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Guideline use behaviors and needs of primary care practitioners in China: a cross-sectional survey

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4 **Guideline use behaviors and needs of primary care practitioners in China: a cross-sectional**
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6 **survey**
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Abstract

Objectives Clinical guidelines are known as an effective way to improve health performance.

However, little is known about general practitioners' attitudes to and behavior concerning clinical guidelines in China. The aim of this study is to investigate use behaviors and needs of clinical guideline in primary care of China.

Methods We conducted a cross-sectional survey among 268 institutions in 15 provinces of China from December 2015 to May 2016. The questionnaire was developed by literature review and experts consultation method. On-site survey was performed by paper questionnaires to minimize response missing. Multivariate logistic regression was used to identify factors associated with the knowledge of and attitude towards clinical guidelines.

Results Among respondents, 91.7%(1568/1708) knew clinical guidelines but only 11.3%(177/1568) frequently use them. The main access to guidelines for primary care practitioners was public search engines (63.4%;911/1438) instead of biomedical database and the major barriers for primary care practitioners to use guidelines included lack of training (49.9%;778/1560), access (44.6%;696/1560) and awareness (38.0%;592/1560). Only less than ¼ of respondents considered current guidelines were 'entirely appropriate' for primary care setting(23.5%;339/1442). Most participants(96.2%;1509/1568) admitted the necessity of developing clinical guidelines for primary care. The attitude towards current guideline was associated with institutions' location, level, and professional title (P<0.05).

Conclusion

Our survey reveals poor knowledge and use of clinical guidelines in primary care as well as the gap between the needs and current status of clinical guidelines for primary care in China.

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4 In addition, lack of access to and training of guidelines also prevent primary healthcare
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6 practitioners from using guidelines in their daily practice.
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10 11 **Strengths and limitations of this study**

- 14 ● This study is the first survey of behavior, attitude and needs regarding clinical guidelines
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16 in primary care of China.
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- 18 ● Our findings shed light on the poor knowledge and use of clinical guidelines in primary
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20 care as well as the gap between the needs and the current status of limited guidelines
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22 for primary care in China.
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- 24 ● Randomized selection of institutions and practitioners did not perform for sampling.
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31 **Keywords**

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34 Primary care; Guideline; Cross-sectional survey
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Introduction

Primary care is the cornerstone of essential health care and public health service in China, which accounts for 96% of all health care institutions and 60% of all visits according to China Health Statistics Yearbook.¹ The effective primary care is associated with improved access to health care services, reduced hospitalizations and enhanced equity.²⁻⁴ However, the performance of primary care was poor plagued by low health human resource capacity, especially in rural areas of China.^{5,6} In the face of the gap between the capacity and the needs of primary care, the State Council emphasized the improvement of primary health care quality as a substantial part of China's New Health Reform.⁷ In August 2016, President Xi claims "The all-round moderately prosperous society could not be achieved without people's all-round health" at a national meeting on health, boosted the high quality universal medical services coverage issue to a height of national strategy.

Clinical guidelines defined by the Institute of Medicine as "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances" are known as an effective way to improve health performance when a institution has the goods and staff to be able to achieve it.⁸⁻¹⁰ However, in China little is known about general practitioners' attitudes to and behavior concerning clinical guidelines. More importantly, since the governance, health resources and staff of primary care are different from that of secondary and tertiary hospitals, whether current guidelines are suitable for primary care need to be studied.

Methods

Between December 2015 and May 2016, we used a cross-sectional survey of primary care practitioners' attitude and behavior regarding clinical guidelines in China. We defined our respondents as practitioners from county hospitals and grass-root institutions including community health centers, health centers in villages and towns, and clinics¹¹.

Survey sites and sampling

We did not use random sampling to select practitioners because national registers were unavailable. To obtain a representative sample, we respectively selected five provinces from Eastern(Beijing, Guangdong, Fujian, Shandong, Zhejiang), Middle(Heilongjiang, Hubei, Hunan, Jilin, Shanxi) and Western China(Sichuan, Shanxi, Yunnan, Xinjiang and Xizang) that represent the regional level of population density, economic development and medical service in each area. In each selected province, we contacted one to three tertiary hospitals through International Network for Rational Use of Drugs, China(INRUD, China). Each tertiary hospital performed the survey in five county hospitals and five grass-root institutions within the provinces. The number of institutions we surveyed is 3% of all primary care institutions(912,620) in China. In each county hospital, three doctors, three nurses, three administrative staffs and three practitioners from auxiliary departments including pharmacy, laboratory, radiology and ultrasound department were randomly selected to fill the questionnaire. In each grass-root institutions, two to five health practitioners were randomly selected to answer the survey according to the total number of practitioners and without limitation on specialty.

Survey tool

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4 The questionnaire developed by literature review and experts consultation was revised on
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6 the basis of feedback from a pre-test in two primary care institutions from Sichuan and
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8 Xizang provinces.⁹ The questionnaire consisted of sections on: (1) the demographic
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10 characteristics of primary care practitioners; (2) primary care practitioners' knowledge and
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12 behavior regarding clinical guidelines; and (3) primary care practitioners' attitudes towards
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14 primary care edition of clinical guidelines(Appendix 1). The knowledge of clinical guidelines
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16 was divided into three levels: completely know, partially know and do not know. If the
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18 general practitioner answered he or she did not know what clinical guideline was or never
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20 used clinical guidelines, the survey was stopped in the second section. Multiple-choice
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22 questions asked respondents to describe the frequency, sources, preferred types of and
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24 barriers to guidelines. The degree of how current guidelines fit for primary care was divided
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26 into 4 levels: entirely applicable, partially applicable, inapplicable, and do not know. If the
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28 general practitioner answered he or she did not think it was necessary to develop clinical
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30 guidelines specially for primary care, the survey was stopped in the third section. The
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32 characteristics of institutions were also investigated by unified form(Appendix2).The
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34 language of the survey was in Chinese.

43 **Survey procedures**

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45 To help minimize methodology bias across provinces, the same questionnaire and consistent
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47 framework of survey was used to ensure overall comparability of results.¹²⁻¹⁴ All investigators
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49 were trained by the chief investigator(Linan Zeng) and were sent to primary care institutions
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51 to perform on-site survey using paper questionnaires to minimize response missing. The
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53 surveys were carried out anonymously.
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Ethical review

Ethical approve was obtained from Ethics Committee of West China Second University Hospital on May 2015. Written informed consent was deemed not to be necessary, since the study only investigates practitioners' attitudes to and behavior concerning clinical guideline and data were collected anonymously.

Statistical analysis

Data were entered in a Microsoft Excel designed for this study and data entry was audited by randomly selecting 10% electronic questionnaires for comparison with hard copies. Questionnaires with missing data were included in the analysis, but the missing answers were excluded from the calculations.

We used simple descriptive statistics to summarize the data from the survey. Categorical variables were expressed by proportions and their significance was assessed by Wilcoxon rank sum test or Kruskal Wallis rank sum test when appropriate. Continuous variables were expressed by means and standard deviations (SD) or medium and interquartile range. We used binary logistic regression to identify factors associated with the knowledge of and attitude towards clinical guidelines, after combined the dependent variables into two categories. The explanatory variables used in the multivariate logistic regression were level and region of institutions, professional title, profession and education background of practitioners. Statistical analyses were performed using the software SPSS 16.0(SPSS Inc., Chicago, USA) and 95% confidence interval was calculated. A two-sided P-value of ≤ 0.05

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4 was considered as significant.
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8 9 **Results**

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11 At 268 institutions studied, 1308 and 620 health practitioners from county hospitals and
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13 grass-root institutions were enrolled in the survey, respectively. Of these, 1708 completed
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15 the questionnaire, with a response rate of 88.6%. The major reason for non-response was on
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17 other duties(eg. see patient). The questionnaire was mainly completed during face to face
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19 survey (84.0%;1433/1708) except few rural areas, in which email or telephone survey was
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21 used.
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25 57.8%(155/268) institutions provided information of institution characteristics (Table 1). The
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27 median of service radius was 10 kilometers, with around 70,000 patients covered. Majority
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29 of Physicians and nurses who were the main components of primary care were college
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31 graduates with a primary or intermediate professional title. As for techniques and facilities,
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33 most of institutions were equipped with blood routine, hepatic and renal function
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35 examinations, etc. However, techniques like bacterial culture, therapeutic drug monitoring,
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37 and magnetic resonance imaging(MRI) were still not universally utilized in grass-root level.
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39 Staffing, medical services, techniques and facilities were similar among different regions.
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46 Of the 1708 respondents, most have bachelor's or lower degree (97.5%;1665/1708) and
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48 immediate or lower professional title (81.9%;1399/1708), which is consistent with the overall
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50 staffing situation of primary care institutions. More than one third of respondents(35.6%)
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52 were physicians, while the other 20% each were nurses, practitioners from auxiliary
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54 departments, and administrative personnel, which is accorded with the professional
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4 distribution of guideline users in China (Table 2).¹⁵
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8 **Knowledge of clinical guidelines**

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10 Majority of health care providers 'completely' or 'partially' knew what clinical guidelines
11 were(91.7%;1568/1708).142 (8.3%) providers saying they knew nothing about guidelines,
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13 71.1% (101/142) of which were with primary or no professional title(Table 3). Practitioners
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15 with higher professional title knew guidelines better(K-W H=195.102,P<0.001). Similarly,
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17 there was also a positive correlation between education level and awareness of guidelines
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19 (K-W H=97.125, P<0.001). Among all the professions, practitioners from auxiliary
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21 departments had the highest rate of being 'completely understanding' guidelines
22
23 (50.3%;186/370), while physicians fell into the highest end of being 'totally not aware of
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25 guidelines', which indicated the insufficient understanding and use of clinical guidelines
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27 within physicians in primary care settings(10.0%;61/610) (K-W H=19.041; P<0.001).
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39 **Behaviors regarding clinical guidelines**

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41 Within those 1588 practitioners who knew guidelines, only 11.3%(177/1568) frequently use
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43 and most just occasionally use them(45.2%;709/1568). Moreover, 8.0% (126/1568)
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45 practitioners never use even they were aware of clinical guidelines. The main access to
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47 guidelines for primary care practitioners were: public search engines (63.4%;911/1438),
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49 medical websites(48.5%;697/1438) and institutions distribution(40.0%;575/1438), instead of
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51 biomedical databases. Moreover, 3.6%(52/1438) even had no idea of how to get guidelines.
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4 primary care practitioners in China (72.1%;1024/1420) (Table 4).¹⁶

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6 The three main barriers for practitioners to use guidelines were lack of
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8 training(49.9%;778/1560), lack of access(44.6%;696/1560) and lack of
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10 awareness(38.0%;592/1560). In addition, limitations of guideline itself including delayed
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12 updating(35.8%;559/1560), redundant format(33.7%;525/1560), not practical for primary
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14 care institutions(30.6%;477/1560) and language barrier concerned with English
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16 guidelines(16.2%,252/1560) also prevent primary care practitioners from using
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18 guidelines(Table 4).
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27 **Attitude towards current clinical guideline**

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29 Only less than ¼ of respondents considered current guidelines were 'entirely applicable' to
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31 be used in the primary care (23.5%;339/1442). Instead, the majority (71.4%;1030/1442)
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33 believed they were 'partially applicable'. The degree of how current guidelines fit for primary
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35 care was similar between different participants' professions, professional titles, and
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37 education levels(Table 5, Supplementary table) (K -W H=4.982,P=0.173 ; K -W
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39 H=3.228,P=0.199; K -W H=0.460,P=0.795, respectively).
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47 **Attitude towards and needs of clinical guideline for primary care institutions**

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49 Most participants(96.2%;1509/1568) admitted the necessity of developing clinical guidelines
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51 for primary care institutions, which was agreed with practitioners from different professions,
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53 professional titles and education levels(K-W H=1.308,P=0.727; K-W H=0.542,P=0.763;K-W
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55 H=0.329,P=0.848,respectively). 10 respondents of those 39 who chose 'unnecessary'
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4 expressed their reasons: (1) Primary care practitioners should use the same guidelines as
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6 other practitioners to keep up with knowledge updating; (2) Lack of access wouldn't be
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8 overcome by simply developing new guidelines; (3) No time to read guidelines. Among 20
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10 respondents who 'do not care' about primary care guideline development, five explained
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12 their reasons: (1) They did not use guideline in daily work; (2) Clinical guidelines were too
13
14 specific for primary care practitioners who usually deal with general diseases. (Table 5,
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16 Supplementary table)
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21 As for preferred clinical guidelines, more than half of the participants tended to use
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23 full-versioned guidelines (56.5%; 874/1546), while 15.2% accepted both full and summary
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25 version. As for language, most practitioners preferred Chinese (96.8%; 1496/1546). More
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27 than half of practitioners believed hard copy of guidelines would be more appropriate in
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29 primary care (51.5%; 797/1546), while 35.8% (53/1546) embraced both paper and electronic
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31 version. As for contents, requirements for specialized and general guidelines were almost
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33 equal (58.0% and 42.0% respectively). Health care providers at county level (33.4%; 329/986)
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35 had higher needs for specialized guidelines than grass-root level (45.0%; 252/560) with
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37 significant difference ($Z=-4.538; P<0.001$). The top three preferred access to guidelines were
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39 public search engine (45.6%; 703/1541), periodical distribution (43.4%; 669/1541) and
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41 medical websites (42.6%; 657/1541), which is coherent to practitioners' habit of guideline
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43 searching. 91.1% (1409/154) of participants welcomed training for guidelines in primary care
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56 **Multivariate logistic regression**

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4 The knowledge of clinical guideline was positively associated with education level and
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6 professional title ($P<0.001$) and related to profession as well as geographic areas. Compared
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8 to administrative staffs, a lower rate of 'completely know' guidelines was found in physicians
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10 and nursing practitioners ($OR=0.636, P=0.004; OR=0.614, P=0.001$). The rate of 'completely
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12 know' guidelines was proven to be lower in Middle China compared with Western China
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14 ($OR=0.648, P<0.001$).

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18 The attitude towards the current guideline was associated with institutions' location, level,
19
20 and professional title of its practitioners. The voice represented that the guideline was 'not
21
22 entirely appropriate' was louder in western areas than in middle areas ($OR=0.399, P=0.017$).
23
24 Grass-root settings had a greater rate believing that the guideline was 'not entirely
25
26 appropriate' than county level hospitals ($OR=1.315, P=0.045$). Larger ratio of participants with
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28 intermediate and senior title believed 'not entirely appropriate' compared with those with
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30 primary title ($OR=0.356, P=0.031; OR=1.602, P=0.009$) (Table 6, Supplementary table).
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39 Discussion

40 Findings of this survey

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42 This study is the first survey of behavior, attitude and needs regarding clinical guidelines in
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44 primary care of China. Our data suggests that primary care staffs lack of knowledge about
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46 clinical guidelines. Among those completely blind to clinical guidelines, 4.2% even have a
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48 senior title. 10% clinical physicians do not know clinical guidelines, the percentage of which
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50 is even higher than medical technicians, nursing and administrative staffs. Use of clinical
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52 guidelines is not common in primary care institutions. 8.0 % medical staffs have never used
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4 guidelines. Most primary care staffs are not used to acquire guidelines through professional
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6 biomedical database (63.4%). The knowledge and use of guidelines improves with higher
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8 education background or professional post. The main reasons contribute to the obstacles in
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10 guideline use including: limitations of guidelines themselves, insufficient access and training
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12 of guidelines, limited knowledge of medical staffs, and inadequate awareness of using
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14 guidelines. Despite the insufficient knowledge and use of guidelines in primary care, 98.5 %
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16 medical staffs still believe clinical guidelines are needed in primary care institutions. Nearly
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18 all practitioners expressed a desire to learn or improve their guideline-based practice
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20 skills(91.1%), which indicates the need of clinical guidelines development for primary care
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22 institutions in China. Most primary care practitioners agree to the development of clinical
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24 guidelines for primary care (96.2 %) and supporting training of guidelines (91.1 %).
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34 **Comparison with similar studies**

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36 A survey of knowledge and attitude regarding clinical guidelines of primary practitioners in
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38 Gansu province of China showed 80% of respondents(114/143) knew guidelines but only 51%
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40 used guidelines in their daily practice. 37% considered that lack of access to guidelines is the
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42 major barriers to the use of guidelines(53/143) and 88% said they need the training of
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44 guidelines(126/143).The result is consistent with ours.¹⁷ Similarly, a cross-sectional survey in
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46 western Sweden showed 96% primary care of practitioners considered guidelines important
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48 but only one third reported being aware of guidelines and the barriers included lack of time,
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50 poor availability and limited access to guidelines. A study in Germany showed because of the
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52 difference in health resources and medical staff conditions between primary care and
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4 tertiary hospitals, deficits exist among pneumologists and primary care practitioners with
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6 respect to diagnosis and treatment of COPD and practical implementation of educational
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8 measures despite the popularity of COPD guidelines.¹⁸ As a result, the lack of specialized
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10 guideline for primary care is not a problem in China but worldwide.¹⁹ And to our knowledge,
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12 this is the first survey in China to investigate the needs of primary care practitioners for
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14 clinical guidelines.
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21 **Characteristics of Chinese primary care and status of primary care clinical guidelines in** 22 **China**

