

BMJ Open Barriers and enablers for the implementation of clinical practice guidelines in China: a mixed-method study

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ABSTRACT

Objectives The aim of this study was to explore perspectives and reasoning of medical staff from Class A tertiary hospitals about the factors hindering and facilitating the uptake and use of clinical practice guidelines (CPGs) during medical procedures.

Design Mixed-method research study to collect and analyse both quantitative and qualitative data.

Setting Class A tertiary hospitals in China.

Participants The inclusion criteria for the questionnaire survey and qualitative research were (1) medical practitioners and (2) years of practice: above 5 years in a tertiary hospital.

Methods Questionnaires were distributed to medical staff in 11 cities to collect quantitative data. Frequency and ranking of barriers and enablers were analysed. Spearman correlations were computed to explore the correlation between years of practice, professional title ranking and educational background with self-reported guideline adherence. Using a constructivist grounded theory method, qualitative data were generated via in-depth face-to-face interviews with Chinese medical practitioners.

Results A total of 359 medical practitioners were surveyed and 32 medical practitioners interviewed in 11 cities. Higher frequency and higher ranking of barriers all converged on 'lack of access', 'less convenient', 'lack of applicability' and 'lack of evidence from Chinese sample'. Higher frequency and higher ranking of enablers converged on 'Short formats presentation', 'Utilisation of various media', 'Information visualisation' and 'Linking to patient electronic medical records'. There were no relationships between characteristics of respondents with self-reported adherence. This research produced a theoretical understanding of the experience of medical practitioners when using guidelines. Themes identified were as follows: existing intrinsic flaws in guidelines, deficient or incomplete system mechanism and being ambiguous.

Conclusion Our findings provide a comprehensive and culturally sensitive perspective in understanding guideline implementation in China. Strategies addressing those barriers should be further discussed and researched in the future.

BACKGROUND

Clinical practice guidelines (CPGs) are evidence-based recommendations for

Strengths and limitations of this study

- This study is the first to explore Chinese physician's views on adherence to guideline implementation using a mixed study design.
- Mixed-methods research draws on potential strengths of both qualitative and quantitative methods, allowing researchers to explore diverse perspectives and uncover relationships that exist between the intricate layers of multifaceted research questions.
- There is a risk that the results are more positive than is actually the case as they are based on self-reported data, which is prone to a social desirability bias especially as evidence-based guidelines have been highly promoted recently.
- Selection bias may have affected some of the outcomes as hospitals that pay more attention to guideline development and implementation and respondents who had used the guidelines would have been more willing to be interviewed or complete the questionnaire.

healthcare professionals about the care of patients with specific conditions. As noted in the Institute of Medicine report, 'Clinical Practice Guideline', we can trust guidelines that translate the complexity of scientific research findings into recommendations that can enhance healthcare quality and outcomes.¹ The vitality of CPGs lies in their implementation. Researchers have shown that the uptake of CPGs is inconsistent,² and there is concern that guidelines have not always delivered the predicted improvements in clinical care.

A systematic review of studies in which guideline use was evaluated revealed that adoption and adherence were low even when awareness of and agreement with guidelines among target users were high.³ Limited use of guidelines contributes to omission of beneficial therapies and preventable harm,

suboptimal patient outcomes or experiences, or waste of resources.⁴

Guideline developers and users have expressed the need for guidance by which to choose, tailor and operationalise implementation strategies. Surveys and interviews with clinicians revealed that they were aware of and agreed with the guidelines but desired guidance and support to help implement them.^{5–7} Guideline implementation (GI) is challenged by many issues. A variety of contextual factors at the individual, institutional and systemic level often coexist and pose additional challenges to GI and use.⁸ A Cochrane systematic review by Baker *et al*⁹ found that interventions that had been selected and tailored to address identified barriers were more likely to improve professional practice compared with either no intervention or simple dissemination of guidelines.⁹

The Chinese health system is challenged with the complex healthcare needs of escalating numbers of patients. The application of evidence-based care using CPGs is one way to make efficient and effective use of resources. Between 1993 and 2010, 269 guidelines were produced by 256 Chinese developers and published in 115 Chinese medical journals, and the number of guidelines is increasing annually.¹⁰ There are only two investigative research studies in this area, and these show that the rate of adherence of clinicians to guidelines for Traditional Chinese Medicine (TCM) was 50% and that for treatment of patients with gout was 20%–40%.^{11 12}

No systematic data have been published on the implementation of and adherence to clinical guidelines in China.¹⁰ In China, normally, Class A tertiary general hospitals provide the full range of medical services, a high level of technical expertise and scientific research so they ought to play an exemplary role in keeping abreast with research advances and establishing evidence-based practice (EBP) methods in routine diagnosis and treatment procedures. Medical practitioners in Class A tertiary hospital should be pioneers to promote disseminating and implementing CPGs.

In this study, we chose medical practitioners in Class A tertiary general hospitals as our respondents to investigate self-reported barriers and enablers related to GI using a self-designed questionnaire. Given that qualitative studies can provide detailed insight into the range of barriers that apply across recommendations in guidelines, quantitative studies are also needed to quantify the prevalence of the barriers in a larger sample across the target group; our study was planned using a mixed-method research design that featured both quantitative and qualitative data within the same study to identify and explain why implementation of guidelines has not always occurred in China. We hope future researchers can design interventions to achieve improvements in GI based on our study results.

METHODS

Design

The aim of this study was to explore the perspectives and reasoning of medical staff from Class A tertiary hospitals related to the factors hindering the uptake and use of CPGs during medical procedures. An online questionnaire survey and semistructured interviews were conducted across China during the period from October 2017 to December 2017.

Approach

Quantitative research

Survey tool development was informed by the execution of a wide literature review and consultation with experts; the questionnaire was then revised based on feedback from a pretest performed in one tertiary hospital. In addition, the section of the questionnaire exploring the determinants of guideline adherence was based on the conceptual framework of implementability developed by Gagliardi *et al*.^{8 13} The questionnaire consisted of three sections. The first section asked a total of eight questions regarding demographic information, including gender, age, top qualifications, education level, clinical department and years worked since qualifying. The second section consisted of 18 multiple choice items that asked respondents to choose answers identifying barriers to GI and to identify and rank the top three barriers. The third part was directed at methods for improving GI and consisted of nine multichoice items from a macroscopic perspective and five multichoice items from a microscopic perspective focusing on a single recommendation implementation strategy, concurrently made in the guideline development process. Respondents also needed to list the top three answers. All these barriers and resolutions addressed adaptability, usability, validity, applicability and communicability of guidelines and accommodation, implementation and evaluation of GI; it also covered individual, organisational and systemic issues. Self-reported guideline adherence was assessed by one single item asking the respondents to what extent they thought they were applying the guidelines for clinical practice: never, sometimes, often, most of the time or always (see online supplementary file).

