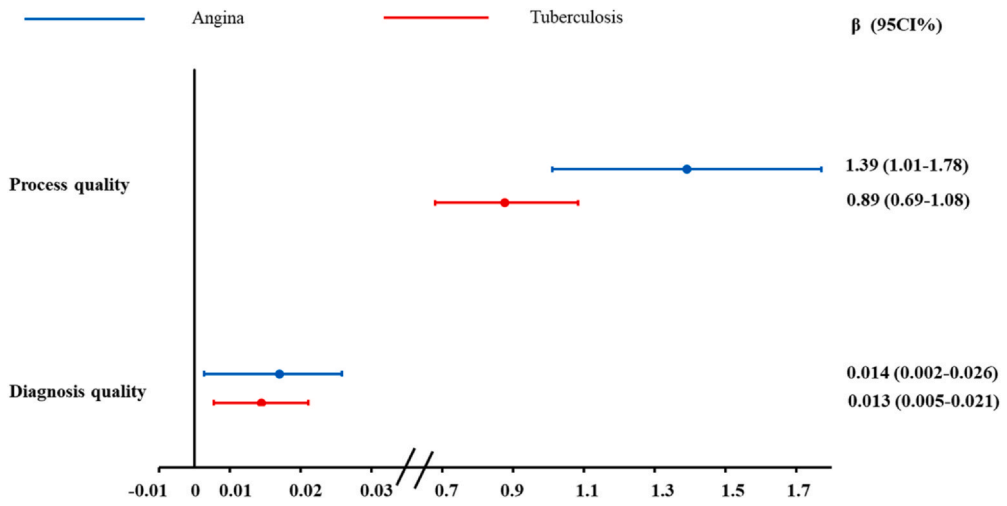

Fig. 3. Relationship between consultation length and the primary care quality. Note: 95% CIs are clustered at the city level. All regressions were adjusted for age, sex, work years, medical education level, and certification.

0.014, 95%CI 0.002–0.026) and tuberculosis (marginal effect = 0.013, 95%CI 0.005–0.021) cases.

4. Discussion and conclusion

4.1. Discussion

Our study used SPs to evaluate consultation length and quality of primary care among healthcare providers in rural China. In this paper, we present two main findings. First, the consultation length of rural primary care providers was around 4–6 min. Second, we found that the length of consultations had a positive impact on the process and diagnosis quality of primary care.

The consultation length of the two cases was only 4.33 min and 6.28 min, which is far less than 15 min as advocated by the World Health Organization [1]. Although consultation length we found was longer than that in community health service center in Beijing (median consultation length around 2 min) [23], it coincided with the average consultation length of 6.37 min in community health service centers in eastern, central, and western China [15] and it was much shorter than the average consultation length in community health service centers in Tianjin(12.8 min), Lanzhou (18.2 min) and Luoyang (8.1 min) in China [25]. After the reform of China's medical system in 2009, as public health services are incorporated into clinical services, primary care providers have assumed more responsibilities [33]. The expanded role of primary care doctors means that they have been not only involved in the provision of public health services (personal preventive services and population health interventions), but also in the provision of clinical services (diagnosis and treatment) [34]. In this case, THC providers are facing more and more workload in providing clinical services and new public health services. A study shows that 47.11% of primary doctors have more than 30 outpatient visits per day. This may be the main reason why the consultation length very short in the rural hospitals in China [35]. Furthermore, the consultation length found in our study was also much shorter than that of many other countries [36,37]. Several countries have made clear requirements for consultation length. For instance, the British Royal Society of Medicine requires the consultation service to be 15 min long, even though the current average consultation time in UK is only about 11 min [5]; Egypt requires the consultation time for primary care services to be 30 min [6]. However, till now, China currently has no official requirement on the length of consultation.