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25 The major responsibility of Chinese primary care institutions is to provide prevention,
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27 diagnosis, treatment for common diseases, and public health service including health
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29 education and consulting, chronic diseases management and rehabilitation service. China
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31 launched medical reforms in 2009, with strengthening the primary health care system.²⁰
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33 However, despite several years of primary care reform, current performance of primary care
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35 in China remains poor.⁶ In addition, regional divergence exists in medical service ability, the
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37 quality of primary health care in Western China remains weaker than that of Eastern and
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39 Middle China.²¹
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47 Clinical guideline is an important way to improve medical services quality and it can promote
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49 health service fairness.^{8,22} However, the lack of appropriate clinical guidelines for primary
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51 care seriously impacts the essential medical care quality in China. Among five most common
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53 chronic diseases in China (hypertension, diabetes, cancer, stroke, and chronic obstructive
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55 pulmonary disease), primary care specialized guidelines are only available to hypertension
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4 and diabetes).^{23,24} Moreover, the quality assessment of current primary care specialized
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6 guidelines showed though more readable than normal guidelines, but many problems
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8 existed in quality, including: poor preciseness, absent of external experts review, lack of
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10 primary care staffs participation.¹⁶ On the contrary, some studies proved that guideline which
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12 is more suitable for primary care improved the health outcomes and strengthened the health
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14 system.^{25,26}
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21 **Strengths and limitations**

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23 We did not randomized select institutions s and practitioners because the national registers
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25 of primary care institutions and health practitioners were not available. However, we
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27 balanced the number of selected institutions among provinces and covered all levels and
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29 main professions in primary care. In addition, the questionnaires were distributed and filled
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31 almost by face to face survey, except a few rural areas. Therefore, the data can be considered
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33 to be representative. Nevertheless, for questions that respondents may feel have a “correct”
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35 response, a bias may come from respondents giving the answer they feel is “expected”.
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37 Moreover, in this closed question quantitative, the researcher could not probe into
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39 respondents’ answers to explore levels of understanding and intent. Although this survey can
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41 provide a snapshot of the situation, additional qualitative research is necessary for a more
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43 comprehensive understanding of the needs of clinical guidelines in primary care in China.
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51 **Conclusion**

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56 Our findings shed light on the poor knowledge and use of clinical guidelines in primary care
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4 as well as the gap between the needs and the current status of limited guidelines for primary
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6 care in China. In addition, lack of access to and training of guidelines also prevent primary
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8 healthcare workers from using guidelines in their daily practice.
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41 42 43 44 **Data sharing statement**

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46 No additional data are available
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49 50 51 **Reference** 52 53 54 55 56 57 58 59 60

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For peer review only

Table 1 Characteristics of 155 primary care institutions selected for clinical guideline survey, China,2016

	Total (N=155)	Institutional Level			Geographic Areas	
		County level(n=66)	Grass root level(n=89)	East(n=39)	Middle(n=50)	West(n=66)
Staffing^a						
Profession						
Physician(No.)	29(10,116)	136(69.25,232 .75)	12(5,24)	29(9,152)	30(10,176.75)	30.5(10.75,95.75)
Nurse(No.)	31(10,167)	211.50(78.75, 372.25)	12(4,25.50)	37(9,203)	26(12,262.75)	33.5(7,140.25)
Practitioners from Auxiliary	15(4,43)	59.50(30.75,9 6)	6(2,10.50)	15(6,61)	10.5(3,68)	15(4.75,34)

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Departments(No.)						
Administrative	4(1,23)	25(10,42.25)	2(0,4)	4(1,25)	4.5(1,25.25)	4(1,22)
Staff (No.)						
Others(No.)	8(1,30)	47(9.75,82.50)	3(0,9)	9(1,47)	9(2,58.50)	7.5(1,18.50)
Education						
Background						
Master(No.)	0(0,3)	2(0,10)	0(0,1)	3(1,12)	0(0,3)	0(0,1)
Bachelor(No.)	21(4,104)		7(2,17)	42(8,152)	14(4,236)	17(4,77.50)
		143.50(46,305				
		.25)				
College	35(7,162)		12(5,31)	23(5,170)	33.5(8.75,233.75)	37.5(2.75,140.50)
Graduate(No.)		199.50(105.75				
		,310)				

High school and below(No.)	22(5,82)	89.50(39.50,1737.50)	8(2,19.50)	9(0,100)	29(11,91)	21.50(7.25,73.50)
Professional Title						
Senior(No.)	5(1,28)	31(12,71.75)	1(0,4)	9(1,35)	5(1,46.25)	3.50(0,20.25)
Intermediate(No.)	26(5,100)	109(47.50,217.75)	8(2,23)	32(8,121)	25.5(5,173)	21.50(4.75,63)
Primary(No.)	43(16,144)	191(88.25,361)	20(5,40)	45(10,142)	46(16.75,234.50)	40(16,101.75)
None(No.)	9(1,46)	53.5(27.75,145.75)	3(0,9)	3(0,45)	7(3,83)	19(2,46.50)
Length of Services						
<5 years(No.)	19(4,105)	140.50(39.50,361)	6(2,18)	37(4,130)	11(4,162)	20.5(4.75,62)

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		179)				
5-10 years(No.)	21(4,73)	97.50(39.75,179)	8(2,15)	25(3,76)	15(3.75,114.75)	21.5(6,53.25)
10-15 years(No.)	13(3,50)	65.50(27.50,179)	4(2,10)	9(2,50)	11.50(4,71.75)	15(3,44.75)
≥15 years(No.)	24(4,81)	100.50(40.75,245.50)	8(2,26)	14(0,70)	49.50(6.50,136)	18.50(7.75,65.50)
Medical Services ^a						
Radius/(km)	10(3,30)	34.50(13.75,52.50)	4(2,12)	3(1.40,10)	15(6.75,40.50)	15.05(3.12,4.90)
Population	7(2.45,33)	45(17.72,52.5)	3.40(1.65,7.25)	6(0.55,33)	7.25(2.58,45.75)	6.90(2.93,31.45)
Covered/(10 thousand)		0))			

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Beds/(No.)	68(5,350)	397(203.75,82 2.25)	11(0,52)	0(0,500)	87.5(20,657.50)	70(17.50,277.50)
Annually Patient	57670(138	180812.50(10	23876(6643,6	146000(1200	47421.50(13023.	48446
Visits/(visits/year)	00,194372)	5000,332500)	3892)	0,230000)	75,27470.50)	(13873.50,14175)
Annually	1823(0,127		75(0,1175)	0(0,17535)		1550
Discharges	50)	16000(6726,3			3075.5(369.50,27	(112.75,11075)
/(discharges/year)		0244.25)			470.50)	
Physicians' Daily	16.30(6.50,	17.60(6.07,35.	16(6.90,30.50)	25(5.5,60)	15(5.84,25.75)	16.35(7,30)
Burden of Patient	31)	30)				
Visits per Capital						
(visits/day)						

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Physicians' Daily	3(0,7)	5(3,8)	2(0,5.55)	0(0,2.32)	5(2,8)	3.5(1,7.25)
Burden of Inpatient Beds per Capital (beds/day)						
Nursing Staff's Daily Burden of Inpatient Beds per Capital (beds/day)	3(0,6)	3.89(2,6)	2(0,5)	0(0,2.30)	3.2(2,7.73)	3(1.10,6)
Equipment and Technology						
Total Value of Institutional Equipment \geq 10000(10000RMB)	200(28,200)	2871.31(437.5)	50(5,200)	72(0,2852.62)	200(43.50,3301.5)	206.50(41.60,172)

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10-50	12(2,96)	113(20,255.5)	3(0.50,13)	2(0,120)	14.5(3,72.25)	15(2.75,85.50)	
thousand(piece)							
50-100	4(1,22)	25(6.75,63)	1(0,4)	1(0,42)	3.5(1,19)	4.5(0.75,15.25)	
thousand(piece)							
100-500	3(0,30)	34(5,81)	1(0,3)	2(0,52)	3(1,34.75)	3(0.75,13.50)	
thousand(piece)							
≥ 500	1(0,8)	10(2,28.25)	0(0,1)	0(0,12)	1(0,7.50)	0.5(0,5)	
thousand(piece)							
Lab Techniques							
Routine	blood	140(90.3)	66(100.0)	74(83.1)	36(92.3)	48(96.0)	56(84.8)
Test n (%)							
Hepatic	Function	133(85.8)	65(98.5)	68(76.4)	31(79.5)	47(94.0)	55(83.3)
n(%)							

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Renal Function	131(84.5)	65(98.5)	66(74.2)	29(74.4)	47(94.0)	55(83.3)
n(%)						
Stool & Urine Test	132(85.2)	65(98.5)	67(75.3)	31(79.5)	45(90.0)	56(84.8)
n(%)						
Bacterial Culture	68(43.9)	55(83.3)	13(14.6)	17(43.6)	23(46.0)	28(42.4)
n(%)						
Blood Concentration	15(9.7)	13(19.7)	2(2.2)	4(10.3)	6(12.0)	5(7.6)
Monitoring n(%)						
Ultrasonic Techniques						
Black-White	116(74.8)	56(84.8)	60(67.4)	23(59.0)	45(90.0)	48(72.7)
Ultrasonic B						

scanner n(%)							
Colored Ultrasonic	111(71.6)	66(100.0)	45(50.6)	30(76.9)	34(68.0)	47(71.2)	
B scanner n(%)							
Radioactive							
Techniques							
Plain Film n(%)	121(78.1)	65(98.5)	56(62.9)	30(76.9)	43(86.0)	48(72.7)	
CT n(%)	63(40.6)	55(83.3)	8(9.0)	16(41.0)	20(40.0)	27(40.9)	
MRI n(%)	39(25.2)	38(57.6)	1(1.1)	14(35.9)	15(30.0)	10(15.2)	
Angiography n(%)	28(18.1)	27(40.9)	1(1.1)	10(25.6)	11(22.0)	7(10.6)	

Notes: a. Median and interquartile. b. Auxiliary departments include pharmacy, lab, radiation, and ultrasonic.

Table 2 Professional and demographic characteristics of 1078 health practitioners participating in clinical guideline survey, China, 2016

Characteristics	No.(%)					
	Total(N=1708)	Institutional level		Geographic area		
		County level(n=1088)	Grass-root level(n=620)	East(n=350)	Middle(n=536)	West(n=822)
Education						
Master, Doctor	43(2.5)	25(2.3)	18(2.9)	15(4.3)	15(2.8)	13(1.6)
Bachelor	958(56.1)	682(62.7)	276(44.5)	214(61.1)	302(56.3)	442(53.8)
College and below	707(41.4)	381(35.0)	326(52.6)	121(34.6)	219(40.9)	367(44.6)
Professional Title						
Senior	309(18.1)	252(23.2)	57(9.2)	63(18.0)	101(18.8)	145(17.6)

Intermediate	613(35.9)	402(36.9)	211(34.0)	119(34.0)	203(37.9)	291(35.4)
Primary and Below	786(46.0)	434(39.9)	352(56.8)	168(48.0)	232(43.4)	386(47.0)
Profession						
Physician	610(35.7)	315(29.0)	295(47.6)	121(34.6)	173(32.3)	315(38.4)
Nurse	411(24.1)	263(24.2)	148(23.9)	90(25.7)	131(24.4)	190(23.1)
Practitioners from auxiliary department ^a	370(21.7)	262(24.1)	108(17.4)	82(23.4)	116(21.6)	172(20.9)
Administrative Staff	317(18.6)	248(22.8)	69(11.1)	57(16.3)	116(21.86)	144(17.5)

Note: a. Auxiliary departments include pharmacy, lab, radiation, and ultrasonic.

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Table 3 Knowledge of clinical guidelines of 1078 health practitioners, China, 2016

Knowledge of Guideline	No.(%)										
	Total	Profession*			Professional title*			Education level*			
	(N=1708)	Physician(n=610)	Nurse(n=411)	Practitioners from auxiliary department ^a (n=370)	Administrative(n=317)	Primary and below(n=786)	Intermediate(n=613)	Senior(n=309)	College and below(n=707)	Bachelor(n=958)	Master & Doctor(n=43)
Completely know	760(44.5)	301(49.3)	146(35.5)	186(50.3)	127(40.1)	212(27.0)	346(56.4)	202(65.4)	232(32.8)	495(51.7)	33(76.7)
Partially know	808(47.2)	248(40.7)	237(57.7)	160(43.2)	161(50.8)	473(60.2)	232(37.8)	101(32.7)	375(53.0)	421(43.9)	10(23.3)
Do not know	142(8.3)	61(10.0)	28(6.8)	24(6.5)	29(9.1)	101(12.8)	35(5.7)	6(1.9)	100(14.1)	42(4.4)	0(0)
Total	1708(100)	610(100)	411(100)	370(100)	317(100)	786(100)	613(100)	309(100)	707(100)	958(100)	43(100)

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Note: a. Auxiliary departments include pharmacy, lab, radiation, and ultrasonic. *P<0.001

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Table 4 Behavior regarding clinical guidelines of 1568 health practitioners, China,2016

Guideline Utilization	No.(%)
Frequency of Guideline Use(n=1568)^a	
Frequently	177(11.3)
Often	556(35.5)
Occasionally	709(45.2)
Never	126(8.0)
Sum	1568(100.0)
Sources of Guidelines (n= 1438)¹	
Public search engine	911(63.4)
Medical websites	697(48.5)
Distributed by institutions	575(40.0)
Professional academic journals	413(28.7)
Chinese biomedical database	408(28.4)
Distributed by companies	188(13.1)
Foreign biomedical database	69(4.8)
Not clear how to get	52(3.6)
Preferred Types of Guidelines (n= 1420)¹	
Chinese guidelines for primary care institutions	1024(72.1)
Chinese guidelines for all medical institutions	1006(70.9)
Translated foreign guidelines(Chinese version)	261(18.4)
Original foreign guidelines(English version)	66(4.6)

Barriers to Guidelines(n=1560)

Lack of training	778(49.9)
Lack of access	696(44.6)
Lack of awareness	592(38.0)
Guidelines not updated timely	559(35.8)
Guidelines not concise enough	525(33.7)
Limited knowledge of practitioners	480(30.8)
Guidelines not practical for grass-root level	477(30.6)
Lack of oversight mechanism to ensure medical practice coherent to recommendation	329(21.1)
Language barrier	252(16.2)
No time to read guidelines	227(14.6)
Others	5(0.3)

Note: a. "Frequently" was defined as using guidelines once every day. "Often" was defined as using guidelines once every week. "Occasionally" was defined as using guidelines once every month.