The readability and content validity of the questionnaire were tested by an expert in guideline development and a clinical expert who is also an expert in EBM. The appropriateness of each item was discussed and established within our team. Before the survey, we did a pilot study using 40 questionnaires administered to the same population twice within a 2-week interval to check reliability and to make sure the questionnaires were relevant and clear to the respondents. The test–retest reliability coefficient after 2 weeks was 0.79.

An online questionnaire survey developed by Changsha Ranxing Information Technology (<https://www.wjx.cn/>) was used as it was simple and easy to distribute and complete. Institutions and practitioners were not randomly selected during the sample process.

To obtain a representative sample, we first selected 11 large cities (Beijing, Tianjin, Zhengzhou, Chengdu, Shanghai, Wuhan, Guangdong, Shijiazhuang, Xinjiang, Changsha and Lanzhou), which had many physicians working in Class A tertiary hospitals and were representative of the population density, economic development and medical services of their respective regions. In each selected city, convenience sampling for hospitals was used. We contacted hospital administrators of targeted Class A tertiary level hospitals, through existing working relationships, which included general hospitals and specialised hospitals so as to give a representative sample of the different specialties being considered. Our on-line questionnaire was distributed through their staff network group. Doctors' samples were obtained based on the doctors' ID numbers included in the hospital directories.

The inclusion criteria for the questionnaires were as follows: (1) medical practitioners, (2) working time above 5 years in a tertiary hospital. A tertiary hospital is large hospital with a high level of specialised healthcare, research activities and quality of medical practice.

The aims of this questionnaire survey were as follows: (1) to investigate self-reported barriers and enablers related to GI; (2) to explore associations of self-reported use of guidelines with these demographic characteristics: length of time in practice, professional title and education background. We hypothesised that the use of guidelines would be influenced by these demographic characteristics. Our hypothesis that there would be associations between those factors and guideline adherence was based on a systematic review of related literature and discussion between all authors with whom we had a relationship and who were willing to engage in dialogue with us.

Qualitative research

We used a qualitative approach to report on the medical practitioners' experiences and perceptions regarding GI. The constructivist grounded theory (GT) approach was used to determine barriers to GI.¹⁴

The interview guide was formulated based on a literature review that used general, open-ended and non-leading questions including questions to determine participants' understanding of GI, their practical experiences in this area, what additional resources are required, barriers and facilitators for the implementation of CPGs and the contexts in which CPGs were implemented. The interviewer also encouraged exploration of responses using a combination of conventional interview techniques (eg, probing questions, seeking clarification, confirming answers if required and presenting reflections). The authors continually revised and explored new topics that had emerged from the data collection. Some questions were asked of all medical practitioners, while others which came up during one interview and were then included as questions in subsequent interviews.

The sampling strategies applied in this study were purposive sampling and theoretical sampling. Purposive sampling was used at the start of the research to select

participants who met the following inclusion criteria. Each participant: (1) was a healthcare provider, (2) had more than 5 years experience working in a tertiary hospital. The exclusion criteria were unwillingness to being audio-recorded. We initially approached potential interviewees by telephone, email, WeChat (a mobile text and voice messaging communication service developed by Tencent in China) or speaking with them in person. Following an expression of interest, health workers received study descriptions and consent forms. Respondents identified were asked to nominate at least one other person to facilitate snowball sampling. The selection of participants sought to achieve a balanced representation of different professional areas.

In addition, the researcher also used theoretical sampling to select participants with particular experiences or characteristics to meet specific needs identified through data analysis and relevant to the theory development. Theoretical sampling is a distinctively GT method. It is a process whereby concepts, categories and conceptual ideas are elicited from raw data through constant comparison and used to direct further data generation. One example, after the initial analysis of the first 10 interviews showed that evidence-based medicine (EBM)-related status had a considerable influence on participant GI experience, so the researcher sought clinical medical practitioners who were actively engaged in EBM research or knowledge translation to further refine the theory. As is common in qualitative research, sampling was concurrent with data collection and analysis and proceeded until no further unique themes emerged from successive interviews (saturation). This was determined through discussion between two independent reviewers at various times during the iterative data analysis process until the two reviewers reached consensus in their analysis of the interviews.

The interview guide and process were pilot-tested with the first practitioner who met the eligibility criteria, and the pilot interview was retained as part of the analysis as no major adjustment was needed.

Data collection

All respondents were voluntarily participating in the investigation and could discontinue the survey at any time. Informed consent was assumed with the participation in the survey. The survey was anonymous. The objectives and procedures were explained to the participants in detail before the implementation of the survey. We set the automated inspection function for missing answers to avoid incomplete data.

All interviews were conducted in Chinese within the respondent's workplace in a quiet and confidential environment. The interviews were conducted by two authors (YJ and DH). The two interviewers had received training in qualitative methods and interviewing techniques prior to commencement of the study. Notes were taken to facilitate recall and further exploration. The interviewer would record the responses or non-verbal language as

they were presented and encourage elaboration to collect more in-depth data. At the end of the conversation, the interviewer would repeat captured information and request confirmation from the key informant to ensure data accuracy.

The researchers had no relationships with the participants or personal goals.

To ensure the questionnaire sample did not contaminate the interview sample, we did the survey first and chose interviewees who were not included in questionnaires sample.

Data analysis

Data from the survey were entered into SPSS (V.21.0). The data were reported as percentages and frequencies. Spearman correlations were computed to explore the correlation between years of practice and self-reported guideline adherence, correlation between professional title ranking and self-reported guideline adherence and correlation between educational background and self-reported guideline adherence. Spearman correlation coefficients were used and were interpreted as follows: >0.90: excellent relationship, 0.71–0.90: good, 0.51–0.70: fair, 0.31–0.50: weak and 0.30: none.

The interviews were transcribed verbatim and reread with the audio by one author to ensure accuracy. Data management software Nvivo Pro V.11 was used to manage qualitative data (<http://www.qsrinternational.com/nvivo-product/nvivo11-for-windows/pro>). Content analysis was performed to analyse the qualitative data and induce themes. Such analysis of qualitative data involved preparation, management and the interpretation of data to guide the coding of data into categories. All data were coded into thematic coding trees. Initial themes included descriptive categories of barriers and enablers. Further examination of the data led to higher order coding. Codes that had similar concepts were grouped together to form categories. Themes emerged from codes and categories.

Patient and public involvement

Patients and or public were not involved in this study.