Our study also found a significant association between consultation length and process and diagnosis quality among rural primary care providers. In both case scenarios, providers who spent more time with patients were significantly more likely to complete more checklist items of recommended questions and examinations, which is consistent with existing literature [38]. A comprehensive review of 13 studies showed that the length of consultation determines how much information the provider knows about the patient, and it is essential for correct diagnosis and treatment [14]. Providers with longer consultation times are more likely to find health problems and thus provide higher quality primary care [39]. More interestingly, we found the percentage of recommended items increased rapidly with the increase in consultation length at 10–20 min. Besides, the quality of diagnosis was also positively impacted by consultation length in our study, which is consistent with previous study showing that providers who consulted longer time with patients were more likely to give a correct diagnosis[40]. A prospective study in France showed 10% of psychological diagnosis was found in consultations lasted for less than 15 min, and 48% was found in consultations lasted for more than 20 min [41]. Our study presents very good reasons to increase consultation length based on process and diagnosis quality, and it does seem likely that longer consultation times will improve things like provider-patient interaction and patient satisfaction - as well as treatment success, recognition of multimorbity, mental health diagnosis, etc. Therefore, findings of our study underscore the importance and urgency of establishing health policy on affordable and reliable consultation length to ensure adequate interaction between patients and providers. Besides, trainings, which are the proven technique for effective behavior change communication, can lead to better consultation outcomes if continuous in-service trainings are provided to primary care providers on effective health communication with patients.

Our study contributes to the knowledge on consultation length in township health clinics in China and its role in accurately diagnosing disease symptoms. To the best of our knowledge, this study is the first large cross-sectional study using unannounced SPs to investigate consultation length among primary care providers in rural China. Moreover, this study adds to the literature by providing direct measures of consultation length and medical quality in a representative sample of providers. This study has several limitations. First, the study considers two diseases with firmly established checklists, while the diagnostic process is much less clear for most other diseases. Second, the diagnostic process fails in a very substantial portion of cases where patients present with new

symptoms, and findings on process and diagnosis for two very crisply defined diseases will not tell us anything about primary care success in cases where symptoms remain unexplained. Third, although SPs were given intensive training aimed at standardizing their presentation of the disease case, there may still be variations across SPs. We tried to reduce the impact of the variations among SPs by randomly assigning them to providers. Fourth, the quality of communication is an important factor of the outcome of a consultation, but there are some problems in measuring the quality of communication through the SPs method. Because each SP visited multiple providers, they would form a stereotype after several visits, which leads to a high individual difference in the evaluation of communication quality (such as provider-patient interaction and patient satisfaction). In future studies, we will consider interviewing real patients to collect other elements in the interaction between primary care providers and patients.

4.2. Conclusions

In summary, this study found that the average consultation length was extremely short among primary care providers in rural China. Results showed that the length of consultation had a positive impact on the quality of primary care.

4.3. Practical implications

The results have potential implications for medical practice. We suggest increasing consultation length in rural primary health systems to improve quality of primary care. China government should implement healthcare reforms to clarify the requirements for affordable and reliable consultation length in medical care services. Trainings for primary care providers on effective health communication with patients in prolonged consultation time can lead to better consultation outcomes. **T**hese findings can also be extended to other developing countries.

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CRediT authorship contribution statement

Qingzhi Wang: Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Sasmita Poudel Adhikari:** Formal analysis, Writing – original draft, Writing – review & editing. **Yuju Wu:** Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Thankam S. Sunil:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Yuping Mao:** Writing – original draft, Writing – review & editing. **Ruixue Yea**. **Chang Suna**. **Yaojiang Shi:** Conceptualization, Funding acquisition. **Chengchao Zhou:** Funding acquisition, Methodology. **Sean Sylvia:** Conceptualization, Funding acquisition, Methodology. **Scott Rozelle:** Conceptualization, Funding acquisition. **Huan Zhou:** Conceptualization, Funding acquisition, Methodology, Writing – original draft, Writing – review & editing.

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Conflict of Interest

The authors declare no conflict of interest.

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