Table 5 Attitude towards current clinical guidelines and needs for primary care guidelines of 1568 health practitioners, China,2016

	No.(%)										
	Total	Profession				Professional Title			Education		
	Physicia n	Nurse	Practitioners from auxiliary departments	Admini strative Staff	Primary	Interme diate	Senior	Colleg e and Below	Bachelor	Master and Above	
Degree of how current guidelines fit for primary care(n=1442)											
Entirely applicable	339 (23.5)	124 (23.4)	69 (19.6)	83 (26.9)	63 (25.0)	174 (26.4)	110 (21.8)	55 (19.8)	137 (23.5)	192 (23.4)	10 (25.6)
Partially applicable	1030 (71.4)	377 (71.3)	264 (75.0)	212 (68.6)	177 (70.2)	448 (68.0)	369 (73.1)	213 (76.6)	408 (70.1)	596 (72.6)	26 (66.7)

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Inapplicabl	31(2.2)	14	5	5	7	17	9	5	13	15	3
e		(2.6)	(1.4)	(1.6)	(2.8)	(2.6)	(1.8)	(1.8)	(2.2)	(1.8)	(7.7)
Do not	42 (2.9)	14	14	9	5	20	17	5	24	18	0
know		(2.6)	(4.0)	(2.9)	(2.0)	(3.0)	(3.4)	(1.8)	(4.1)	(2.2)	(0.0)
Sum	1442	529	352	309	252	659	505	278	582	821	39
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Necessity of developing clinical guidelines for primary care (n=1568)

Necessary	1509(96.2)	559	363	323	264	685	535	289	601	866	42
		(96.0)	(96.5)	(97.0)	(95.3)	(96.1)	(96.1)	(97.0)	(96.0)	(96.3)	(97.7)
Unnecessar	39(2.6)	14	10	5	10	18	16	5	23	15	1
y		(2.4)	(2.7)	(1.5)	(3.6)	(2.5)	(2.9)	(1.7)	(3.7)	(1.7)	(2.3)

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Do not care	20(1.3)	9	3	5	3	10	6	4	2	18	0
		(1.5)	(0.8)	(1.5)	(1.1)	(1.4)	(1.1)	(1.3)	(0.3)	(2.0)	(0.0)
Sum	1568(100.0)	582	376	333	277	713	557	298	626	899	43
		(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
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Table 6 Multivariate logistic regression-knowledge and attitude of guidelines

Dependent Variable	Independent Variable	Level	Odds Ratios(95%CI)	P Value
Knowledge of guideline:	Institutional type	County level	0.788(0.625,0.992)	0.043
		Grass root level	Reference	
Not completely know	Geographic area	Eastern	0.834 (0.633,1.097)	0.195
		Central	0.648 (0.510,0.825)	<0.001
		Western	Reference	
	Education level	Master or doctor	5.282 (2.458,11.348)	<0.001
		Bachelor	1.876 (1.504,2.340)	<0.001
		High school and below	Reference	
	Professional title	Senior	4.875 (3.606,6.592)	<0.001
		Intermediate	3.648 (2.887,4.608)	<0.001
	Primary or None	Reference		

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	Profession	Physician	0.636 (0.470,0.862)	0.004
		Nursing practitioner	0.614 (0.464,0.813)	0.001
		Medical tech	1.196 (0.901,1.588)	0.216
		Administrative staffs	Reference	
Attitude towards guideline:	Institutional type	Primary care level	1.315 (1.007,1.718)	0.045
Entirely applicable/		County level	Reference	
Not entirely applicable	Geographic area	Eastern	0.205 (0.858,1.692)	0.282
		Central	0.715 (0.543,0.942)	0.017
		Western	Reference	
	Professional title	Senior	1.602 (1.127,2.279)	0.009
		Intermediate	1.356 (1.028,1.788)	0.031
		Primary or none	Reference	

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Appendix 1 Questionnaire: Attitudes to and behavior concerning clinical guidelines in primary care of China

To whom it may concern,

Thank you for taking time to participate in this survey. Our objective is to investigate the health practitioners' behavior and needs concerning clinical guidelines in primary care institutions. We conduct an anonymous survey and promise that your private information will not be disclosed. Thanks for your collaboration.

1. Your working place: _____ Province/Autonomous Region /Municipality

2. Name of the health care institution you are working in:

3. Type of institution you are working in:

- A. County Hospital
- B. Community Health Service Centers
- C. Township Hospital
- D. Village Clinics
- E. Clinics
- F. Others _____

4. Your specialty

- A. Doctors
- B. Nurses
- C. Pharmacists
- D. Administrators
- E. Others _____

5. Your gender

- A. Male
- B. Female

6. Your education background

- A. Junior college and lower
- B. Undergraduate
- C. Master
- D. Doctor and higher
- E. Others _____

7. Your title

- A. Junior
- B. Middle

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- C. Senior
 - D. N/A
 - E. Others _____

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8. Do you know what the clinical guideline is?

- 10
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- A. Completely unclear
 - B. Partially clear
 - C. Clear

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(If you completely unclear about clinical guidelines, you could quit this survey)

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9. Frequency of clinical guidelines use

- 17
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- A. Frequently
 - B. Often
 - C. Occasionally
 - D. Never

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(If you never use guidelines, you can ignore No.10-14)

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10. Do you think it is necessary for primary healthcare practitioners to use clinical guidelines?

- 26
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- A. Necessary
 - B. Not necessary
 - C. It does not matter

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11. Degree of current clinical guidelines fit for primary care institutions:

- 32
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- A. Entirely appropriate
 - B. Partially appropriate
 - C. Not appropriate
 - D. Don't know

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12. Most of clinical guidelines you use derived from(Could be multiple choice):

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- A. Public search engines (eg. Baidu, Google)
 - B. Medical websites (eg. DXY.cn, Clinphar.cn)
 - C. Chinese biomedical databases (eg. WanFang, VIP, CNKI)
 - D. Foreign biomedical databases (eg. Medline, Pubmed, Cochrane)
 - E. Professional medical journals as subscribed
 - F. Guidelines distributed by pharmaceutical companies
 - G. Guidelines distributed by institutions
 - H. Don't know how to find a guideline
 - I. Others _____

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13. Which part of guidelines do you frequently read? (Could be multiple choice)

- 54
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- A. Abstract
 - B. Summary of recommendations
 - C. Background
 - D. Method

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- E. Flow chart of diagnose and treatment
 - F. Recommendations
 - G. Evidence level and recommendation strength
 - H. Evidence for recommendations
 - I. References
 - J. Full text
 - K. Others _____

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14. Which type of guidelines do you use frequently? (Could be multiple choice)

- A. Chinese guidelines for primary care institutions
- B. Chinese guidelines for all medical institutions
- C. Original foreign guidelines
- D. Translated foreign guidelines
- E. Others _____

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15. The obstacles for primary care practitioners to use guidelines (Could be multiple choice)

- A. Lack concise forms of guidelines
- B. Lack regular access to guidelines
- C. Lack aware of using guidelines
- D. Current guideline do not satisfy needs of primary care
- E. Poor updates of guidelines
- F. Limited knowledge of primary care practitioners
- G. Language barrier
- H. No time to read guidelines
- I. Lack training on guidelines
- J. Lack supervision on whether practices complying with guideline
- K. Others _____

16. Do you think it is necessary to develop clinical guidelines for primary care institutions?

- A. Necessary
- B. Unnecessary
- C. Do not care

Reason for your answer:

(If you think it is unnecessary, you could stop the survey.)

17. What type of guidelines do you think is more desirable for primary care institutions?

- A. Specialized guideline
- B. General guideline

18. Which parts do you think guidelines for primary care institutions should include? (Could be multiple choice)

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- A. Abstract
 - B. Recommendations (abstract)
 - C. Background
 - D. Method
 - E. Flow chart of diagnose and treatment
 - F. Recommendations (main body)
 - G. Evidence level and recommendation strength
 - H. Evidence for the recommendations
 - I. References
 - J. Full text
 - K. Others _____

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19. Your preferred guidelines

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1) Length

- 22
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- A. Full text version
 - B. Summary version (including the recommendations)
 - C. Both can do
 - D. Others _____

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2) Language

- 28
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32
- A. Chinese
 - B. English
 - C. Both can do
 - D. Others _____

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3) Version

- 34
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37
38
- A. Hard copy
 - B. Electronic edition
 - C. Both can do
 - D. Others _____

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20. Which ways do you like to have access to guidelines for primary care institutions? (Could be multiple choice)

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- A. Public search engines (eg. Baidu, Google)
 - B. Medical websites (eg. DXY.cn, Clinphar.cn)
 - C. Biomedical databases (eg. WanFang, VIP, CNKI, Medline)
 - D. Professional medical journals
 - E. Periodical training program for guidelines
 - F. Periodical dispersion of hard copy or electronic edition of guidelines
 - G. Others _____

52

21. Do you want to attend training program for clinical guidelines for primary care institutions?

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- A. Yes
 - B. No
 - C. Do not care

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22. Your suggestions for development of clinical guidelines for primary care institutions:

Thank you again for your participation!

For surveyor only

1. Name:

2. Contact information:

3. Survey time:

4. Survey method:

- A. Field survey
- B. Telephone survey
- C. Email survey
- D. Others _____

5. If it was a field survey

- A. Respondents completed the questionnaire independently
- B. Respondents completed the questionnaire with the assistance of the surveyor
- C. Surveyor completed the questionnaire after consulting the respondents

Appendix2:**Personnel & medical services in primary care institutions**

Name of institution:

Item	Data
Personnel	
Total Number (NO.)	
Structure (No.)	Physician Nursing Practitioners from auxiliary departments (pharmacy, lab, radiology, echo) Administrative staff Others
Education(No.)	Master Bachelor College graduate High school and below
Professional Title(No.)	Senior Intermediate Primary No title
Length of Services(No.)	<5 years 5-10 years (5 years included) 10-15 years (10 years included) Over 15 years
Medical coverage radius	
Radius(km)	
Population Covered(10 thousands)	
Beds	
Annual Visits(visits/year)	
Annual Discharge (discharges/year)	

Physicians' daily burden of patient visits per capital(visits/day)	
Physicians' daily burden of inpatient beds per capital(beds/day)	
Nursing staff's daily burden of inpatient beds per capital (beds/day)	
Equipment and Technology	
Total value of institutional equipment \geq 10000 RMB(10000 RMB)	
Number of Equipment over 10000RMB(NO.)	10-50 thousand (10 thousand included) 50-100 thousand (50 thousand included) 100-500 thousand (100 thousand included) \geq 500 thousand
Lab Techniques	Routine blood Test: <input type="checkbox"/> yes <input type="checkbox"/> no Hepatic Function: <input type="checkbox"/> yes <input type="checkbox"/> no Renal Function: <input type="checkbox"/> yes <input type="checkbox"/> no Stool & Urine Test: <input type="checkbox"/> yes <input type="checkbox"/> no Bacterial Culture: <input type="checkbox"/> yes <input type="checkbox"/> no Blood Concentration Monitoring: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Ultrasonic	Black-White Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Colored Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Radioactive Techniques	Plain Film: <input type="checkbox"/> yes <input type="checkbox"/> no CT: <input type="checkbox"/> yes <input type="checkbox"/> no MRI: <input type="checkbox"/> yes <input type="checkbox"/> no Angiography: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	P1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	P2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P4
Objectives	3	State specific objectives, including any prespecified hypotheses	P4
Methods			
Study design	4	Present key elements of study design early in the paper	P5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	P5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P5
Bias	9	Describe any efforts to address potential sources of bias	P5
Study size	10	Explain how the study size was arrived at	P5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P7
		(b) Describe any methods used to examine subgroups and interactions	P7
		(c) Explain how missing data were addressed	P7
		(d) If applicable, describe analytical methods taking account of sampling strategy	P6
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P8
		(b) Give reasons for non-participation at each stage	P8
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P8
		(b) Indicate number of participants with missing data for each variable of interest	P8
Outcome data	15*	Report numbers of outcome events or summary measures	P8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	P8-11
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	P11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	P15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Guideline use behaviors and needs of primary care practitioners in China: a cross-sectional survey

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Abstract

Objectives Clinical guidelines are known as an effective way to improve health care performance. However, little is known about guideline uptake and implementation by general practitioners in China. The aim of this study is to investigate using behaviors and needs of clinical guidelines in primary care settings in China.

Methods We conducted a cross-sectional survey among 268 institutions in 15 provinces of China from December 2015 to May 2016. The questionnaire was developed by literature review and expert consultation method. On-site survey was performed by paper questionnaires to minimize missing response. Multivariate logistic regression was used to identify factors associated with the knowledge of and the attitude towards clinical guidelines.

Results Among respondents, 91.7% (1568/1708) knew clinical guidelines but only 11.3% (177/1568) frequently used them. The main access to guidelines for primary care practitioners was via public search engines (63.4%;911/1438) instead of biomedical database, and the major barriers for primary care practitioners to use guidelines included lack of training (49.9%;778/1560), access (44.6%;696/1560) and awareness (38.0%;592/1560). Only less than a quarter of respondents considered current guidelines 'entirely appropriate' for primary care use(23.5%;339/1442). Most participants (96.2%;1509/1568) admitted the necessity of developing primary care guidelines. The attitude towards current guidelines was associated with institutions' location, level, and professional title ($P<0.05$).

Conclusion

Our survey reveals poor knowledge and uptake of clinical guidelines in primary care, as well as the gap between the needs and availability of clinical guidelines for primary care in China.

In addition, lack of access to and training in the development of guidelines also prevent primary healthcare practitioners from using guidelines in their daily practice.

Strengths and limitations of this study

- This study is the first survey of behavior, attitude and needs regarding clinical guidelines in primary care of China.
- Our findings shed light on the poor knowledge and uptake of clinical guidelines in primary care as well as the gap between the needs and the current status of limited guidelines for primary care in China.
- Randomized selection of institutions and practitioners were not performed as part of sampling.

Keywords

Primary care; Guideline; Cross-sectional survey

Introduction

Primary care is the cornerstone of essential health care and public health service in China, which accounts for 96% of all health care institutions and 60% of all visits according to China Health Statistics Yearbook.¹ The effective primary care system is a prerequisite of improved

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access to health care services, reduced hospitalizations and enhanced equity.²⁻⁴ However, the current primary care performance was poor and plagued by low health human resource capacity, especially in rural areas of China.^{5,6} In the face of the gap between the low capacity and the high needs of primary care, the State Council emphasized the improvement of primary care quality as a substantial part of China's New Health Reform.⁷ In August 2016, President Xi pointed out: The all-round moderately prosperous society could not be achieved without people's all-round health, which raised universal coverage of high-quality medical services to a height of national strategy.

Clinical guidelines defined by the Institute of Medicine as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” are known as an effective way to improve health performance when an institution equips with sufficient medical resources and qualified staff to be able to achieve it.⁸⁻¹⁰ However, in China little is known about guideline uptake and implementation by general practitioners. More importantly, since the governance, health resources and staff of primary care are different from that of secondary and tertiary hospitals, whether current guidelines are suitable for primary care use needs to be studied. Given these concerns, we undertook this descriptive cross-sectional survey study to gain a better understanding of general practitioners' attitudes to and behaviors with regard to implementation and uptake of clinical guidelines.

Methods

Between December 2015 and May 2016, we used a cross-sectional survey of primary care

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4 practitioners' attitude and behavior regarding clinical guidelines in China. We defined our
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6 respondents as practitioners from county hospitals and grass-root institutions including
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8 community health centers, health centers in villages and towns, and clinics.¹¹
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10 11 **Survey sites and sampling** 12

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14 Randomized selection of institutions and practitioners were not performed as part of sampling
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16 due to unavailable national registers. To obtain a representative sample, we selected five
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18 provinces respectively from Eastern (Beijing, Guangdong, Fujian, Shandong, Zhejiang),
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20 Middle (Heilongjiang, Hubei, Hunan, Jilin, Shanxi) and Western China (Sichuan, Shanxi,
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22 Yunnan, Xinjiang and Xizang) that represent the regional level of population density,
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24 economic development and medical service in each area. In each selected province, we
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26 contacted one to three tertiary hospitals through International Network for Rational Use of
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28 Drugs, China (INRUD, China). Each tertiary hospital performed the survey in five county
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30 hospitals and five grass-root institutions within the provinces. The number of institutions we
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32 surveyed is 3tional performed the survey in fi (912,620) in China. In each county hospital,
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34 three physicians, three nurses, three administrative staff and three practitioners from auxiliary
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36 departments including pharmacy, laboratory, radiology and ultrasound were randomly
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38 selected to fill the questionnaire. In each grass-root institutions, two to five health
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40 practitioners were randomly selected to respond to the survey according to the total number of
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42 practitioners regardless of specialty.
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50 51 **Survey tool** 52

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54 The questionnaire developed by literature review and expert consultation was revised on the
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56 basis of feedback from a pre-test in two primary care institutions in Sichuan and Xizang
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4 provinces.⁹ The questionnaire consisted of sections on: (1) the demographic characteristics of
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6 primary care practitioners; (2) primary care practitioners' knowledge and implementation of
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8 clinical guidelines; and (3) primary care practitioners' attitudes towards primary care specific
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10 clinical guidelines (Appendix 1). The knowledge of clinical guidelines was divided into three
11
12 levels: completely knowledgeable, partially knowledgeable and unaware. If the general
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14 practitioner answered he or she did not know what clinical guideline was or never used
15
16 clinical guidelines, the survey was stopped in the second section. Multiple-choice questions
17
18 were asked to let respondents describe the frequency, sources, preferred types of and barriers
19
20 to guidelines. The degree of how current guidelines fit for primary care was divided into 4
21
22 levels: entirely applicable, partially applicable, inapplicable, and unaware. If the general
23
24 practitioner answered he or she did not think it was necessary to develop clinical guidelines
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26 particularly for primary care, the survey was stopped in the third section. The characteristics
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28 of institutions were also investigated by unified form (Appendix2). The language of the
29
30 survey was in Chinese.
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39 **Survey procedures**

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41 To help minimize methodology bias across provinces, the same questionnaire and consistent
42
43 framework of survey was used to ensure overall comparability of results.¹²⁻¹⁴ All investigators
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45 were trained by the chief investigator (Linan Zeng) and were sent to primary care institutions
46
47 to perform on-site survey using paper questionnaires to minimize missing responses. The
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49 surveys were carried out anonymously.
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54 **Ethical review**

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56 Ethical approval was obtained from Ethics Committee of West China Second University
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4 Hospital on May 2015. Written informed consent was deemed not to be necessary, since the
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6 study only investigates practitioners' attitudes to and behavior concerning clinical guideline
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8 and data were collected anonymously.
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10 11 12 13 14 **Statistical analysis**