RESULTS

Quantitative research findings

The participants in the questionnaire survey were from Class A tertiary hospitals (24 hospitals in total) located in the 11 cities across China. A total of 359 questionnaires were collected. The median age of participants was 40 years, ranging from 28 to 59 years (see [table 1](#)).

All 359 respondents stated that they were knowledgeable about clinical guidelines. Most respondents 83.6% (300/359) stated that they sometimes used guidelines, and only 11.7% (42/359) frequently used these guidelines. In addition, 4.7% (17/359) of the practitioners had never used clinical guides even though they were aware of them.

Table 1 Demographic characteristics of respondents: 359 health practitioners in Class A tertiary hospitals in China

Characteristic	Category	Respondents, n (%)
Gender	Male	152 (42.3)
	Female	207 (57.7)
Professional practice area	Medical oncology	34 (9.5)
	Surgical oncology	27 (7.5)
	ICU	18 (5.0)
	Respiratory medicine	30 (8.4)
	Endocrinology and metabolism	28 (7.8)
	Stomatology	20 (5.6)
	Emergency	29 (8.1)
	General surgery	29 (8.1)
	Gastrology	11 (3.1)
	Rehabilitation	8 (0.2)
	Haematology	41 (11.4)
	Paediatrics	20 (5.6)
	Paediatric surgery	16 (4.5)
	Nephrology	9 (2.5)
	Urinary surgery	25 (25)
	Obstetrics and gynaecology	14 (7.0)
Years of practice	5–9 years	132 (36.8)
	10–15 years	101 (28.1)
	>15 years	126 (35.1)
Education background	PhD	84 (23.4)
	Master	202 (56.3)
	Bachelor	73 (20.3)
Professional title	Chief physician or professor of medicine	55 (15.3)
	Associate senior doctor or associate chief physician or associate professor	71 (19.8)
	Intermediate	102 (28.4)
	Primary	131 (36.5)
City	Beijing	38 (10.6)
	Tianjin	34 (9.5)
	Zhengzhou	35 (9.7)
	Chengdu	37 (10.3)
	Shanghai	27 (7.5)
	Wuhan	40 (11.1)
	Guangdong	31 (8.6)
	Shijiazhuang	40 (11.1)
	Xinjiang	30 (8.4)
	Changsha	29 (8.1)
	Lanzhou	18 (5.0)

Continued

Table 1 Continued

Characteristic	Category	Respondents, n (%)
Self-reported guideline adherence	Very high	42 (11.7)
	High	119 (33.1)
	Moderate	131 (36.5)
	Low	50 (13.9)
	Very low	17 (4.7)

ICU, intensive care unit.

There are 18 items relating to barriers in the questionnaire. All items were chosen by more than one person. The most frequent barrier was 'less convenient', cited by 49% of the respondents. The other most cited barriers were 'lack of evidence from Chinese sample (148: 41.2%)', 'lack of applicability (141: 39.3%)', 'lack of access to CPG (128: 35.7%)' and 'impractical for use in local settings (patients factors) (113: 31.5%)' (see [table 2](#) and [figure 1](#)).

The three top ranked barriers in turn were 'lack of access (54: 15.0%)', 'less convenient (30: 8.4%)' and 'lack of applicability (30: 8.4%)' (see [figure 1](#)).

From [figure 1](#), we can see that higher frequency and higher rank all cluster around 'lack of access', 'less convenient', 'lack of applicability' and 'lack of evidence from Chinese sample.'

'Utilisation of various media (237: 66.0%)', 'Linking to patient electronic medical records (194: 54.0%)' and 'Short formats presentation (192: 53.5%)' were the strategies most commonly recommended for GI (see [table 3](#)).

The strategies respondent ranked as the top three, in turn, were 'Utilisation of various media (60: 16.7%)', 'Linking to patient electronic medical records (39: 10.7%)' and 'Information visualisation (49: 13.6%)'.

From [figure 2](#), we can see that higher frequency and higher rank all cluster around 'Short formats presentation', 'Utilisation of various media', 'Information visualisation' and 'Linking to patient electronic medical records'.

From [table 4](#), we can see ways to improve guideline documents to enhance guideline use including 'identify the possible barriers, facilitators or feasible solution', 'provide the real case' and 'provide guideline implementation tools'.

There was correlation between years of practice and self-reported guideline adherence, but the degree of correlation was very low ($p=0.00$, $r=0.20$ (CI: 0.07 to 0.31)).

There was correlation between professional title ranking and self-reported guideline adherence, but the degree of correlation was also very low ($p=0.00$, $r=0.21$ (CI: 0.11 to 0.28)).

There was correlation between education background and self-reported guideline adherence, but the degree of

Table 2 Barriers to guideline implementation in 359 health practitioners in Class A tertiary hospital in China

Parameters	N	Per cent
Lack of access	128	35.7
Less convenient, for example, cannot interface with hospital information system	175	48.8
No specified target user or audience	81	22.6
Lack of applicability, for example, lack of a clear, feasible and practical implementation method; or too simple to solve the patient's practical problem	141	39.3
Ambiguity and lack of clarity	83	23.1
Too complex to allow rational methods of guideline development	82	22.8
Lack of evidence from Chinese sample	148	41.2
Low quality of underlying evidence	47	13.1
Lack of agreement between different guidelines dealing with a similar topic	86	24.0
Guidelines deemed impractical for use in local setting (administrative factors), such as a higher ranked doctor disagreed with the guidelines' use	93	25.9
Guidelines deemed impractical for use in local setting (patients factors), such as recommendations were not in accordance with patients' values and preferences	113	31.5
Guidelines deemed impractical for use in local setting (resources factors), such as lack of personnel, materials and funding	98	27.3
Guideline implementation affected physician's income	38	10.6
Language barriers associated with English guidelines	98	27.3
Delayed updates	58	16.2
Worry about legal issues because of conflict with usual practice	87	24.2
Lack of validity, such as high possibility of existing conflict of interest	40	11.1
Lack of attraction, such as being turgid and long	99	27.6

correlation was also very low ($p=0.00$, $r=0.24$ (CI: 0.09 to 0.40)).

Qualitative research findings

The pilot testing led to no major adjustment of the interview guide. Thirty-two medical practitioners participated in this interview. Data saturation occurred by interview 26 and little new information was elicited in the last six interviews. Each interview lasted for approximately 1 hour. Fifteen interviewees were male and 17 were female. The average age was 39 years (range, 33 to 49 years). The average duration of clinical practice was 14 years (range, 8 to 28 years). There were two TCM doctors. Nineteen medical practitioners had participated in EBP-related

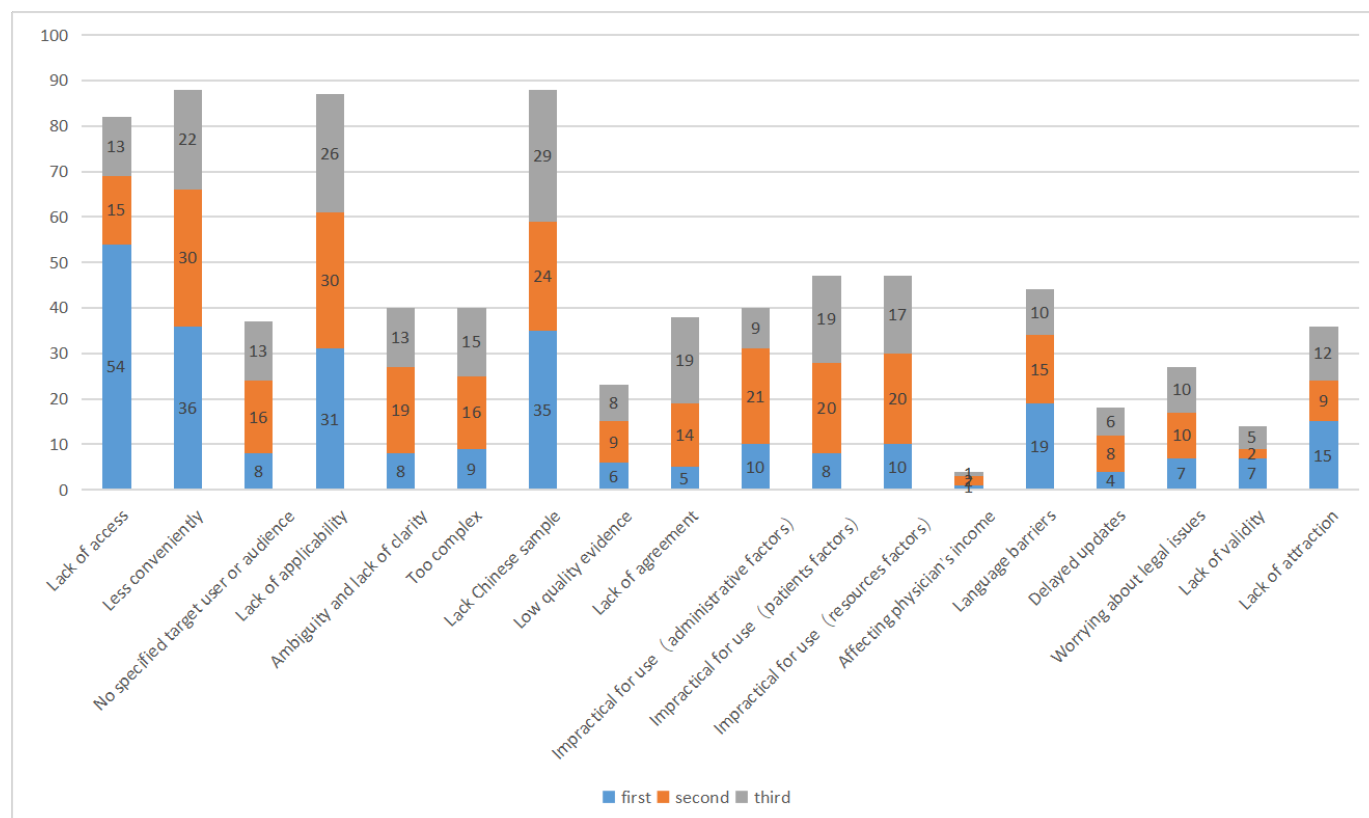


Figure 1 The top three barriers to guideline use among 359 health practitioners in Class A tertiary hospitals in China.

research (conducting systematic review, being a member of a guidelines development group, practicing EBP in clinical work, teaching EBP-related courses in a medical university).

The key themes are reported in [table 5](#) and [figure 3](#), along with categories and each set of codes. Most interviewees strongly agreed that it is important to use guidelines. Overall, medical practitioners admitted that

guidelines can improve patient outcomes, but that is not the reason they adhered to the guideline. Themes were identified inductively and interactively using constant comparative technique. The emerging themes were broadly similar to our research questions and corresponded with our objectives ([table 5](#)).

Barriers were classified into existing intrinsic flaw in the guidelines, deficient or incomplete system mechanism and being ambiguous ([figure 3](#)). No interviewees felt that there were no barriers to putting the guideline into practice. There is some overlap within the information in the qualitative research data leading to controversies between data analysts. We solved those controversies by using a third data analyst.

Existing intrinsic flaw: make guidelines more implementable by modifying their content and format

Respondents expressed concern regarding the application of guidelines. Guidelines have some limitations, which we came to express using the word 'flaw' affecting their usability. Outpatients often have multiple chronic diseases, and inpatients are often at risk from multiple preventable problems. Unfortunately, currently most guidelines often only address a single chronic disease or complication.

"To be honest, lots of guidelines are not applicable. For example, I work in a general intensive-care unit. We admit all the sickest patients from the surrounding areas and ICU patients are at risk from more than

Table 3 Helpful strategies for guideline use in 359 health practitioners in Class A tertiary hospitals in China

Parameters	N	Per cent
Short formats presentation	192	53.5
Utilisation of various media	237	66.0
Information visualisation	172	47.9
Linking to patient electronic medical records	194	54.0
Discourse by guideline developers	140	39.0
Combine with clinical pathway	159	44.3
Support and facilitation of the guideline implementation by administrative leaders of health service institutions	120	33.4
Dissemination and promotion of guidelines by government health department via teaching events (eg, national conferences, continuing professional education)	157	43.7