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16 Data were entered in a Microsoft Excel spreadsheet database designed for this study and data
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18 entry was audited by randomly selecting 10% electronic questionnaires for comparison with
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20 hard copies. Questionnaires with missing data were included in the analysis, but the missing
21
22 answers were excluded from the calculations.
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25 We used simple descriptive statistics to summarize the data from the survey. Categorical
26
27 variables were expressed by proportions and their significance was assessed by Wilcoxon
28
29 rank sum test or Kruskal Wallis rank sum test when appropriate. Continuous variables were
30
31 expressed by means and standard deviations (SD) or medium and interquartile range. We used
32
33 binary logistic regression to identify factors associated with the knowledge of and attitude
34
35 towards clinical guidelines, after combining the dependent variables into two categories. The
36
37 explanatory variables used in the multivariate logistic regression were level and region of
38
39 institutions, professional title, profession and education background of practitioners.
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41 Statistical analyses were performed using the software SPSS 16.0 (SPSS Inc., Chicago, USA)
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43 and 95% confidence interval was calculated. A two-sided P-value of tandard deviations (SD)
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53 54 55 56 **Results**

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4 At 268 institutions studied, 1308 and 620 health practitioners from county hospitals and
5
6 grass-root institutions were enrolled in the survey, respectively. Of these, 1708 in total
7
8 completed the questionnaire, with a response rate of 88.6%. The major reason for
9
10 non-response was on other duties (eg. see patient). The questionnaire was mainly completed
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12 via face to face survey (84.0%;1433/1708) except in few rural areas, where email or
13
14 telephone survey was used.
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18 Fifty-seven percent of institutions (155/268) provided information of institution characteristics
19
20 (Table 1). The median of service radius was 10 kilometers, with around 70,000 patients
21
22 covered. Majority of Physicians and nurses who were the main components of primary care
23
24 were college graduates with a primary or intermediate professional title. As for techniques
25
26 and facilities, most of institutions were equipped with blood routine, hepatic and renal
27
28 function examinations, etc. However, techniques like bacterial culture, therapeutic drug
29
30 monitoring, and magnetic resonance imaging (MRI) were still not universally utilized in
31
32 grass-root level. Staffing, medical services, techniques and facilities were similar among
33
34 different regions.
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38 Of the 1708 respondents, most have bachelor's or lower degree (97.5%;1665/1708) and
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40 immediate or lower professional title (81.9%;1399/1708), which is consistent with the overall
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42 staffing situation of primary care institutions. More than one third of respondents (35.6%)
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44 were physicians, while the other 20% each were nurses, practitioners from auxiliary
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46 departments, and administrative personnel, which is accorded with the professional
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48 distribution of guideline users in China (Table 2).¹⁵
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Knowledge of clinical guidelines

Majority of health care providers ‘completely’ or ‘partially’ knew what clinical guidelines were (91.7%;1568/1708). One hundred and forty-two (8.3%) providers saying they knew nothing about guidelines, 71.1% (101/142) of which were with primary or no professional title (Table 3). Practitioners with higher professional title knew guidelines better (K-W $H=195.102, P<0.001$). Similarly, there was also a positive correlation between education level and awareness of guidelines (K-W $H=97.125, P<0.001$). Among all the professions, practitioners from auxiliary departments had the highest rate of being ‘completely understanding’ guidelines (50.3%;186/370), while physicians fell into the highest end of being ‘totally not aware of guidelines’, which indicated the insufficient understanding and use of clinical guidelines within physicians in primary care settings (10.0%;61/610) (K-W $H=19.041; P<0.001$).

Behaviors regarding clinical guidelines

Within those 1588 practitioners who knew guidelines, only 11.3% (177/1568) frequently use and most just occasionally use them (45.2%;709/1568). Moreover, 8.0% (126/1568) practitioners never used even they were aware of clinical guidelines. The main access to guidelines for primary care practitioners were: public search engines (63.4%;911/1438), medical websites (48.5%;697/1438) and institutions distribution (40.0%;575/1438), instead of biomedical databases. Moreover, 3.6% (52/1438) even had no idea of how to get guidelines. Though very few, Chinese clinical guidelines for primary care remained the first choice for primary care practitioners in China (72.1%;1024/1420) (Table 4).¹⁶

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4 The three main barriers for practitioners to use guidelines were lack of training
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6 (49.9%;778/1560), lack of access (44.6%;696/1560) and lack of awareness (38.0%;592/1560).
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9 In addition, limitations of guideline itself including delayed updating(35.8%;559/1560),
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11 redundant format (33.7%;525/1560), not practical for primary care institutions
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13 (30.6%;477/1560) and language barrier concerned with English guidelines (16.2%,252/1560)
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15 also prevent primary care practitioners from using guidelines (Table 4).
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21 **Attitude towards current clinical guideline**

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24 Only less than a quarter of respondents considered current guidelines were 'entirely
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26 applicable' to be used in the primary care (23.5%;339/1442). Instead, the majority
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28 (71.4%;1030/1442) believed they were 'partially applicable'. The degree of how current
29
30 guidelines fit for primary care was similar between different participants' professions,
31
32 professional titles, and education levels (Table 5, Supplementary table) (K-W
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34 H=4.982,P=0.173; K -W H=3.228,P=0.199; K -W H=0.460,P=0.795, respectively).
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41 **Attitude towards and needs of clinical guideline for primary care institutions**

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44 Most participants (96.2%;1509/1568) admitted the necessity of developing clinical guidelines
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46 for primary care institutions, which was agreed with practitioners from different professions,
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48 professional titles and education levels (K-W H=1.308,P=0.727; K-W H=0.542,P=0.763;
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50 K-W H=0.329,P=0.848,respectively). Ten respondents of those 39 who chose 'unnecessary'
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52 expressed their reasons: (1)Primary care practitioners should use the same guidelines as other
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54 practitioners to keep up with knowledge updating; (2) Lack of access wouldn't be overcome
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4 by simply developing new guidelines; (3) No time to read guidelines. Among 20 respondents
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6 who 'do not care' about primary care guideline development, five explained their reasons: (1)
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8 They did not use guideline in daily work; (2)Clinical guidelines were too specific for primary
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10 care practitioners who usually deal with general diseases. (Table 5, Supplementary table)
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14 As for preferred clinical guidelines, more than half of the participants tended to use
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16 full-versioned guidelines (56.5%; 874/1546), while 15.2% accepted both full and summary
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18 version. As for language, most practitioners preferred Chinese (96.8%;1496/1546). More than
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20 half of practitioners believed hard copy of guidelines would be more appropriate in primary
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22 care (51.5%;797/1546), while 35.8% (53/1546) embraced both paper and electronic version.
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26 As for contents, requirements for specialized and general guidelines were almost equal (58.0%
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28 and 42.0% respectively). Health care providers at county level (33.4%; 329/986) had higher
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30 needs for specialized guidelines than grass-root level (45.0%;252/560) with significant
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32 difference ($Z=-4.538;P<0.001$). The top three preferred access to guidelines were public
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34 search engine (45.6%;703/1541), periodical distribution (43.4%; 669/1541) and medical
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36 websites (42.6%;657/1541), which is coherent to practitioners' habit of guideline searching.
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Ninety-one percent of participants (1409/154) welcomed training for guidelines in primary
care settings.

Multivariate logistic regression

The knowledge of clinical guideline was positively associated with education level and professional title ($P<0.001$) and related to profession as well as geographic areas. Compared to administrative staff, a lower rate of 'completely knowledgeable' was found in physicians

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4 and nursing practitioners (OR=0.636,P=0.004;OR=0.614, P=0.001). The rate of ‘completely
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6 knowledgeable’ was proven to be lower in Middle China compared with Western China
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8 (OR=0.648,P<0.001).

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11 The attitude towards the current guideline was associated with institutions’ location, level, and
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13 professional title of its practitioners. The voice represented that the guideline was ‘not entirely
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15 appropriate’ was louder in western areas than in middle areas (OR=0.399, P=0.017).
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17 Grass-root settings had a greater rate believing that the guideline was ‘not entirely appropriate’
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19 than county level hospitals (OR=1.315,P=0.045). Larger ratio of participants with
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21 intermediate and senior title believed ‘not entirely appropriate’ compared with those with
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23 primary title (OR=0.356,P=0.031;OR=1.602,P=0.009) (Table 6, Supplementary table).
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31 Discussion

32 Findings of this survey

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34 This study is the first survey of behavior, attitude and needs regarding clinical guidelines in
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36 primary care of China. Our data suggests that the surveyed Chinese primary care practitioners
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38 lack knowledge about clinical guidelines. Among those completely unaware to clinical
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40 guidelines, 4.2% reported a senior title. Ten percent of clinical physicians were unaware of
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42 clinical guidelines, the percentage of which is even higher than medical technicians, nursing
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44 and administrative staff. Use of clinical guidelines is not common in primary care institutions.
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46 Eight percent of medical staff have never used guidelines. Most primary care staff reportedly
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48 do not access guidelines through professional biomedical database (63.4%). The knowledge
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50 and use of guidelines improves with higher education background or professional post. The
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main reasons contribute to the obstacles in guideline use include: limitations of guidelines themselves, insufficient access and training of guidelines, limited knowledge of medical staff, and inadequate awareness of using guidelines. Despite the insufficient knowledge and use of guidelines in primary care, 98.5 % medical staff still believe clinical guidelines are needed in primary care institutions. Nearly all practitioners expressed a desire to learn or improve their guideline-based practice skills (91.1%), which indicates the need of clinical guidelines development for primary care institutions in China. Most primary care practitioners agree to the development of clinical guidelines for primary care (96.2 %) and supporting training of guidelines (91.1 %).

Comparison with similar studies

A survey of knowledge and attitude regarding clinical guidelines of primary practitioners in Gansu province of China showed 80% of respondents (114/143) knew guidelines but only 51% used guidelines in their daily practice.¹⁷ Thirty-seven percent of considered that lack of access to guidelines is the major barriers to the use of guidelines (53/143) and 88% said they need the training of guidelines (126/143).¹⁷ The result is consistent with ours. Similarly, a cross-sectional survey in western Sweden showed 96% primary care of practitioners considered guidelines important but only one third reported being aware of guidelines and the barriers included lack of time, poor availability and limited access to guidelines.¹⁸ A study in Germany showed because of the difference in health resources and medical staff conditions between primary care and tertiary hospitals, deficits exist among pneumologists and primary care practitioners with respect to diagnosis and treatment of COPD and practical

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4 implementation of educational measures despite the popularity of COPD guidelines.¹⁹ A
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6 qualitative descriptive study from Canada explored facilitators and barriers to guideline use
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8 among physicians and focused on the application of Grading of Recommendations
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10 Assessment, Development and Evaluation (GRADE) methods in guideline development. The
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12 survey found the interviewees recognized the need for guidelines and the benefits of using
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14 GRADE methods in the guideline development process.²⁰
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21 **Characteristics of Chinese primary care and status of primary care clinical guidelines in** 22 **China**

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25 The major responsibility of Chinese primary care institutions is to provide prevention,
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27 diagnosis, treatment for common diseases, and public health service including health
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29 education and consulting, chronic diseases management and rehabilitation service. China
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31 launched medical reforms in 2009, with strengthening the primary health care system.²¹
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33 However, despite several years of primary care reform, current performance of primary care
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35 in China remains poor.⁶ In addition, regional divergence exists in medical service ability, the
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37 quality of primary health care in Western China remains weaker than that of Eastern and
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39 Middle China.²²
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47 Clinical guideline is an important way to improve medical services quality and it can promote
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49 health service fairness.^{8,23} However, the lack of appropriate clinical guidelines for primary
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51 care seriously impacts the essential medical care quality in China. Among five most common
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53 chronic diseases in China (hypertension, diabetes, cancer, stroke, and chronic obstructive
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55 pulmonary disease), primary care specialized guidelines are only available to hypertension
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4 and diabetes).^{24,25} Moreover, the quality assessment of current primary care specialized
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6 guidelines showed though more readable than normal guidelines, but many problems existed
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8 in quality, including: poor preciseness, absent of external experts review, lack of primary care
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10 staff participation.¹⁶ On the contrary, some studies proved that guideline which is more
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12 suitable for primary care improved the health outcomes and strengthened the health
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14 system.^{26,27}
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21 **Strengths and limitations**

22 **Response bias**

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24 We did not randomize selected institutions and practitioners because the national registers of
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26 primary care institutions and health practitioners were not available. However, we balanced
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28 the number of selected institutions among provinces and covered all levels and main
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30 professions in primary care. In addition, the questionnaires were distributed and filled almost
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32 by face-to-face survey, except in a few rural areas. Therefore, the data can be considered to be
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34 representative. Nevertheless, for questions that respondents may feel have a “correct”
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36 response, a bias may come from respondents giving the answer they feel is “expected”.
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38 Moreover, in this closed quantitative survey questionnaire, the researcher could not probe the
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40 respondents’ answers to explore levels of understanding and intent. In addition, 11.4%
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42 potential respondents failed to answer the questionnaire. The knowledge and uptake of
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44 guidelines in this population may be poorer. Although this survey can provide a snapshot of
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46 the situation, additional qualitative research is necessary for a more comprehensive
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48 understanding of the needs of clinical guidelines in primary care in China.
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Conclusion

Our findings shed light on the poor knowledge and use of clinical guidelines in primary care as well as the gap between the needs and the current status of limited guidelines for primary care in China. In addition, lack of access to and training of guidelines also prevent primary healthcare workers from using guidelines in their daily practice.

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17
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24

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36

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38
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43

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54 **Data sharing statement**

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56 No additional data are available
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Table 1 Characteristics of 155 primary care institutions selected for clinical guideline survey, China, 2016

	Total (N=155)	Institutional Level			Geographic Areas		
		County level (n=66)	Grass root level (n=89)	East (n=39)	Middle (n=50)	West (n=66)	
Staffing ^a							
Profession							
Physician	29(10,116)	136(69.25,232.75)	12(5,24)	29(9,152)	30(10,176.75)	30.5(10.75,95.75)	
Nurse	31(10,167)	211.50(78.75,372.25)	12(4,25.50)	37(9,203)	26(12,262.75)	33.5(7,140.25)	
Practitioners from Auxiliary Departments	15(4,43)	59.50(30.75,96)	6(2,10.50)	15(6,61)	10.5(3,68)	15(4.75,34)	

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Administrative	4(1,23)	25(10,42.25)	2(0,4)	4(1,25)	4.5(1,25.25)	4(1,22)
Staff						
Others	8(1,30)	47(9.75,82.50)	3(0,9)	9(1,47)	9(2,58.50)	7.5(1,18.50)
Education Background						
Master	0(0,3)	2(0,10)	0(0,1)	3(1,12)	0(0,3)	0(0,1)
Bachelor	21(4,104)		7(2,17)	42(8,152)	14(4,236)	17(4,77.50)
		143.50(46,305.25)				
College Graduate	35(7,162)		12(5,31)	23(5,170)	33.5(8.75,233.75)	37.5(2.75,140.50)
		199.50(105.75,310)				
High school and below	22(5,82)		8(2,19.50)	9(0,100)	29(11,91)	21.50(7.25,73.50)

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			37.50)			
Professional Title						
Senior	5(1,28)	31(12,71.75)	1(0,4)	9(1,35)	5(1,46.25)	3.50(0,20.25)
Intermediate	26(5,100)	109(47.50,217.75)	8(2,23)	32(8,121)	25.5(5,173)	21.50(4.75,63)
Primary	43(16,144)	191(88.25,361)	20(5,40)	45(10,142)	46(16.75,234.50)	40(16,101.75)
None	9(1,46)	53.5(27.75,145)	3(0,9)	3(0,45)	7(3,83)	19(2,46.50)
Length of Services		.75)				
<5 years	19(4,105)	140.50(39.50,179)	6(2,18)	37(4,130)	11(4,162)	20.5(4.75,62)
5-10 years	21(4,73)	97.50(39.75,117)	8(2,15)	25(3,76)	15(3.75,114.75)	21.5(6,53.25)

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		9)				
10-15 years	13(3,50)	65.50(27.50,134)	4(2,10)	9(2,50)	11.50(4,71.75)	15(3,44.75)
		9)				
≥15 years	24(4,81)	100.50(40.75,245.50)	8(2,26)	14(0,70)	49.50(6.50,136)	18.50(7.75,65.50)
Medical Services ^a						
Radius/(km)	10(3,30)	34.50(13.75,52.50)	4(2,12)	3(1.40,10)	15(6.75,40.50)	15.05(3.12,4.90)
Population	7(2.45,33)	45(17.72,52.50)	3.40(1.65,7.25)	6(0.55,33)	7.25(2.58,45.75)	6.90(2.93,31.45)
Covered/(10 thousand)						
Beds	68(5,350)	397(203.75,822.25)	11(0,52)	0(0,500)	87.5(20,657.50)	70(17.50,277.50)

Annually	Patient	57670(138	180812.50(105	23876(6643,63	146000(1200	47421.50(13023.7	48446
Visits/(visits/year)		00,194372)	000,332500)	892)	0,230000)	5,27470.50)	(13873.50,14175)
Annually		1823(0,127		75(0,1175)	0(0,17535)		1550
Discharges		50)	16000(6726,30			3075.5(369.50,27	(112.75,11075)
/(discharges/year)			244.25)			470.50)	
Physicians’	Daily	16.30(6.50,	17.60(6.07,35.	16(6.90,30.50)	25(5.5,60)	15(5.84,25.75)	16.35(7,30)
Burden of Patient		31)	30)				
Visits per Capital							
(visits/day)							
Physicians’	Daily	3(0,7)	5(3,8)	2(0,5.55)	0(0,2.32)	5(2,8)	3.5(1,7.25)
Burden of Inpatient							
Beds per Capital							
(beds/day)							

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Nursing Staff's 3(0,6) 3.89(2,6) 2(0,5) 0(0,2.30) 3.2(2,7.73) 3(1.10,6)

Daily Burden of
Inpatient Beds per
Capital (beds/day)

Equipment and Technology ^a

Total Value of 200(28,200) 2871.31(437.5) 50(5,200) 72(0,2852.62) 200(43.50,3301.5)

Institutional 0) 0,7723.25)) 0) 206.50(41.60,172

Equipment ≥
10000(10000RMB) 5)

10-50 12(2,96) 113(20,255.5) 3(0.50,13) 2(0,120) 14.5(3,72.25) 15(2.75,85.50)
thousand(piece)

50-100 4(1,22) 25(6.75,63) 1(0,4) 1(0,42) 3.5(1,19) 4.5(0.75,15.25)
thousand(piece)

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100-500	3(0,30)	34(5,81)	1(0,3)	2(0,52)	3(1,34.75)	3(0.75,13.50)
thousand(piece)						
≥500	1(0,8)	10(2,28.25)	0(0,1)	0(0,12)	1(0,7.50)	0.5(0,5)
thousand(piece)						
Lab Techniques ^b						
Routine blood Test	140(90.3)	66(100.0)	74(83.1)	36(92.3)	48(96.0)	56(84.8)
Hepatic Function	133(85.8)	65(98.5)	68(76.4)	31(79.5)	47(94.0)	55(83.3)
Renal Function	131(84.5)	65(98.5)	66(74.2)	29(74.4)	47(94.0)	55(83.3)
Stool & Urine Test	132(85.2)	65(98.5)	67(75.3)	31(79.5)	45(90.0)	56(84.8)
Bacterial Culture	68(43.9)	55(83.3)	13(14.6)	17(43.6)	23(46.0)	28(42.4)
Blood	15(9.7)	13(19.7)	2(2.2)	4(10.3)	6(12.0)	5(7.6)
Concentration						
Monitoring						

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Ultrasonic Techniques^b

Black-White 116(74.8) 56(84.8) 60(67.4) 23(59.0) 45(90.0) 48(72.7)

Ultrasonic B scanner

Colored 111(71.6) 66(100.0) 45(50.6) 30(76.9) 34(68.0) 47(71.2)

Ultrasonic B scanner

Radioactive Techniques^b

Plain Film 121(78.1) 65(98.5) 56(62.9) 30(76.9) 43(86.0) 48(72.7)

CT 63(40.6) 55(83.3) 8(9.0) 16(41.0) 20(40.0) 27(40.9)

MRI 39(25.2) 38(57.6) 1(1.1) 14(35.9) 15(30.0) 10(15.2)

Angiography 28(18.1) 27(40.9) 1(1.1) 10(25.6) 11(22.0) 7(10.6)

Notes: a. Median and interquartile. b. Number and Percentage.

Table 2 Professional and demographic characteristics of 1078 health practitioners participating in clinical guideline survey, China, 2016

Characteristic	No.(%)					
	Total(N=1708)	Institutional level		Geographic area		
		County level (n=1088)	Grass-root level(n=620)	East(n=350)	Middle(n=536)	West(n=822)
Education						
Master, Doctor	43(2.5)	25(2.3)	18(2.9)	15(4.3)	15(2.8)	13(1.6)
Bachelor	958(56.1)	682(62.7)	276(44.5)	214(61.1)	302(56.3)	442(53.8)
College and below	707(41.4)	381(35.0)	326(52.6)	121(34.6)	219(40.9)	367(44.6)
Professional Title						
Senior	309(18.1)	252(23.2)	57(9.2)	63(18.0)	101(18.8)	145(17.6)
Intermediate	613(35.9)	402(36.9)	211(34.0)	119(34.0)	203(37.9)	291(35.4)

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Primary and	786(46.0)	434(39.9)	352(56.8)	168(48.0)	232(43.4)	386(47.0)
Below						
Profession						
Physician	610(35.7)	315(29.0)	295(47.6)	121(34.6)	173(32.3)	315(38.4)
Nurse	411(24.1)	263(24.2)	148(23.9)	90(25.7)	131(24.4)	190(23.1)
Practitioners	370(21.7)	262(24.1)	108(17.4)	82(23.4)	116(21.6)	172(20.9)
from auxiliary						
department						
Administrative	317(18.6)	248(22.8)	69(11.1)	57(16.3)	116(21.86)	144(17.5)
Staff						

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Table 3 Knowledge of clinical guidelines of 1078 health practitioners, China, 2016

Knowledge of Guideline	No.(%)										
	Total (N=1708)	Profession*			Professional title*				Education level*		
	Physician (n=610)	Nurse (n=411)	Practitioners from auxiliary department (n=370)	Adminis trative (n=317)	Primary and below (n=786)	Intermedia te(n=613)	Senior (n=309)	College and below (n=707)	Bachelor (n=958)	Master & Doctor (n=43)	
Completely knowledgeable	760(44.5)	301(49.3)	146(35.5)	186(50.3)	127(40.1)	212(27.0)	346(56.4)	202(65.4)	232(32.8)	495(51.7)	33(76.7)
Partially knowledgeable	808(47.2)	248(40.7)	237(57.7)	160(43.2)	161(50.8)	473(60.2)	232(37.8)	101(32.7)	375(53.0)	421(43.9)	10(23.3)

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Unaware	142(8.3)	61(10.0)	28(6.8)	24(6.5)	29(9.1)	101(12.8)	35(5.7)	6(1.9)	100(14.1)	42(4.4)	0(0)
Total	1708(10.0)	610(100)	411(100)	370(100)	317(100)	786(100)	613(100)	309(100)	707(100)	958(100)	43(100)

Note: *P<0.001

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Table 4 Behavior regarding clinical guidelines of 1568 health practitioners, China, 2016

Guideline Utilization	No. (%)
Frequency of Guideline Use(n=1568)^a	
Frequently	177 (11.3)
Often	556 (35.5)
Occasionally	709 (45.2)
Never	126 (8.0)
Sum	1568 (100.0)
Sources of Guidelines (n= 1438)	
Public search engine	911(63.4)
Medical websites	697 (48.5)
Distributed by institutions	575 (40.0)
Professional academic journals	413 (28.7)

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Chinese biomedical database	408 (28.4)
Distributed by companies	188 (13.1)
Foreign biomedical database	69 (4.8)
Not clear how to get	52 (3.6)
Preferred Types of Guidelines (n= 1420)¹	
Chinese guidelines for primary care institutions	1024 (72.1)
Chinese guidelines for all medical institutions	1006 (70.9)
Translated foreign guidelines(Chinese version)	261 (18.4)
Original foreign guidelines(English version)	66 (4.6)
Barriers to Guidelines(n=1560)	
Lack of training	778 (49.9)
Lack of access	696 (44.6)
Lack of awareness	592 (38.0)

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Guidelines not updated timely	559 (35.8)
Guidelines not concise enough	525 (33.7)
Limited knowledge of practitioners	480 (30.8)
Guidelines not practical for grass-root level	477 (30.6)
Lack of oversight mechanism to ensure medical practice	329 (21.1)
coherent to recommendation	
Language barrier	252 (16.2)
No time to read guidelines	227 (14.6)
Others	5 (0.3)

Note: a. “Frequently” was defined as using guidelines once every day. “Often” was defined as using guidelines once every week. “Occasionally” was defined as using guidelines once every month.

Table 5 Attitude towards current clinical guidelines and needs for primary care guidelines of 1568 health practitioners, China, 2016

	No. (%)										
	Total	Profession			Professional Title			Education			
	Physician	Nurse	Practitioners from auxiliary departments	Administrative Staff	Primary	Intermediate	Senior	College and Below	Bachelor	Master and Above	
Degree of how current guidelines fit for primary care(n=1442)											
Entirely applicable	339 (23.5)	124 (23.4)	69 (19.6)	83 (26.9)	63 (25.0)	174 (26.4)	110 (21.8)	55 (19.8)	137 (23.5)	192 (23.4)	10 (25.6)
Partially applicable	1030 (71.4)	377 (71.3)	264 (75.0)	212 (68.6)	177 (70.2)	448 (68.0)	369 (73.1)	213 (76.6)	408 (70.1)	596 (72.6)	26 (66.7)

Inapplicabl	31(2.2)	14	5	5	7	17	9	5	13	15	3
e		(2.6)	(1.4)	(1.6)	(2.8)	(2.6)	(1.8)	(1.8)	(2.2)	(1.8)	(7.7)
Unaware	42 (2.9)	14	14	9	5	20	17	5	24	18	0
		(2.6)	(4.0)	(2.9)	(2.0)	(3.0)	(3.4)	(1.8)	(4.1)	(2.2)	(0.0)
Sum	1442	529	352	309	252	659	505	278	582	821	39
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

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Necessity of developing clinical guidelines for primary care (n=1568)

Necessary	1509(96.	559	363	323	264	685	535	289	601	866	42
	2)	(96.0)	(96.5)	(97.0)	(95.3)	(96.1)	(96.1)	(97.0)	(96.0)	(96.3)	(97.7)
Unnecessar	39(2.6)	14	10	5	10	18	16	5	23	15	1
y		(2.4)	(2.7)	(1.5)	(3.6)	(2.5)	(2.9)	(1.7)	(3.7)	(1.7)	(2.3)

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Do not care	20(1.3)	9	3	5	3	10	6	4	2	18	0
		(1.5)	(0.8)	(1.5)	(1.1)	(1.4)	(1.1)	(1.3)	(0.3)	(2.0)	(0.0)
Sum	1568(100	582	376	333	277	713	557	298	626	899	43
	.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

For Peer review only

Table 6 Multivariate logistic regression-knowledge and attitude of guidelines

Dependent Variable	Independent Variable	Level	Odds Ratios(95%CI)	P Value
Knowledge of guideline: Completely knowledgeable/ Not completely knowledgeable	Institutional type	County level	0.788(0.625,0.992)	0.043
		Grass root level	Reference	
	Geographic area	Eastern	0.834 (0.633,1.097)	0.195
		Central	0.648 (0.510,0.825)	<0.001
		Western	Reference	
	Education level	Master or doctor	5.282 (2.458,11.348)	<0.001
		Bachelor	1.876 (1.504,2.340)	<0.001
		High school and below	Reference	
		Professional title	Senior	4.875 (3.606,6.592)
		Intermediate	3.648 (2.887,4.608)	<0.001
	Primary or None	Reference		

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	Profession	Physician	0.636 (0.470,0.862)	0.004
		Nursing practitioner	0.614 (0.464,0.813)	0.001
		Medical tech	1.196 (0.901,1.588)	0.216
		Administrative staffs	Reference	
Attitude towards guideline:	Institutional type	Primary care level	1.315 (1.007,1.718)	0.045
Entirely applicable/		County level	Reference	
Not entirely applicable	Geographic area	Eastern	0.205 (0.858,1.692)	0.282
		Central	0.715 (0.543,0.942)	0.017
		Western	Reference	
	Professional title	Senior	1.602 (1.127,2.279)	0.009
		Intermediate	1.356 (1.028,1.788)	0.031
		Primary or none	Reference	

Appendix 1 Questionnaire: Attitudes to and behavior concerning clinical guidelines in primary care of China

To whom it may concern,

Thank you for taking time to participate in this survey. Our objective is to investigate the health practitioners' behavior and needs concerning clinical guidelines in primary care institutions. We conduct an anonymous survey and promise that your private information will not be disclosed.

Thanks for your collaboration.

1. Your working place: _____ Province/Autonomous Region /Municipality

2. Name of the health care institution you are working in:

3. Type of institution you are working in:

- A. County Hospital
- B. Community Health Service Centers
- C. Township Hospital
- D. Village Clinics
- E. Clinics
- F. Others _____

4. Your specialty

- A. ~~Physicians~~Doctors
- B. Nurses
- C. Pharmacists
- D. Administrators
- E. Others _____

5. Your gender

- A. Male
- B. Female

6. Your education background

- A. Junior college and lower
- B. Undergraduate
- C. Master
- D. Doctor and higher
- E. Others _____

7. Your title

- A. Junior
- B. Middle

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3 C. Senior
4 D. N/A
5 E. Others _____
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8 **8. Do you know what the clinical guideline is?**

- 9 A. ~~Unaware~~~~Completely unclear~~
10 B. Partially ~~clear~~~~knowledgeable~~
11 C. ~~Completely knowledgeable~~~~lear~~
12

13 (If you ~~completely unclear~~~~unaware of about~~ clinical guidelines, you could quit this survey)
14

15 **9. Frequency of clinical guidelines use**

- 16 A. Frequently
17 B. Often
18 C. Occasionally
19 D. Never
20

21 (If you never use guidelines, you can ignore No.10-14)
22

23 **10. Do you think it is necessary for primary healthcare practitioners to use clinical guidelines?**

- 24 A. Necessary
25 B. Not necessary
26 C. It does not matter
27

28 **11. Degree of current clinical guidelines fit for primary care institutions:**

- 29 A. Entirely appropriate
30 B. Partially appropriate
31 C. Not appropriate
32 D. ~~Don't know~~~~Unaware~~
33

34 **12. Most of clinical guidelines you use derived from(Could be multiple choice):**

- 35 A. Public search engines (eg. Baidu, Google)
36 B. Medical websites (eg. DXY.cn, Clinphar.cn)
37 C. Chinese biomedical databases (eg. WanFang, VIP, CNKI)
38 D. Foreign biomedical databases (eg. Medline, Pubmed, Cochrane)
39 E. Professional medical journals as subscribed
40 F. Guidelines distributed by pharmaceutical companies
41 G. Guidelines distributed by institutions
42 H. ~~Don't know~~~~Unaware of~~ how to find a guideline
43 I. Others _____
44

45 **13. Which part of guidelines do you frequently read? (Could be multiple choice)**

- 46 A. Abstract
47 B. Summary of recommendations
48 C. Background
49 D. Method
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- E. Flow chart of diagnose and treatment
 - F. Recommendations
 - G. Evidence level and recommendation strength
 - H. Evidence for recommendations
 - I. References
 - J. Full text
 - K. Others _____

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14. Which type of guidelines do you use frequently? (Could be multiple choice)

- A. Chinese guidelines for primary care institutions
- B. Chinese guidelines for all medical institutions
- C. Original foreign guidelines
- D. Translated foreign guidelines
- E. Others _____

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15. The obstacles for primary care practitioners to use guidelines (Could be multiple choice)

- A. Lack concise forms of guidelines
- B. Lack regular access to guidelines
- C. Lack aware of using guidelines
- D. Current guideline do not satisfy needs of primary care
- E. Poor updates of guidelines
- F. Limited knowledge of primary care practitioners
- G. Language barrier
- H. No time to read guidelines
- I. Lack training on guidelines
- J. Lack supervision on whether practices complying with guideline
- K. Others _____

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16. Do you think it is necessary to develop clinical guidelines for primary care institutions?

- A. Necessary
- B. Unnecessary
- C. Do not care

Reason for your answer:

(If you think it is unnecessary, you could stop the survey.)