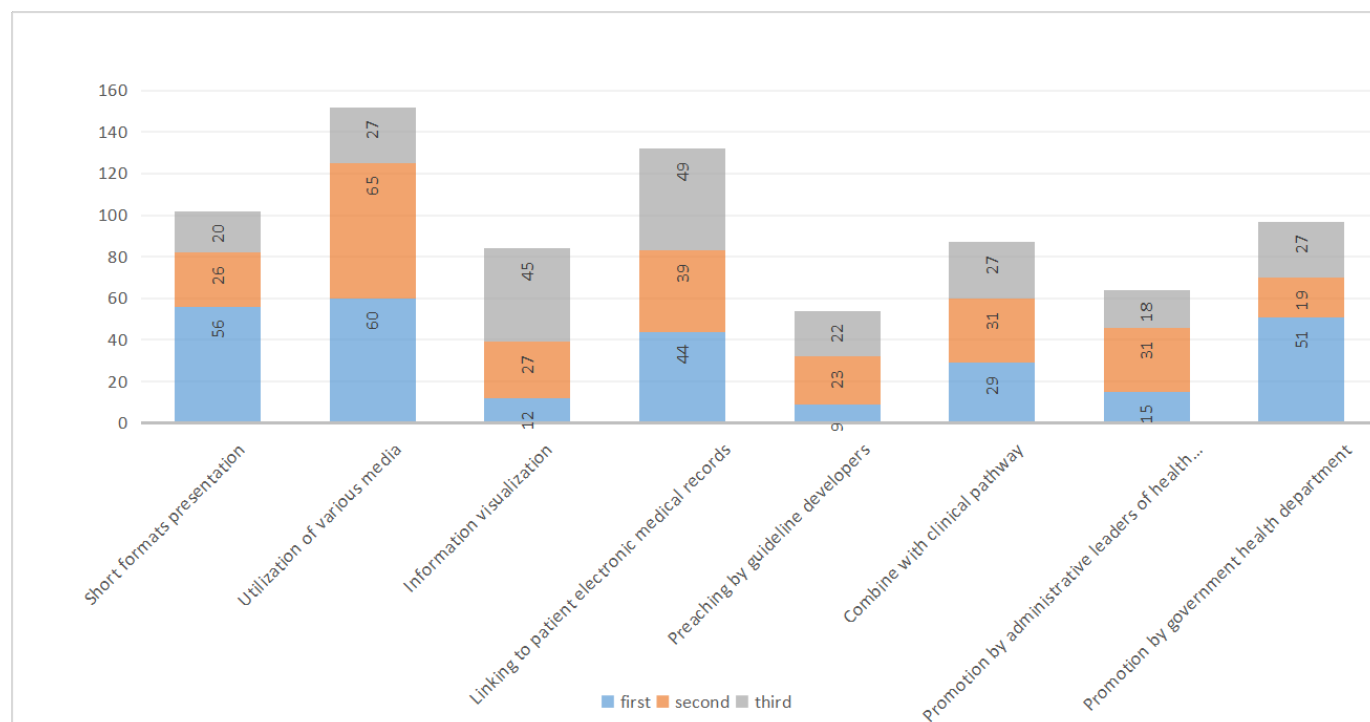


Figure 2 The top three strategies to promote guideline use among 359 health practitioners in Class A tertiary hospitals in China.

a dozen different problems, such as nosocomial infections, venous thromboembolism, delirium, and ventilator-associated pneumonia. All those interventions or solutions co-exist in so many guidelines, and it is difficult for us to collect and integrate them into a care plan or daily workflow.”

Three respondents referred to guidelines as sometimes being the ‘ivory tower’ of academia.

“I work in real life settings, where research needs to matter on the ground on a daily basis, not just in the ivory tower of academia.”

The guidelines need to contain additional tools, templates or instructions to support user implementation.

“Guideline recommendations are sometimes ambiguous: one recommendation said that one immediate instillation of chemotherapy should be administered within 24 hours after surgery. ‘Within 24 hours’ is a broad time span, what should clinicians do? As another example, elderly hip fracture patients should have delirium assessment conducted after surgery, so, how should the clinician decide, which assessment tool is recommended? We cannot find this information anywhere in the guideline.”

Two TCM doctors expressed their views about guideline applicability for Classical TCM treatment methods.

“Guideline implementation in TCM is still a controversial issue, TCM focuses on individual therapy. The four traditional methods of diagnosis: observation, listening, interrogation, and pulse-taking are very personalized. Every doctor has their own prescription method especially in herbal medicine treatment. Given the fact that TCM is becoming increasingly popular and recognized worldwide, promoting guidelines in some TCM areas is needed, for example, acupuncture and Chinese patent drugs.”

Table 4 Ways to improve guideline documents to enhance implementation in 359 health practitioners in Class A tertiary hospitals in China

Parameters	N	Per cent
Identify the possible barriers or facilitators, or a feasible solution needed for specified recommendations	231	64.3
Provide guideline implementation tools (implementation tool means any self-contained informational or interactive print or electronic resources in the guideline document or accompanying files, websites or applications)	225	62.7
Clarify the equipment, staff or corresponding training needed for implementing recommendation	168	46.8
Provide baseline assessment tool, audit tool, measurement tool	177	49.3
Provide a real case example whose diagnosis and treatment process run through the whole or most of recommendations	229	63.8

Table 5 Themes, categories and codes based on interview responses by medical practitioners

Themes	Category	Codes
Existing intrinsic flaw of guideline	Guideline	Did not address patient's complex status Insufficient clinical experts were involved in the guideline development resulting in the omission of some important clinical questions Few indigenous and high-quality guidelines Little support to users for implementing the recommendations Lack of clarity of recommendations Not suitable for Chinese traditional medicine
Deficient or incomplete system mechanism	External environment	Insufficient drive by department director Insufficient drive by medical quality supervision department
	Power of role model (humanistic environment)	No strong support from peers Reduced culture of EBM
Being ambiguous	Awareness	Not absolutely necessary to implement guideline
	Ability	Limited skill, limited self-efficacy Difficult to integrate patient preferences
	Inertia	Maintain the status quo

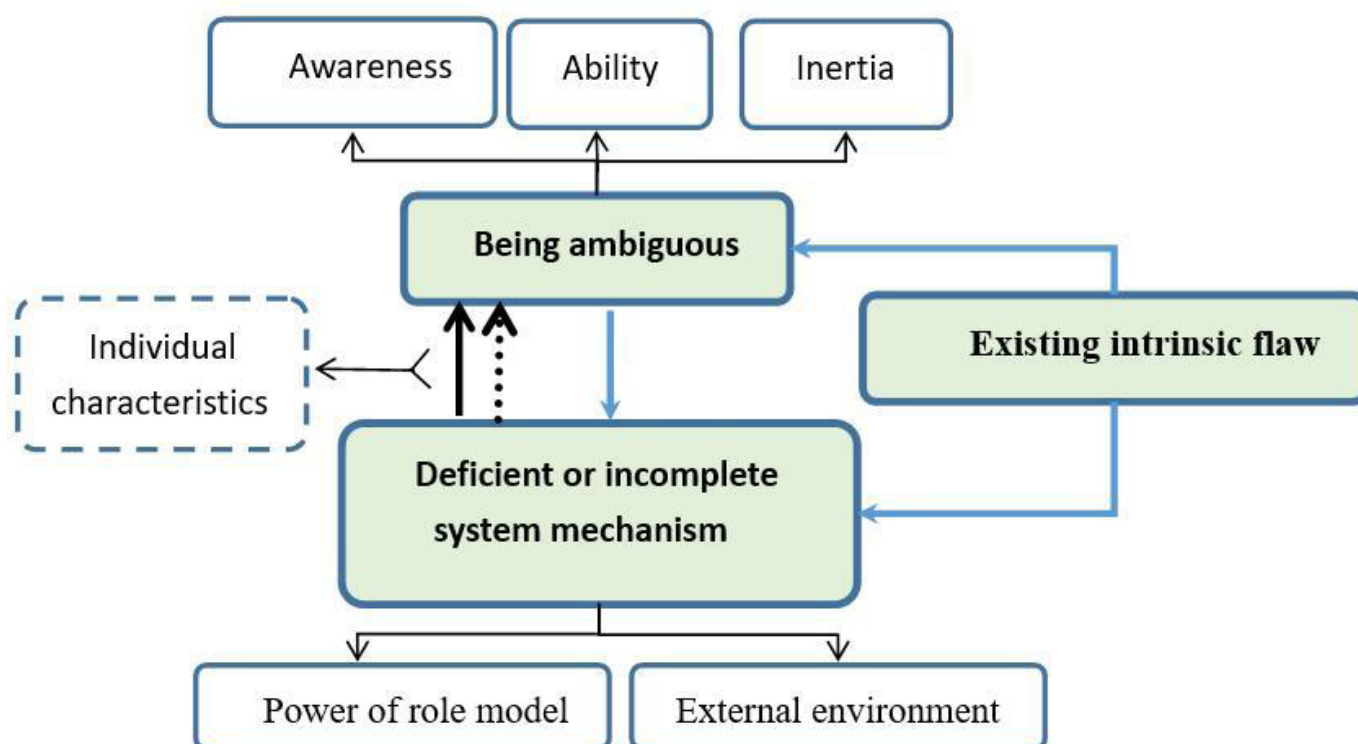
EBM, evidence-based medicine.

Deficient or incomplete system mechanism

Almost all participants described GI as needing strong executive support. The lack of guideline promotion and supervision by superiors within the department was likely to influence the consistent provision of good quality services. This theme refers to the organisational processes, structures and resources required to support the uptake of the guideline. In particular, having formal

structures and forums for GI, establishing structures to support reflective practice and building capacity for EBP were considered to be important enablers of guideline use.

Some doctors complained that time constraints hinder access and use of guidelines. It seems like a workload theme: actually it reflects an incomplete system mechanism. Some interviewees also expressed the belief that

**Figure 3** Relational graph showing qualitative research categories and themes.

guideline use depended on whether the director or other external environmental organisations drove and supported them.

“Lack of support from leaders was the major barrier to implementation of guideline, this is absolutely right.”

“Regulatory scrutiny from national or regional Health and Family Planning Commission maybe the best method to disseminate and implement guidelines.”

“Linking guideline recommendation with patient’s health insurance is also a method, but this requires a significant change in thinking...”

“Should the guideline first be checked and then introduced by the Chief physician?”

“We are not confident when using guidelines because they haven’t been officially approved”

“There are too many patients in hospital, you know, doctors in China suffer from great stress because of a heavy workload and tense relationship between patients and doctors. There are so many times when doctors just hope to get the job done without mistakes and medical disputes. So, for some physicians, searching, reading and using guidelines are not of paramount importance, unless the department leaders forcefully promote guideline use.”

Four medical practitioners considered that EBP culture and the power of a role model in practicing EBP should give positive stimulation. After discussion, we decided to classify social influence from people around medical practitioners, whom we described as physicians’ colleagues, within the category and theme of system mechanisms part of the social/humanistic environment.

So we looked at the relationship between medical practitioners’ colleagues and the power of role models (humanistic environment) and classified this under the theme of system mechanism.

“Lack of atmosphere: for example, if my colleagues frequently read and communicate guidelines, this will encourage me.”

Ambiguity (clinicians are unclear who is supposed to do what, when and how)

‘Being or becoming aware’ has a potential moderating role in the relationship between determinants of adherence and actual guideline adherence. Specifically, because ‘awareness’ is seen as a first step in behaviour change, which in this case has been interpreted as ‘being aware of one’s own behaviour’, as medical practitioners become aware, they should internalise the importance of using guidelines, learn and practice techniques related to guideline use for themselves. Participants offered different responses in self-evaluated ability to implement guidelines. More than half of the participants described GI as challenging, time-consuming and/or complex, often recognising the need for specific expertise. Some

medical practitioners indicated that they found keeping up to date with the latest information, including the latest guidelines was a significant problem.

Three interviewees stated that

“I do not know where to find guidelines on the internet”, or “I do not know how to identify high-quality guidelines”, or “I have no time, everyday is so busy...”.

“I think we underemphasize the need to search for and read CPG, yes, that is the most important barrier between clinicians. Most physicians adhere to the Chief physician’s recommendations without questioning whether some of them should be updated.”

“...We have a three level ward-round system, which can ensure the quality of medical treatment.”

Three-level ward-round system means the system of staff organisation involving chief physician (deputy chief physician), attending physician and resident doctor. In China, the quality of medical treatment is ensured by the resident doctor who looks after the patient on an hour by hour basis, deferring in treatment decisions to the attending physician who will in turn defer to the chief physician (consultant). So the views of the chief physician are of paramount importance.

“For patients with chronic disease or old people, it is difficult to get them to agree to change their former treatment plan even though we explain that the recommended treatment is based on the best evidence, or tell them the detailed information about the possible adverse consequences of a former drug regime.”

Also, two doctors considered that they or their team are able to identify treatments which are more up to date than the current guidelines in a very fast changing situation. GI capacity varies between healthcare professionals. Actually it reflects respondents’ self-efficacy. As depicted in figure 3, if deficient or incomplete system mechanisms affect physician behaviour in using guidelines, most are dependent on the awareness and ability of physicians, so we used a solid and a dotted arrow to describe their relationship.

“Cancer diagnosis and treatment is progressing quickly all over the world. Like our hospital, ** university ** Cancer Center, is taking a lead in lots of therapy research areas in China, and even in the world. I believe that some physicians, like me, sometimes, think that guideline even the latest updates will lag behind. Some guidelines cannot be updated quickly enough to include the latest research results. Actually we already know those latest research results through international or domestic academic conferences. In that sense, guidelines maybe more suitable for primary hospitals.”