17. What type of guidelines do you think is more desirable for primary care institutions?

- A. Specialized guideline
- B. General guideline

18. Which parts do you think guidelines for primary care institutions should include? (Could be multiple choice)

- 1
2
3 A. Abstract
4 B. Recommendations (abstract)
5 C. Background
6 D. Method
7 E. Flow chart of diagnose and treatment
8 F. Recommendations (main body)
9 G. Evidence level and recommendation strength
10 H. Evidence for the recommendations
11 I. References
12 J. Full text
13 K. Others _____
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18
19 **19. Your preferred guidelines**

20 **1) Length**

- 21 A. Full text version
22 B. Summary version (including the recommendations)
23 C. Both can do
24 D. Others _____
25

26 **2) Language**

- 27 A. Chinese
28 B. English
29 C. Both can do
30 D. Others _____
31

32 **3) Version**

- 33 A. Hard copy
34 B. Electronic edition
35 C. Both can do
36 D. Others _____
37
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40 **20. Which ways do you like to have access to guidelines for primary care institutions?** (Could be
41 multiple choice)

- 42 A. Public search engines (eg. Baidu, Google)
43 B. Medical websites (eg. DXY.cn, Clinphar.cn)
44 C. Biomedical databases (eg. WanFang, VIP, CNKI, Medline)
45 D. Professional medical journals
46 E. Periodical training program for guidelines
47 F. Periodical dispersion of hard copy or electronic edition of guidelines
48 G. Others _____
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52 **21. Do you want to attend training program for clinical guidelines for primary care institutions?**

- 53 A. Yes
54 B. No
55 C. Do not care
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22. Your suggestions for development of clinical guidelines for primary care institutions:

Thank you again for your participation!

For surveyor only

1. Name:

2. Contact information:

3. Survey time:

4. Survey method:

- A. Field survey
- B. Telephone survey
- C. Email survey
- D. Others _____

5. If it was a field survey

- A. Respondents completed the questionnaire independently
- B. Respondents completed the questionnaire with the assistance of the surveyor
- C. Surveyor completed the questionnaire after consulting the respondents

Appendix2:**Personnel & medical services in primary care institutions**

Name of institution:

Item	Data
Personnel	
Total Number (NO.)	
Structure (No.)	Physician Nurse Practitioners from auxiliary departments (pharmacy, lab, radiology, echo) Administrative staff Others
Education(No.)	Master Bachelor College graduate High school and below
Professional Title(No.)	Senior Intermediate Primary No title
Length of Services(No.)	<5 years 5-10 years (5 years included) 10-15 years (10 years included) Over 15 years
Medical coverage radius	
Radius(km)	
Population Covered(10 thousands)	
Beds	
Annual Visits(visits/year)	
Annual Discharge (discharges/year)	
Physicians' daily burden of patient visits per	

capital(visits/day)	
Physicians' daily burden of inpatient beds per capital(beds/day)	
Nursing staff's daily burden of inpatient beds per capital (beds/day)	
Equipment and Technology	
Total value of institutional equipment \geq 10000 RMB(10000 RMB)	
Number of Equipment over 10000RMB(NO.)	10-50 thousand (10 thousand included) 50-100 thousand (50 thousand included) 100-500 thousand (100 thousand included) \geq 500 thousand
Lab Techniques	Routine blood Test: <input type="checkbox"/> yes <input type="checkbox"/> no Hepatic Function: <input type="checkbox"/> yes <input type="checkbox"/> no Renal Function: <input type="checkbox"/> yes <input type="checkbox"/> no Stool & Urine Test: <input type="checkbox"/> yes <input type="checkbox"/> no Bacterial Culture: <input type="checkbox"/> yes <input type="checkbox"/> no Blood Concentration Monitoring: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Ultrasonic	Black-White Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Colored Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Radioactive Techniques	Plain Film: <input type="checkbox"/> yes <input type="checkbox"/> no CT: <input type="checkbox"/> yes <input type="checkbox"/> no MRI: <input type="checkbox"/> yes <input type="checkbox"/> no Angiography: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	P1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	P2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P4
Objectives	3	State specific objectives, including any prespecified hypotheses	P4
Methods			
Study design	4	Present key elements of study design early in the paper	P5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	P5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P5
Bias	9	Describe any efforts to address potential sources of bias	P5
Study size	10	Explain how the study size was arrived at	P5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P7
		(b) Describe any methods used to examine subgroups and interactions	P7
		(c) Explain how missing data were addressed	P7
		(d) If applicable, describe analytical methods taking account of sampling strategy	P6
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P8
		(b) Give reasons for non-participation at each stage	P8
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P8
		(b) Indicate number of participants with missing data for each variable of interest	P8
Outcome data	15*	Report numbers of outcome events or summary measures	P8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	P8-11
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	P11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	P15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Guideline use behaviours and needs of primary care practitioners in China: a cross-sectional survey

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Abstract

Objectives Clinical guidelines have been recognized as an effective way to improve health care performance. However, little is known about the uptake and implementation of guidelines by general practitioners in China. The aim of this study was to investigate the guideline use behaviours and needs of practitioners in primary care settings in China.

Methods We conducted a cross-sectional survey from December 2015 to May 2016 that included practitioners at 268 institutions in 15 provinces in China. Questionnaire development was informed by the execution of a literature review and consultation of experts. On-site surveys were implemented using a paper questionnaire to minimize missing responses. A multivariate logistic regression analysis was performed to identify factors associated with provider knowledge of and attitudes towards clinical guidelines.

Results Of the respondents, 91.7% (1568/1708) were aware of clinical guidelines, but only 11.3% (177/1568) frequently used them. The main mechanism by which primary care practitioners accessed guidelines was public search engines (63.4%; 911/1438), and practitioners seldom reported using biomedical databases. The most frequently identified barriers to guideline use were lack of training (49.9%; 778/1560), lack of access (44.6%; 696/1560) and lack of awareness (38.0%; 592/1560). Less than one quarter of respondents considered current guidelines “entirely appropriate” for use in primary care (23.5%; 339/1442). Most participants (96.2%; 1509/1568) believed it was necessary to develop primary care guidelines. Provider attitudes towards current guidelines were associated with the location and level of the institution and professional title of the practitioner ($P<0.05$).

Conclusion

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4 Our survey revealed poor knowledge and uptake of clinical guidelines in primary care, and
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6 we identified a gap between the needs of practitioners and availability of clinical guidelines
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8 for use in primary care in China. In addition, lacking access to and training in guidelines also
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10 prevented primary healthcare practitioners from using guidelines in daily practice.
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13 14 15 16 **Strengths and limitations of this study**

- 17 ● This study is the first survey of the behaviours, attitudes and needs related to clinical
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19 guidelines in Chinese primary care practitioners.
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- 22 ● Our findings shed light on the poor knowledge and uptake of clinical guidelines in
23
24 primary care; additionally, a gap between the needs of practitioners and availability of
25
26 guidelines for primary care in China was identified.
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28
- 29 ● Institutions and practitioners were not randomly selected during the sampling process.
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33 34 35 36 **Keywords**

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38 Primary care; Guidelines; Cross-sectional survey
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43 44 45 46 **Introduction**

47 Primary care is the cornerstone of essential health care and public health services in China,
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49 and according to the China Health Statistics Yearbook, primary care is provided in 96% of
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51 all health care institutions and accounts for 60% of all health care visits.¹ Having an effective
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53 primary care system is a prerequisite for improving access to health care services, reducing
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55 hospitalizations and enhancing equity.²⁻⁴ However, at present, primary care performance has
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been found to be poor and is plagued by low health human resource capacity, especially in rural areas of China.^{5,6} In light of the discrepancy between the low capacity and the high needs of primary care, the State Council has dedicated a substantial portion of China's New Health Reform to the improvement of primary care quality.⁷ In August 2016, President Xi noted that a prosperous society could not be achieved without addressing all aspects of health and promoted efforts towards universal coverage of high-quality medical services to the level of national strategy.

Clinical guidelines, which are defined by the Institute of Medicine as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances,” are known as effective mechanisms by which to improve healthcare performance when an institution is equipped with sufficient medical resources and qualified staff.⁸⁻¹⁰ However, in China, little is known about the uptake and implementation of guidelines by general practitioners. More importantly, due to differences in governance, the health resources and staff available in primary care differ from those available secondary and tertiary hospitals, and whether current guidelines are suitable for primary care use needs to be studied. Given these concerns, we undertook this descriptive cross-sectional survey study to gain a better understanding of general practitioners' attitudes towards and behaviours related to the implementation and uptake of clinical guidelines.

Methods

Between December 2015 and May 2016, we implemented a cross-sectional survey of primary care practitioners' attitudes towards and behaviours related to clinical guidelines in

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4 China. We defined our respondents as practitioners from county hospitals and grass-roots
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6 institutions, including community health centres, health centres in villages and towns, and
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8 clinics.¹¹
9

10 11 **Survey sites and sampling** 12

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14 Institutions and practitioners were not randomly selected during the sample process due to
15
16 the unavailability of national registries. To obtain a representative sample, we selected five
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18 provinces from Eastern (Beijing, Guangdong, Fujian, Shandong, Zhejiang), Central
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20 (Heilongjiang, Hubei, Hunan, Jilin, Shanxi) and Western China (Sichuan, Shanxi, Yunnan,
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22 Xinjiang and Xizang) that were representative of the population density, economic
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24 development and medical services of their respective regions. In each selected province, we
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26 contacted one to three tertiary level hospitals through the International Network for Rational
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28 Use of Drugs, China (INRUD, China). These tertiary level hospitals carried out the survey in
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30 five county hospitals and five grass-roots institutions within their province. Three percent of
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32 all primary care institutions (912,620) in China were included in our survey. In each county
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34 hospital, three physicians, three nurses, three administrative staff and three practitioners
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36 from auxiliary departments, including the pharmacy, laboratory, radiology and
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38 ultrasonography departments, were randomly selected to complete the questionnaire. In each
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40 grass-roots institution, two to five health practitioners were randomly selected to complete
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42 the survey according to the total number of institutional practitioners regardless of specialty.
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50 51 **Survey tool** 52

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54 Questionnaire development was informed by the execution of a literature review and
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56 consultation with experts; additionally, the questionnaire was revised on based on feedback
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4 from a pre-test performed in two primary care institutions in the Sichuan and Xizang
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6 provinces.⁹ The questionnaire consisted of the following sections: (1) demographic
7
8 characteristics of primary care practitioners; (2) primary care practitioners' knowledge and
9
10 implementation of clinical guidelines; and (3) primary care practitioners' attitudes towards
11
12 primary care-specific clinical guidelines (Appendix 1). Knowledge of clinical guidelines
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14 was divided into the following three levels: completely knowledgeable, partially
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16 knowledgeable and unaware. If the general practitioner responded that he or she did not
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18 know what clinical guidelines were or had never used clinical guidelines, the survey was
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20 stopped in the second section. Multiple-choice questions were asked to allow respondents to
21
22 describe the frequency, sources, preferred types of and barriers to guidelines. The degree that
23
24 current guidelines were applicable to primary care practice was divided into 4 levels:
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26 entirely applicable, partially applicable, inapplicable, and unaware. If the general
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28 practitioner responded that he or she did not think it was necessary to develop clinical
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30 guidelines, particularly in primary care, the survey was stopped in the third section. The
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32 characteristics of institutions were also investigated using a universal form (Appendix 2).
33
34 The language of the survey was Chinese.
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43 44 **Survey procedures**

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46 To help minimize the possibility of a methodology bias existing across provinces, the same
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48 questionnaire and a consistent survey framework were used to ensure the overall
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50 comparability of results.¹²⁻¹⁴ All investigators were trained by the chief investigator (Linan
51
52 Zeng) and sent to primary care institutions to perform on-site surveys using paper
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54 questionnaires to minimize missing responses. The surveys were carried out anonymously.
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Ethical review

Ethical approval was obtained from the Ethics Committee of West China Second University Hospital in May 2015. Written informed consent was deemed to be unnecessary, as the study only investigated practitioners' attitudes towards and behaviours related to clinical guidelines, and data were collected anonymously.

Statistical analysis

Data were entered into a Microsoft Excel spreadsheet designed for the study, and data entry was audited by randomly selecting 10% of the electronic questionnaires and comparing the responses with those on the hard copies. Questionnaires with missing data were included in the analysis, but the missing answers were excluded from the calculations.

We used simple descriptive statistics to summarize the data from the survey. Categorical variables are expressed as proportions, and their significance was assessed using the Wilcoxon rank sum test or Kruskal Wallis rank sum test when appropriate. Continuous variables are expressed as means and standard deviations (SD) or medians and interquartile ranges. We performed binary logistic regression analyses to identify factors associated with knowledge of and attitudes towards clinical guidelines after combining the dependent variables into two categories. The explanatory variables used in the multivariate logistic regression analysis were the level and region of the institutions and the professional title, profession and educational background of the practitioners. Statistical analyses were performed using SPSS 16.0 software (SPSS Inc., Chicago, USA), and 95% confidence intervals were calculated. A two-sided P-value of ≤ 0.05 was considered statistically significant.

Results

Within the included 268 institutions, 1308 and 620 health practitioners from county hospitals and grass-roots institutions were enrolled in the survey, respectively. Of these practitioners, 1708 completed the entire questionnaire, for a response rate of 88.6%. The most frequently cited reason for non-response was other duties (e.g., seeing patients). The questionnaire was most frequently completed via face-to-face survey (84.0%; 1433/1708) except for in a few rural areas, where email or telephone surveys were used.

Fifty-seven percent of the institutions (155/268) provided institutional characteristic data (Table 1). The median service radius was 10 kilometres, and their coverage reached approximately 70,000 patients. The majority of the physicians and nurses who played major roles in the provision of primary care were college graduates with primary or intermediate professional titles. With regards to the institutions' techniques and facilities, most institutions were capable of performing routine blood tests, hepatic and renal function examinations, etc. However, techniques such as bacterial culture, therapeutic drug monitoring, and magnetic resonance imaging (MRI) were still not universally available at the grass-roots level. Staffing, medical services, techniques and facilities were similar across the different regions. Of the 1708 respondents, most had a bachelor's degree or lower (97.5%; 1665/1708) and an immediate professional title or lower (81.9%; 1399/1708), which was consistent with the overall staffing situation in primary care institutions. More than one third of respondents (35.6%) were physicians, while nurses, practitioners from auxiliary departments, and administrative personnel each accounted for 20% of the overall study population, which was in accordance with the professional distribution of guideline users in China (Table 2).¹⁵

Knowledge of clinical guidelines

The majority of health care providers were “completely” or “partially” knowledgeable about clinical guidelines (91.7%; 1568/1708). One hundred and forty-two (8.3%) providers reported that they knew nothing about guidelines, 71.1% (101/142) of whom had a primary or no professional title (Table 3). Practitioners with higher professional titles tended to be more knowledgeable about guidelines (K-W $H=195.102$, $P<0.001$). Similarly, a positive correlation between education level and awareness of guidelines was identified (K-W $H=97.125$, $P<0.001$). Among the evaluated practitioners, those from auxiliary departments most frequently reported “completely understanding” guidelines (50.3%; 186/370), while physicians most frequently reported being “fully unaware of guidelines”, which indicated the presence of insufficient understanding in and use of clinical guidelines by primary care providers (10.0%; 61/610) (K-W $H=19.041$; $P<0.001$).

Behaviours regarding clinical guidelines

Of the 1588 practitioners who were knowledgeable about clinical guidelines, only 11.3% (177/1568) frequently used these guidelines, and the majority reported only occasionally using them (45.2%; 709/1568). Moreover, 8.0% (126/1568) of the practitioners had never used clinical guides even though they were aware of them. The modalities by which primary care practitioners most frequently accessed clinical guidelines were as follows: public search engines (63.4%; 911/1438), medical websites (48.5%; 697/1438) and information distributed by institutions (40.0%; 575/1438), and biomedical databases were infrequently reported to be sources of clinical guidelines. Moreover, 3.6% (52/1438) reported being completely

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unaware of how to obtain guidelines. Though few in number, primary care-specific clinical guidelines remained the first choice for primary care practitioners in China (72.1%; 1024/1420) (Table 4).¹⁶

The three main barriers cited by practitioners as preventing guideline use were lack of training (49.9%; 778/1560), lack of access (44.6%; 696/1560) and lack of awareness (38.0%; 592/1560). In addition, guideline-related issues that were cited as preventing guideline use included delayed updates (35.8%; 559/1560), redundant formats (33.7%; 525/1560), guidelines deemed impractical for use in primary care (30.6%; 477/1560) and language barriers associated with English guidelines (16.2%; 252/1560) (Table 4).

Attitudes towards current clinical guidelines

Less than one quarter of respondents considered current guidelines to be “entirely applicable” within the primary care setting (23.5%; 339/1442). Instead, the majority (71.4%; 1030/1442) believed they were “partially applicable”. The degree to which practitioners perceived current guidelines to be applicable to primary care was similar regardless of profession, professional title, or education level (Table 5) (K-W H=4.982, P=0.173; K -W H=3.228, P=0.199; K -W H=0.460, P=0.795, respectively).