DISCUSSION

Finding of this research

To our knowledge, this study is the first to explore Chinese physician's views on GI using a mixed study design. Mixed-methods research draws on potential strengths of both qualitative and quantitative methods, allowing researchers to explore diverse perspectives and uncover relationships that exist between the intricate layers of our multifaceted research questions. Our data suggested that there are so many barriers impeding guideline use and that clinical guideline use is not very common in Class A tertiary hospitals. Barriers such as 'lack of access', 'less convenient', 'lack of applicability' and 'lack of evidence from Chinese sample' were cited and ranked highly. 'Short formats presentation', 'Utilisation of various media', 'Information visualisation' and 'Linking to patient electronic medical records' were suggested as promotional methods. In the qualitative research, three themes reflecting experiences and views of the medical practitioners we interviewed regarding guideline use were existing intrinsic guideline flaw, deficient or incomplete system mechanism and being ambiguous regarding ability and responsibility.

GT methods were chosen for this study because GT methods allow for an uncovering of the underlying social processes that are grounded in empirical data. The main purpose was to generate a theoretical understanding rather than simply describe the study phenomenon. The use of GT methods is more likely to offer insight and enhance understanding rather than simply describe the study phenomenon. In this study, GT provides a constant comparative method for the generation of a theoretical understanding of the experiences of China's medical practitioners regarding guideline use.

Improved features of the guideline itself

In this study, quantitative and qualitative research both showed that there needs to be improvements in the guidelines themselves to facilitate GI. Most guidelines despite the presence of navigational features such as tables of contents contained a large volume of graded evidence and numerous tables featuring complementary clinical information to the point of being cumbersome. Few contained additional features specified by users or suggested by research to improve guideline use.¹⁵ Implementation planning most often occurred on guideline completion. Implementation could be more successful if planning were concurrent with rather than consecutive to guideline development so that the recommendations were clear and useable, target users were primed for adoption, and their needs, preferences and insight into contextual factors could inform implementation planning.¹⁶ Gagliardi⁶ interviewed 30 international guideline developers and concluded that including implementation information within guidelines would help implementation. For example, a GI tool that contains informational or interactive print or electronic resources in the guideline document or accompanying documents and websites

can improve clinician behaviour and patient outcomes. Professional societies were more likely to generate guidelines that included clinician GI tools. Many guidelines do not include any GI tools or a variety of guideline implementation tools for different stakeholders that may be more likely to prompt guideline uptake.²¹⁷ Up until now, none of the Chinese guidelines contain GI tools.

Given the existing flaws of Chinese guidelines and the limited resources available,¹⁰ the adoption or adaptation of existing high-quality international guidelines is a potentially efficient and cost-effective approach. 'Lack of evidence from Chinese sample' was an important barrier to GI. Our research showed that many medical practitioners thought that China needs to develop guidelines de novo to meet the needs of Chinese populations, like including evidence from a Chinese sample.

Patients and practitioners are the main users of guideline. Since compliance with guidelines is not mandatory in China, guideline developers need to make efforts to advise both patients and practitioners on the best ways to use them. Guideline format and content influence perceptions about use of guidelines. Specifically, these intrinsic guideline qualities have been shown to promote greater understanding of how users are to apply the recommendations, stimulating confidence in users' ability to practice the recommended behaviour.¹⁶ Our quantitative and qualitative research showed that medical practitioners need far more explicit guidance and help about some specific recommendations. Thus, use of guidelines might be optimised by improving their format and content and giving Chinese physicians more implementation details.

Lack of applicability (recommendation wording is sometimes too simple and lacks requisite clinical information such as indications, criteria, risk factors and drug dosing that facilitates application) as a high frequency cited barrier also reflected lack of training for medical practitioners about guideline development and implementation methodology. GI checklists organised by time sequence from patient admission to discharge equipped with recommendations is a good method. In China, there are no guideline publishing platforms or specialised guideline databases. Guidelines are usually published in journals. Most Chinese journals impose strict word limits even for guideline publication. The Chinese journal editors usually encourage authors to focus on the recommendation presentation and shorten supporting material or relating tools. 'Lack of applicability' also reflected that a guideline is usually hard to apply to patients with multiple comorbidities or critically ill patients. Evidence-based guidelines focus on patients with single diseases and often exclude complex patients, which limits the applicability in practice. Further research and efforts are needed on methods to address comorbidity in guidelines in order to improve the applicability of guideline recommendations; this is reflected in various other studies.^{18 19}

'Short formats presentation', 'Utilisation of various media', 'Information visualisation' and 'Linking to

patient electronic medical records' were the most highly valued methods to improve GI by Chinese medical practitioners. It is important to make effective use of various media for promoting the implementation of CPG by improving applicability. Presenting guideline recommendations in multiple formats especially in WeChat versions might serve the varying needs of medical practitioners and patients. This is a challenge for guideline developers. Research showed that some things that can be done are as follows: decide the leader of the implementation group and identify the stakeholders; decide which implementation techniques to use to promote the use of CPG in practice; convene a multidisciplinary working group to analyse local needs and priorities; develop the summary version; utilise various information media; educate and train the workforce; organise workshops and conferences; incorporate recommendations for implementation of the guideline in the daily work routines.^{9 13–16 20}

Building a culture and environment that facilitates EBP

Building an EBP culture and environment is instrumental to stimulating GI. Such a culture or atmosphere would require top management taking the lead in promoting and enabling combined research, teaching and clinical practice, which would introduce EBP and GI for medical practitioners. Meanwhile, academics that included guideline developers and implementation researchers should collaborate with clinical practitioners when formulating guidelines to ensure practicability and operability. EBP and supporting an innovative atmosphere in organisations can foster a spirit of inquiry.

Leaders and managers have a key role in EBP in not only supporting guideline or other high-quality evidence implementation and providing the infrastructure for it but also role modelling evidence-based decisions. This is especially important given our interview findings which revealed that many medical practitioners identified lack of leadership support as a major barrier to GI. Changing or breeding culture in an organisation is a lengthy process: it may take many years. Open transparent discussions with clinicians who fear change can sometimes gain their support, since implementation of a CPG should involve team work and co-operation.

Promote the awareness and ability of physicians to adopt guideline recommendations

No obvious difference between different lengths of practice with practical GI in our study suggests that physician's choice of whether or not to use guidelines has more to do with individual characteristics than with years of practice. This result also was supported by the qualitative research data. Although previous research on guideline use by various healthcare professionals has shown that those who are young or less experienced are more inclined to use guidelines than those who are older or more experienced, who are more likely to lean on their clinical expertise.²⁰

In our study, this may not always be the case. Some but not all clinicians place an emphasis on EBP and are equipped with high EBP technologies leading to their positive attitude to GI, this may be due to the variation in research backgrounds and information included in academic preparation programme. Certainly, it is also related to different academic development levels and the research atmosphere of different clinic departments. Knowledge of where to find guidelines and access to relevant guidelines are obviously key prerequisites to their use. The results from qualitative and quantitative elements both show that some medical practitioners in China did not have comprehensive search technique skills for finding guidelines relevant to their practice, leaving them mostly relying on academic conferences and dissemination from colleagues.

Before a practice guideline can affect patient outcomes, it first affects physician knowledge, then attitudes and finally behaviour. Although behaviour can be modified without knowledge or attitude being affected, behaviour change based on influencing knowledge and attitudes is probably more sustainable than indirect manipulation of behaviour alone.²¹

An important finding was that there is very little consensus regarding who is responsible for promoting and implementing guidelines in China. However, some clinicians believe that guideline use is their duty and responsibility, others think that they have no authority, time, energy, funds or capacity to use the guidelines. So the category 'awareness' showed by the qualitative research data means that lack of the concept of EBM remains a possible barrier. In general, 'awareness' refers to public or common knowledge or understanding about a social, scientific or political issue. In our study, 'lack of awareness' implies that clinicians do not have knowledge and understanding of EBM; this in turn leads to a negative attitude regarding GI or other EBP. As stated before, 'awareness' is the first step in behaviour change, so it is not surprising that some clinicians with insufficient knowledge and an inactive attitude will maintain the status quo of disease diagnosis and treatment. Self-efficacy is defined as a personal judgement of 'how well one can execute courses of action required to deal with prospective situations'.²² Expectations of self-efficacy determine whether an individual will be able to exhibit coping behaviour and how long effort will be sustained in the face of obstacles.²² Adequate 'awareness' and 'ability' can boot one's self-efficacy. One of the interviewees showed the highest self-efficacy in conducting EBP. He is young, has a doctoral degree (PhD) and is highly skilled, able and enthusiastic in applying EBM. There is an absolute relationship between his self-efficacy and his GI behaviour. Our research team agreed that the categories of 'awareness', 'ability' and 'inertia' can be replaced by 'self-efficacy'.

Identify barriers and cope with barriers

Nearly all research into GI and guideline development manuals mention that identifying barriers to

implementation is important, and many methods to do this are suggested in the document.^{23–25} The dilemma is which method should we choose when we plan to use guidelines in specific clinical settings. Baker *et al*⁹ found that both single and multiple methods were used in studies identifying barriers, most often interviews, focus groups and questionnaires. Krause *et al*²⁶ investigated the determinants which have been used in implementation projects in five European countries and a total of 601 determinants judged to be plausibly important were identified. They concluded that there was no best way to identify barriers.

Each barrier usually requires a separate intervention. Guideline flaws need multidisciplinary work to develop implementation strategies at the same time as guideline development, awareness requires conversation and an inspirational environment, and inertia requires influencing skills to motivate change. These quantitative and qualitative research data concluded that there are many ways to cope with implementation barriers. These approaches should be pulled together and tailored to suit local circumstances and address local barriers.

Very limited information is available on the process of how and why clinicians change or are reluctant to change their practice, and currently, there is no standardised implementation strategy known to be completely effective in incorporating findings into clinical practice in China. This study attempts to describe the multiple factors that may contribute to, or hinder, the uptake and use of CPGs by clinical practitioners in tertiary hospitals in China. That is a first step to addressing GI in China. The range of cities we sampled and the mixed research method make us believe that our results can be representative and transferable, and our study use a reliable and validated instrument based on a relatively homogenous population of tertiary hospitals and had a satisfactory response rate.

Comparison with similar studies

Zeng *et al*²⁷ conducted a cross-sectional survey in primary care settings in China. Of the respondents, only 11.3% frequently used CPG, lower than our result (44.8% including very high and high frequency) this is likely to be largely because of the different level of medical institutes chosen. The most frequently identified barriers to guideline use were lack of training (49.9%), lack of access (44.6%) and lack of awareness (38.0%), which are consistent with those of our study.

Several qualitative studies have focused on barriers at the level of key recommendations.^{28–30} A focus group study among Dutch guidelines showed that lack of applicability, organisational constraints and lack of knowledge were the most prominent barriers to adherence to guidelines and that each individual key recommendation had a unique pattern of barriers.³¹

Limitations

The cross-sectional design in quantitative research was used but no causal relationships can be inferred. One of

the important factors that promote CPGs utilisation in daily clinical practice is the user's perception of the trustworthiness of the CPGs. In our study, we hypothesised that there were high-quality guidelines that we can apply. We did not include guideline quality as a consideration in the quantitative and qualitative research. For GT, the process of theoretical sampling continues until the point of theoretical saturation is reached. Saturation means that no additional data are being found, whereby the researcher can develop properties of the category. But making a theoretically sensitive judgement about saturation maybe subjective and is never precise. Selection bias may have affected some of the outcomes as hospitals that pay more attention to guideline development and implementation and respondents who had used the guideline would have been more willing to agree to be interviewed or complete the questionnaire. And we only included tertiary hospitals so it should be borne in mind that the findings may not generalise to other levels of hospital. In the future, we will continue to enlarge our sample to investigate specified GI status and explore further influencing factors. We wonder if the frequency of guideline use is also likely to vary with different regions, specialties, participation in guideline development, EBM education in college and EBM education in work unit; these should be explored in the future research.

Implications for research

The results identified here may provide a starting point for the development of GI methodologies. Chinese researchers have published a number of guidelines and development methodological papers in international and domestic medical journals. There are very few articles about GI methodologies, especially rigorous implementation research. We plan to enlarge the sample size to including other levels of hospital and more provinces or cities to collect more comprehensive views for the future.

From October 2016, the Health and Family Planning Commission of the People's Republic of China has initiated work constructing a national CPG database aiming to promote CPGs development, dissemination and implementation in China. Some of authors in this study, as consulted experts in the national guideline progress, are proposing a structured plan to develop a framework or checklist to guide and direct GI based on this study result and future other-level hospital surveys.

Implications for practice

At present, the Health and Family Planning Commission of the People's Republic of China is collecting guidelines developed by Chinese researchers. We hope to put forward some policy suggestions for guideline standardisation, especially recommendations for, preparation and writing of documents and releasing of various versions. We also hope guideline developers in China take note of our paper and pay more attention to the implementation part when planning guideline protocols.

CONCLUSION

In conclusion, we have identified a wide range of barriers that Chinese medical practitioners face when attempting to use guidelines. 'Lack of access', 'less convenient', 'lack of applicability' and 'lack of evidence from Chinese sample' are particularly prominent. Utilisation of various information media, strengthening the administrative promotion and constructing implementation strategies concurrent with guideline development are important. The finding from our study may be useful for guideline developers in the process of developing and updating the guidelines to raise the acceptance and permeability of the guideline recommendations. Our results support the notion that more attention should be given to GI when planning guideline development.

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