Attitudes towards clinical guidelines and needs of primary care practitioners

Most participants (96.2%; 1509/1568) reported the necessity of developing clinical guidelines for primary care institutions, and the responses to this question did not differ by profession, professional title or education level (K-W H=1.308, P=0.727; K-W H=0.542,

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4 P=0.763; K-W H=0.329, P=0.848, respectively). Ten of the 39 respondents who believed
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6 clinical guidelines to be “unnecessary” reported the following reasons for this belief: (1)
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8 primary care practitioners should use the same guidelines as other practitioners to remain
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10 current on updated clinical recommendations; (2) the lack of access could not be remedied
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12 by simply developing new guidelines; and (3) lack of time to review guidelines. Among the
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14 20 respondents who reported they “do not care” about primary care guideline development,
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16 five explained their reasons for this belief: (1) the provider did not use guidelines in their
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18 daily work; and (2) the clinical guidelines were too specific for primary care practitioners, as
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20 they usually address general diseases. (Table 5)
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26 As for the preferred clinical guidelines, more than half of the participants tended to use full
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28 guideline versions (56.5%; 874/1546), while 15.2% accepted both full and summary
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30 versions. For language, most practitioners preferred Chinese (96.8%; 1496/1546). More than
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32 half of the practitioners believed hard copies of guidelines would be more appropriate in
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34 primary care (51.5%; 797/1546), while 35.8% (53/1546) embraced both paper and electronic
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36 versions. Regarding guideline content, requests for specialized and general guidelines were
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38 voiced almost equally (58.0% and 42.0% respectively). Health care providers at the county
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40 level (33.4%; 329/986) reported having a significantly greater need for specialized
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42 guidelines than did grass-roots level providers (45.0%; 252/560; $Z=-4.538$; $P<0.001$). The
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44 top three preferred modalities by which to access guidelines were public search engines
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46 (45.6%; 703/1541), distributed periodicals (43.4%; 669/1541) and medical websites (42.6%;
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48 657/1541), a finding that was in accordance with the practitioners’ guideline searching habits.
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Ninety-one percent of the participants (1409/154) welcomed training regarding the

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4 application of guidelines in primary care settings.
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8 9 **Multivariate logistic regression**

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11 Knowledge about clinical guidelines was positively associated with education level and
12 professional title ($P<0.001$) as well as profession and geographic area. Compared to
13 administrative staff, physicians and nurse practitioners were less likely to report being
14 “completely knowledgeable” about clinical guidelines (OR=0.636, $P=0.004$; OR=0.614,
15 $P=0.001$). The odds of being “completely knowledgeable” was lower in practitioners in
16 central China than those in western China (OR=0.648, $P<0.001$).
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25 Attitudes towards the current guidelines were associated with the location and level of the
26 institution and professional title of the practitioner. Western practitioners were more likely to
27 report that clinical guidelines were “not entirely appropriate” than were central practitioners
28 (OR=0.399, $P=0.017$). Providers working in grass-roots settings were at greater odds of
29 believing that guidelines were “not entirely appropriate” than were county level hospital
30 providers (OR=1.315, $P=0.045$). A greater proportion of participants with intermediate and
31 senior titles believed clinical guidelines to be “not entirely appropriate” relative to those
32 with primary titles (OR=0.356, $P=0.031$; OR=1.602, $P=0.009$) (Table 6).
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49 **Discussion**

50 51 **Findings of this survey**

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53 This study is the first to examine primary care providers’ behaviours, attitudes and needs
54 related to clinical guidelines in China. Our data suggest that the surveyed Chinese primary
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4 care practitioners lacked knowledge about clinical guidelines. Of those completely unaware
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6 of clinical guidelines, 4.2% reported having a senior title. Ten percent of the clinical
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8 physicians were unaware of clinical guidelines, and even higher proportions of medical
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10 technicians, nursing and administrative staff reported being unaware. Clinical guideline
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12 usage was not common in primary care institutions. Eight percent of medical staff reported
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14 having never used guidelines. Most primary care staff reported accessing guidelines through
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16 resources other than professional biomedical databases (63.4%). Knowledge and use of
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18 guidelines was higher in those who reported higher educational and professional levels. The
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20 following factors were identified as obstacles to guideline use: limitations of the guidelines
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22 themselves, insufficient access to and training regarding guidelines, limited medical staff
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24 knowledge, and inadequate awareness of guideline use. Despite the presence of insufficient
25
26 knowledge and guideline use in primary care, 98.5% of the medical staff still believed that
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28 clinical guidelines are needed in primary care institutions. Nearly all practitioners expressed
29
30 a desire to learn about or improve their guideline-based practice skills (91.1%), which
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32 indicates the need for clinical guideline development in primary care institutions in China.
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34 Most primary care practitioners suggested that clinical guidelines should be developed for
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36 primary care (96.2%) and supported the provision of guideline training (91.1%).
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49 **Comparison with similar studies**

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51 The results of a survey of knowledge and attitudes related to clinical guidelines among
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53 primary practitioners that was conducted in Gansu province in China suggested that while
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55 80% of respondents (114/143) being aware of these guidelines, only 51% used them in daily
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practice.¹⁷ In that study, 37% of the participants believed that lacking guideline access was a major barrier to guideline use (53/143), and 88% of the participants stated that they needed guideline training (126/143).¹⁷ These results are consistent with those of our study. Similarly, a cross-sectional survey conducted in western Sweden showed that 96% of primary care practitioners considered guidelines to be important, but only one third of these providers reported being aware of guidelines; barriers cited in that study included lack of time and unavailability of and limited access to guidelines.¹⁸ A study conducted in Germany showed that despite the popularity of COPD guidelines, differences in health resource and medical staffing conditions between primary care and tertiary hospitals resulted in the persistence of deficits between pneumologists and primary care practitioners regarding the diagnosis and treatment of COPD and practical implementation of educational measures.¹⁹ A qualitative descriptive study conducted in Canada explored the facilitators of and barriers to guideline use among physicians and focused on the application of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) method for guideline development. The results of this survey suggested that the interviewees recognized the need for guidelines and the benefits of using the GRADE method during the guideline development process.²⁰

Characteristics of the Chinese primary care system and status of primary care clinical guidelines in China

The major responsibilities of Chinese primary care providers are to prevent, diagnose, and treat common diseases and provide public health services, including health education and consulting, chronic disease management and rehabilitation services. The medical reforms

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4 launched in China in 2009 aimed to strengthen the primary health care system.²¹ However,
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6 despite several years of primary care reform, the current performance of the Chinese primary
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8 health care system remains poor.⁶ In addition, regional disparities exist in medical service
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10 ability, and the quality of primary health care in western China remains weaker than that of
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12 eastern and central China.²²

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16 Clinical guideline may serve as an important mechanism by which to improve medical
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18 service quality and promote health service equity.^{8,23} However, the lack of appropriate
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20 clinical guidelines for primary care may seriously impact the overall quality of medical care
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22 in China. Among the five most common chronic diseases in China (hypertension, diabetes,
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24 cancer, stroke, and chronic obstructive pulmonary disease), primary care-specific guidelines
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26 are only available for hypertension and diabetes.^{24,25} Moreover, a quality assessment of
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28 current primary care-specific guidelines showed though they were more readable than
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30 normal guidelines, many quality problems were identified, including poor precision, the
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32 absence of review by external experts, and a lack of primary care staff participation.¹⁶ In
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34 contrast, some studies have reported that guidelines that were more suitable for primary care
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36 were associated with improved health outcomes and strengthened the health system.^{26,27}

37 38 39 40 41 42 43 44 45 46 **Strengths and limitations**

47 48 49 **Response bias**

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51 We did not randomly select the included institutions and practitioners because the national
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53 registries of both primary care institutions and health practitioners were not available.

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55 However, we balanced the number of selected institutions across provinces and covered all
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4 levels and the majority of professions in primary care. In addition, the questionnaires were
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6 distributed and completed via face-to-face interviews, except for in a few rural areas.
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9 Therefore, these data can be considered to be representative. Nevertheless, for questions that
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11 respondents may have felt required to provide a “correct” response, a bias may have resulted
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13 from respondents providing the answer they felt was “expected”. Moreover, on this
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15 closed-ended quantitative survey questionnaire, the researcher could not probe further into
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17 the respondents’ answers or explore their levels of understanding and intent. In addition,
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19 11.4% of potential respondents failed to complete the questionnaire. Knowledge and uptake
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21 of guidelines in this population may be poorer. Although this survey can provide a snapshot
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23 of the current situation in primary care, additional qualitative research is necessary to
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25 generate a more comprehensive understanding of needs related to clinical guidelines in
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27 primary care in China.
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33 34 35 36 **Conclusion**

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38 Our findings shed light on the poor knowledge levels and infrequent use of clinical
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40 guidelines in primary care. Additionally, a gap between the needs of practitioners and the
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42 availability of guidelines for primary care in China was identified. In addition, lack of access
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44 to and training related to guidelines may also prevent primary healthcare workers from using
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46 guidelines in daily practice.
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50 51 52 53 54 **Contributorship statement**

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56 Linan Zeng, Youping Li and Lingli Zhang were responsible for conception and design.
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4 Linan Zeng,, Yang Zhang, Shangwei Zhen, Honghao Li and Xiaodong Wang collected the
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6 data. Guanjian Liu, Xue Song and Jiajie Yu analysed and interpreted data. Linan Zeng,
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9 Youping Li, Lingli Zhang and Yanjun Duan drafted and revised the paper.

14 **Competing interests**

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16 The authors declare that they have no conflict of interest.
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31 **Data sharing statement**

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33 No additional data are available
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Table 1 Characteristics of 155 primary care institutions selected for the clinical guideline survey, China, 2016

	Total (N=155)	Institutional Level			Region	
		County-level (n=66)	Grass-roots level (n=89)	Eastern (n=39)	Central (n=50)	Western (n=66)
Staffing ^a						
Profession						
Physician	29(10,116)	136(69.25,232.75)	12(5,24)	29(9,152)	30(10,176.75)	30.5(10.75,95.75)
Nurse	31(10,167)	211.50(78.75,372.25)	12(4,25.50)	37(9,203)	26(12,262.75)	33.5(7,140.25)
Practitioner from Auxiliary	15 (4,43)	59.50 (30.75,96)	6 (2,10.50)	15 (6,61)	10.5 (3,68)	15 (4.75,34)
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Administrative	4 (1,23)	25 (10,42.25)	2 (0,4)	4 (1,25)	4.5 (1,25.25)	4 (1,22)
Staff						
Other	8 (1,30)	47 (9.75,82.50)	3 (0,9)	9 (1,47)	9 (2,58.50)	7.5 (1,18.50)
Education Background						
Master's	0 (0,3)	2 (0,10)	0 (0,1)	3 (1,12)	0 (0,3)	0 (0,1)
Bachelor's	21 (4,104)	143.50 (46,305.25)	7 (2,17)	42 (8,152)	14 (4,236)	17 (4,77.50)
College Graduate	35 (7,162)	199.50 (105.75,310)	12 (5,31)	23 (5,170)	33.5 (8.75,233.75)	37.5 (2.75,140.50)
High school and below	22 (5,82)	89.50 (39.50,1737.50)	8 (2,19.50)	9 (0,100)	29 (11,91)	21.50 (7.25,73.50)

Professional Title

Senior	5 (1,28)	31 (12,71.75)	1 (0,4)	9 (1,35)	5 (1,46.25)	3.50 (0,20.25)
Intermediate	26 (5,100)	109 (47.50,217.75)	8 (2,23)	32 (8,121)	25.5 (5,173)	21.50 (4.75,63)
Primary	43 (16,144)	191 (88.25,361)	20 (5,40)	45 (10,142)	46 (16.75,234.50)	40 (16,101.75)
None	9 (1,46)	53.5 (27.75,145.75)	3 (0,9)	3 (0,45)	7 (3,83)	19 (2,46.50)

Length of Service

<5 years	19 (4,105)	140.50 (39.50,179)	6 (2,18)	37 (4,130)	11 (4,162)	20.5 (4.75,62)
5-10 years	21 (4,73)	97.50 (39.75,179)	8 (2,15)	25 (3,76)	15 (3.75,114.75)	21.5 (6,53.25)

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10-15 years	13 (3,50)	65.50 (27.50,139)	4 (2,10)	9 (2,50)	11.50 (4,71.75)	15 (3,44.75)
≥15 years	24 (4,81)	100.50 (40.75,245.50)	8 (2,26)	14 (0,70)	49.50 (6.50,136)	18.50 (7.75,65.50)
Medical Services ^a						
Radius/(km)	10 (3,30)	34.50 (13.75,52.50)	4 (2,12)	3 (1.40,10)	15 (6.75,40.50)	15.05 (3.12,4.90)
Population Covered/(10 thousand)	7 (2.45,33)	45 (17.72,52.50)	3.40 (1.65,7.25)	6 (0.55,33)	7.25 (2.58,45.75)	6.90 (2.93,31.45)
Beds	68 (5,350)	397 (203.75,822.25)	11 (0,52)	0 (0,500)	87.5 (20,657.50)	70 (17.50,277.50)

Annual Patient	57670	180812.50	23876	146000	47421.50	48446
Visits/(visits/year)	(13800,194372)	(105000,332500)	(6643,63892)	(12000,23000)	(13023.75,27470.50)	(13873.50,14175)
Annual Discharges	1823	16000	75 (0,1175)	0 (0,17535)	3075.5	1550
/(discharges/year)	(0,12750)	(6726,30244.25)			(369.50,27470.50)	(112.75,11075)
Physicians' Daily Patient Load	16.30 (6.50,31)	17.60 (6.07,35.30)	16 (6.90,30.50)	25 (5.5,60)	15 (5.84,25.75)	16.35 (7,30)
Physicians' Daily	3 (0,7)	5 (3,8)	2 (0,5.55)	0 (0,2.32)	5 (2,8)	3.5 (1,7.25)
Burden in Inpatient Beds per Capita						
(beds/day)						

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Nursing Staff's 3 (0,6) 3.89 (2,6) 2 (0,5) 0 (0,2.30) 3.2 (2,7.73) 3 (1.10,6)

Daily Burden in
Inpatient Beds per
Capita (beds/day)

Equipment and Technology ^a

Total Value of 200 2871.31 50 (5,200) 72 200 206.50

Institutional (28,2000) (437.50,7723.2 (0,2852.62) (43.50,3301.50) (41.60,1725)

Equipment ≥ 10000
(10000 RMB)

10-50 thousand 12 (2,96) 113 (20,255.5) 3 (0.50,13) 2 (0,120) 14.5 (3,72.25) 15 (2.75,85.50)
(pieces)

50-100 thousand 4 (1,22) 25 (6.75,63) 1 (0,4) 1 (0,42) 3.5 (1,19) 4.5 (0.75,15.25)
(pieces)

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	100-500 thousand	3 (0,30)	34 (5,81)	1 (0,3)	2 (0,52)	3 (1,34.75)	3 (0.75,13.50)
	(pieces)						
	≥500 thousand	1 (0,8)	10 (2,28.25)	0 (0,1)	0 (0,12)	1 (0,7.50)	0.5 (0,5)
	(pieces)						
Lab Techniques ^b							
	Routine Blood	140 (90.3)	66 (100.0)	74 (83.1)	36 (92.3)	48 (96.0)	56 (84.8)
Tests							
	Hepatic Function	133 (85.8)	65 (98.5)	68 (76.4)	31 (79.5)	47 (94.0)	55 (83.3)
Tests							
	Renal Function	131 (84.5)	65 (98.5)	66 (74.2)	29 (74.4)	47 (94.0)	55 (83.3)
Tests							
	Stool & Urine	132 (85.2)	65 (98.5)	67 (75.3)	31 (79.5)	45 (90.0)	56 (84.8)
Tests							

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Bacterial Cultures	68 (43.9)	55 (83.3)	13 (14.6)	17 (43.6)	23 (46.0)	28 (42.4)
Blood	15 (9.7)	13 (19.7)	2 (2.2)	4 (10.3)	6 (12.0)	5 (7.6)
Concentration						
Monitoring						
Ultrasonographic Techniques ^b						
Black-White	116 (74.8)	56 (84.8)	60 (67.4)	23 (59.0)	45 (90.0)	48 (72.7)
Ultrasound	B					
Scanner						
Coloured	111 (71.6)	66 (100.0)	45 (50.6)	30 (76.9)	34 (68.0)	47 (71.2)
Ultrasound	B					
scanner						
Radiographic Techniques ^b						
Plain Film	121 (78.1)	65 (98.5)	56 (62.9)	30 (76.9)	43 (86.0)	48 (72.7)

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CT	63 (40.6)	55 (83.3)	8 (9.0)	16 (41.0)	20 (40.0)	27 (40.9)
MRI	39 (25.2)	38 (57.6)	1 (1.1)	14 (35.9)	15 (30.0)	10 (15.2)
Angiography	28 (18.1)	27 (40.9)	1 (1.1)	10 (25.6)	11 (22.0)	7 (10.6)

Notes: a. Median and interquartile range. b. Number and percentage.

Table 2 Professional and demographic characteristics of the 1708 health practitioners participating in the clinical guideline survey, China, 2016

Characteristic	No.(%)					
	Total (N=1708)	Institutional level			Geographic area	
		County (n=1088)	Grass-roots level (n=620)	Eastern (n=350)	Central (n=536)	Western (n=822)
Education						
Master's,	43 (2.5)	25 (2.3)	18 (2.9)	15 (4.3)	13 (1.6)	
Doctorate						
Bachelor's	958 (56.1)	682 (62.7)	276 (44.5)	214 (61.1)	442 (53.8)	
College and below	707 (41.4)	381 (35.0)	326 (52.6)	121 (34.6)	219 (40.9)	
					367 (44.6)	
Professional Title						
Senior	309 (18.1)	252 (23.2)	57 (9.2)	63 (18.0)	101 (18.8)	
					145 (17.6)	

Intermediate	613 (35.9)	402 (36.9)	211 (34.0)	119 (34.0)	203 (37.9)	291 (35.4)
Primary and Below	786 (46.0)	434 (39.9)	352 (56.8)	168 (48.0)	232 (43.4)	386 (47.0)
Profession						
Physician	610 (35.7)	315 (29.0)	295 (47.6)	121 (34.6)	173 (32.3)	315 (38.4)
Nurse	411 (24.1)	263 (24.2)	148 (23.9)	90 (25.7)	131 (24.4)	190 (23.1)
Practitioner from auxiliary department	370 (21.7)	262 (24.1)	108 (17.4)	82 (23.4)	116 (21.6)	172 (20.9)
Administrative Staff	317 (18.6)	248 (22.8)	69 (11.1)	57 (16.3)	116 (21.86)	144 (17.5)

Table 3 Knowledge of clinical guidelines among 1708 health practitioners, China, 2016

Knowledge of Guidelines	No. (%)										
	Total (N=1708)	Profession*			Professional title*			Education level*			
		Physician (n=610)	Nurse (n=411)	Practitioner from auxiliary department (n=370)	Administrative (n=317)	Primary and below (n=786)	Intermediate (n=613)	Senior (n=309)	College and below (n=707)	Bachelor's (n=958)	Master's & doctorate (n=43)
Completely knowledgeable	760 (44.5)	301 (49.3)	146 (35.5)	186 (50.3)	127 (40.1)	212 (27.0)	346 (56.4)	202 (65.4)	232 (32.8)	495 (51.7)	33 (76.7)
Partially knowledgeable	808 (47.2)	248 (40.7)	237 (57.7)	160 (43.2)	161 (50.8)	473 (60.2)	232 (37.8)	101 (32.7)	375 (53.0)	421 (43.9)	10 (23.3)

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Unaware	142 (8.3)	61 (10.0)	28 (6.8)	24 (6.5)	29 (9.1)	101 (12.8)	35 (5.7)	6 (1.9)	100 (14.1)	42 (4.4)	0 (0)
Total	1708	610 (100)	411 (100)	370 (100)	317	786 (100)	613 (100)	309 (100)	707 (100)	958 (100)	43 (100)
	(100.0)				(100)						

Note: *P<0.001

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Table 4 Behaviours related to clinical guideline use in 1568 health practitioners, China, 2016

Guideline Utilization	No. (%)
Frequency of Guideline Use (n=1568)^a	
Frequently	177 (11.3)
Often	556 (35.5)
Occasionally	709 (45.2)
Never	126 (8.0)
Sum	1568 (100.0)
Sources of Guidelines (n=1438)	
Public search engines	911 (63.4)
Medical websites	697 (48.5)
Materials distributed by institutions	575 (40.0)
Professional academic journals	413 (28.7)

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Chinese biomedical databases	408 (28.4)
Materials distributed by companies	188 (13.1)
Foreign biomedical databases	69 (4.8)
Unaware of how to obtain guidelines	52 (3.6)
Preferred Types of Guidelines (n=1420)¹	
Chinese guidelines for primary care institutions	1024 (72.1)
Chinese guidelines for all medical institutions	1006 (70.9)
Translated foreign guidelines (Chinese versions)	261 (18.4)
Original foreign guidelines (English versions)	66 (4.6)
Barriers to Guideline Use (n=1560)	
Lack of training	778 (49.9)
Lack of access	696 (44.6)
Lack of awareness	592 (38.0)

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Guidelines not updated in a timely manner	559 (35.8)
Guidelines not sufficiently concise	525 (33.7)
Limited practitioner knowledge	480 (30.8)
Guidelines not practical for implementation at the grass-roots level	477 (30.6)
Lack of oversight mechanisms to ensure medical practice fulfils the clinical recommendations	329 (21.1)
Language barriers	252 (16.2)
Lack of time to review guidelines	227 (14.6)
Others	5 (0.3)

Note: a. “Frequently” was defined as using guidelines on a daily basis. “Often” was defined as using guidelines on a weekly basis. “Occasionally” was defined as using guidelines on a monthly basis

Table 5 Attitudes towards clinical guidelines among and needs of 1568 health practitioners, China, 2016

	No. (%)										
Total	Profession				Professional Title			Education			
	Physician	Nurse	Practitioner from auxiliary department	Administrative staff	Primary	Intermediate	Senior	College and below	Bachelor's	Master's and above	
Evaluation of the applicability of current guidelines to primary care practice (n=1442)											
Entirely applicable	339 (23.5)	124 (23.4)	69 (19.6)	83 (26.9)	63 (25.0)	174 (26.4)	110 (21.8)	55 (19.8)	137 (23.5)	192 (23.4)	10 (25.6)
Partially applicable	1030 (71.4)	377 (71.3)	264 (75.0)	212 (68.6)	177 (70.2)	448 (68.0)	369 (73.1)	213 (76.6)	408 (70.1)	596 (72.6)	26 (66.7)

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Inapplicabl	31(2.2)	14	5	5	7	17	9	5	13	15	3
e		(2.6)	(1.4)	(1.6)	(2.8)	(2.6)	(1.8)	(1.8)	(2.2)	(1.8)	(7.7)
Unaware	42 (2.9)	14	14	9	5	20	17	5	24	18	0
		(2.6)	(4.0)	(2.9)	(2.0)	(3.0)	(3.4)	(1.8)	(4.1)	(2.2)	(0.0)
Sum	1442	529	352	309	252	659	505	278	582	821	39
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

)

Necessity of developing clinical guidelines for primary care (n=1568)

Necessary	1509	559	363	323	264	685	535	289	601	866	42
	(96.2)	(96.0)	(96.5)	(97.0)	(95.3)	(96.1)	(96.1)	(97.0)	(96.0)	(96.3)	(97.7)
Unnecessar	39 (2.6)	14	10	5	10	18	16	5	23	15	1
y		(2.4)	(2.7)	(1.5)	(3.6)	(2.5)	(2.9)	(1.7)	(3.7)	(1.7)	(2.3)

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Do not care	20 (1.3)	9	3	5	3	10	6	4	2	18	0
		(1.5)	(0.8)	(1.5)	(1.1)	(1.4)	(1.1)	(1.3)	(0.3)	(2.0)	(0.0)
Sum	1568	582	376	333	277	713	557	298	626	899	43
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

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Table 6 Multivariate logistic regression of knowledge of and attitudes towards guidelines

Dependent Variable	Independent Variable	Level	Odds Ratio (95% CI)	P Value
Knowledge of guidelines: Completely knowledgeable/ Not completely knowledgeable	Institution type	County level	0.788 (0.625,0.992)	0.043
		Grass roots level	Reference	
	Geographic area	Eastern	0.834 (0.633,1.097)	0.195
		Central	0.648 (0.510,0.825)	<0.001
		Western	Reference	
	Education level	Master's or doctorate	5.282 (2.458,11.348)	<0.001
		Bachelor's	1.876 (1.504,2.340)	<0.001
		High school and below	Reference	
		Professional title	Senior	4.875 (3.606,6.592)
		Intermediate	3.648 (2.887,4.608)	<0.001
	Primary or None	Reference		

		Profession	Physician	0.636 (0.470,0.862)	0.004
			Nurse practitioner	0.614 (0.464,0.813)	0.001
			Medical tech	1.196 (0.901,1.588)	0.216
			Administrative staff	Reference	
Attitudes	towards	Institution type	Primary care level	1.315 (1.007,1.718)	0.045
guideline:			County level	Reference	
Entirely applicable/		Geographic area	Eastern	0.205 (0.858,1.692)	0.282
Not entirely applicable			Central	0.715 (0.543,0.942)	0.017
			Western	Reference	
		Professional title	Senior	1.602 (1.127,2.279)	0.009
			Intermediate	1.356 (1.028,1.788)	0.031
			Primary or none	Reference	

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Appendix 1 Questionnaire: Attitudes to and behaviour concerning clinical guidelines in primary care of China

To whom it may concern,

Thank you for taking time to participate in this survey. Our objective is to investigate the health practitioners' behavior and needs concerning clinical guidelines in primary care institutions. We conduct an anonymous survey and promise that your private information will not be disclosed. Thanks for your collaboration.

1. Your working place: _____ Province/Autonomous Region /Municipality

2. Name of the health care institution you are working in:

3. Type of institution you are working in:

- A. County Hospital
- B. Community Health Service Centers
- C. Township Hospital
- D. Village Clinics
- E. Clinics
- F. Others _____

4. Your specialty

- A. Physicians
- B. Nurses
- C. Pharmacists
- D. Administrators
- E. Others _____

5. Your gender

- A. Male
- B. Female

6. Your education background

- A. Junior college and lower
- B. Undergraduate
- C. Master
- D. Doctor and higher
- E. Others _____

7. Your title

- A. Junior
- B. Middle

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- C. Senior
 - D. N/A
 - E. Others _____

8. Do you know what the clinical guideline is?

- A. Unaware
- B. Partially knowledgeable
- C. Completely knowledgeable

(If you unaware of clinical guidelines, you could quit this survey)

9. Frequency of clinical guidelines use

- A. Frequently
- B. Often
- C. Occasionally
- D. Never

(If you never use guidelines, you can ignore No.10-14)

10. Do you think it is necessary for primary healthcare practitioners to use clinical guidelines?

- A. Necessary
- B. Not necessary
- C. It does not matter

11. Degree of current clinical guidelines fit for primary care institutions:

- A. Entirely appropriate
- B. Partially appropriate
- C. Not appropriate
- D. Unaware

12. Most of clinical guidelines you use derived from(Could be multiple choice):

- A. Public search engines (eg. Baidu, Google)
- B. Medical websites (eg. DXY.cn, Clinphar.cn)
- C. Chinese biomedical databases (eg. WanFang, VIP, CNKI)
- D. Foreign biomedical databases (eg. Medline, Pubmed, Cochrane)
- E. Professional medical journals as subscribed
- F. Guidelines distributed by pharmaceutical companies
- G. Guidelines distributed by institutions
- H. Unaware of how to find a guideline
- I. Others _____

13. Which part of guidelines do you frequently read? (Could be multiple choice)

- A. Abstract
- B. Summary of recommendations
- C. Background
- D. Method

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4 E. Flow chart of diagnose and treatment
5 F. Recommendations
6 G. Evidence level and recommendation strength
7 H. Evidence for recommendations
8 I. References
9 J. Full text
10 K. Others _____
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14 **14. Which type of guidelines do you use frequently?** (Could be multiple choice)

- 15 A. Chinese guidelines for primary care institutions
16 B. Chinese guidelines for all medical institutions
17 C. Original foreign guidelines
18 D. Translated foreign guidelines
19 E. Others _____
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23 **15. The obstacles for primary care practitioners to use guidelines** (Could be multiple choice)

- 24 A. Lack concise forms of guidelines
25 B. Lack regular access to guidelines
26 C. Lack aware of using guidelines
27 D. Current guideline do not satisfy needs of primary care
28 E. Poor updates of guidelines
29 F. Limited knowledge of primary care practitioners
30 G. Language barrier
31 H. No time to read guidelines
32 I. Lack training on guidelines
33 J. Lack supervision on whether practices complying with guideline
34 K. Others _____
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41 **16. Do you think it is necessary to develop clinical guidelines for primary care institutions?**

- 42 A. Necessary
43 B. Unnecessary
44 C. Do not care
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47 **Reason for your answer:**

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51 (If you think it is unnecessary, you could stop the survey.)
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53 **17. What type of guidelines do you think is more desirable for primary care institutions?**

- 54 A. Specialized guideline
55 B. General guideline
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59 **18. Which parts do you think guidelines for primary care institutions should include?** (Could be
60 multiple choice)

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- A. Abstract
 - B. Recommendations (abstract)
 - C. Background
 - D. Method
 - E. Flow chart of diagnose and treatment
 - F. Recommendations (main body)
 - G. Evidence level and recommendation strength
 - H. Evidence for the recommendations
 - I. References
 - J. Full text
 - K. Others _____

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19. Your preferred guidelines

1) Length

- A. Full text version
- B. Summary version (including the recommendations)
- C. Both can do
- D. Others _____

2) Language

- A. Chinese
- B. English
- C. Both can do
- D. Others _____

3) Version

- A. Hard copy
- B. Electronic edition
- C. Both can do
- D. Others _____

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20. Which ways do you like to have access to guidelines for primary care institutions? (Could be multiple choice)

- A. Public search engines (eg. Baidu, Google)
- B. Medical websites (eg. DXY.cn, Clinphar.cn)
- C. Biomedical databases (eg. WanFang, VIP, CNKI, Medline)
- D. Professional medical journals
- E. Periodical training program for guidelines
- F. Periodical dispersion of hard copy or electronic edition of guidelines
- G. Others _____

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21. Do you want to attend training program for clinical guidelines for primary care institutions?

- A. Yes
- B. No
- C. Do not care

22. Your suggestions for development of clinical guidelines for primary care institutions:

Thank you again for your participation!

For surveyor only

1. Name:

2. Contact information:

3. Survey time:

4. Survey method:

- A. Field survey
- B. Telephone survey
- C. Email survey
- D. Others _____

5. If it was a field survey

- A. Respondents completed the questionnaire independently
- B. Respondents completed the questionnaire with the assistance of the surveyor
- C. Surveyor completed the questionnaire after consulting the respondents

Appendix2:**Personnel & medical services in primary care institutions**

Name of institution:

Item	Data
Personnel	
Total Number (NO.)	
Structure (No.)	Physician Nurse Practitioners from auxiliary departments (pharmacy, lab, radiology, echo) Administrative staff Others
Education(No.)	Master Bachelor College graduate High school and below
Professional Title(No.)	Senior Intermediate Primary No title
Length of Services(No.)	<5 years 5-10 years (5 years included) 10-15 years (10 years included) Over 15 years
Medical coverage radius	
Radius(km)	
Population Covered(10 thousands)	
Beds	
Annual Visits(visits/year)	
Annual Discharge (discharges/year)	
Physicians' daily burden of patient visits per	

capital(visits/day)	
Physicians' daily burden of inpatient beds per capital(beds/day)	
Nursing staff's daily burden of inpatient beds per capital (beds/day)	
Equipment and Technology	
Total value of institutional equipment \geq 10000 RMB(10000 RMB)	
Number of Equipment over 10000RMB(NO.)	10-50 thousand (10 thousand included) 50-100 thousand (50 thousand included) 100-500 thousand (100 thousand included) \geq 500 thousand
Lab Techniques	Routine blood Test: <input type="checkbox"/> yes <input type="checkbox"/> no Hepatic Function: <input type="checkbox"/> yes <input type="checkbox"/> no Renal Function: <input type="checkbox"/> yes <input type="checkbox"/> no Stool & Urine Test: <input type="checkbox"/> yes <input type="checkbox"/> no Bacterial Culture: <input type="checkbox"/> yes <input type="checkbox"/> no Blood Concentration Monitoring: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Ultrasonic	Black-White Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Colored Ultrasonic B scanner: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____
Radioactive Techniques	Plain Film: <input type="checkbox"/> yes <input type="checkbox"/> no CT: <input type="checkbox"/> yes <input type="checkbox"/> no MRI: <input type="checkbox"/> yes <input type="checkbox"/> no Angiography: <input type="checkbox"/> yes <input type="checkbox"/> no Others: _____

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	P1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	P2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P4
Objectives	3	State specific objectives, including any prespecified hypotheses	P4
Methods			
Study design	4	Present key elements of study design early in the paper	P5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	P5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P5
Bias	9	Describe any efforts to address potential sources of bias	P5
Study size	10	Explain how the study size was arrived at	P5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P7
		(b) Describe any methods used to examine subgroups and interactions	P7
		(c) Explain how missing data were addressed	P7
		(d) If applicable, describe analytical methods taking account of sampling strategy	P6
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P8
		(b) Give reasons for non-participation at each stage	P8
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P8
		(b) Indicate number of participants with missing data for each variable of interest	P8
Outcome data	15*	Report numbers of outcome events or summary measures	P8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA

		(b) Report category boundaries when continuous variables were categorized	P8-11
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	P11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P12-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	P15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P17

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.