Determinants of Successful Guideline Implementation: A National Cross-Sectional Survey

Ying-hui Jin
Centre for Evidence-Based and Translational Medicine
Li-Ming Tan
The Second People's Hospital of Huaihua
Khalid S. Khan
Women's Health Research Unit, Queen Mary University of London
Tong Deng
Department of General Surgery, Huaihe Hospital of Henan Univeristy
Chao Huang
National Center for Medical Service Administration, National Health and Family Planning Commission
Fei Han
Emergency Department, Xuan Wu Traditional Chinese Medicine Hospital, Beijing
Jing Zhang
The First Clinical College of Wuhan University, Wuhan University
Qiao Huang
Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University
Di Huang
Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University
Dan-qi Wang
Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University
Yu Wang
Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University
Xian-tao Zeng
Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University
Qiang Wang
National Center for Medical Service Administration, National Health and Family Planning Commission
Xing-huan Wang (wangxinghuan1965@163.com)
https://orcid.org/0000-0003-4725-9581

Research article

Keywords: guideline, adherence, implementation, barriers

Posted Date: July 6th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-37357/v1

Version of Record: A version of this preprint was published on January 14th, 2021. See the published version at https://doi.org/10.1186/s12911-020-01382-w.

Abstract

Background: CPGs are not uniformly successful in improving care and several instances of implementation failure have been reported. Performing a comprehensive assessment of the barriers and enablers is key to developing an informed implementation strategy. To investigate determinants of guideline implementation and explore associations of self-reported adherence to guidelines with characteristics of participants in China.

Methods: This is a cross-sectional survey, using multi-stage stratified typical sampling based on China's economic regional divisions (the East, the Middle, the West and the Northeast). 2-5 provinces were selected from each region. 2-3 cities were selected in each province, and secondary and tertiary hospitals from each city were included. We developed a questionnaire underpinned by recommended methods for the design and conduct of self-administered surveys and based on conceptual framework of guideline use, in-depth related literature analysis, guideline development manuals, related behavior change theory. At last, multivariate analyses were performed using logistic regression to produce adjusted odds ratios (OR) and 95% confidence intervals (95%CI).

Results: The questionnaire consisted of four sections: knowledge on methodology for developing guidelines; barriers to accessing guideline; barriers to guideline implementation; and methods for improving guideline implementation.

There were 1732 participants (87.3% response rate) from 51 hospitals. Of these, 77.2% reported to have used guidelines frequently or very frequently. The key barriers to guideline use were lack of education or training (46.2%), and overly simplistic wording or overly broad scope of recommendations (43.8%). Level of adherence to guidelines was associated with geographical regions (the northeast $P<0.001$; the west $P=0.02$; the middle $P<0.001$ compared with the east), hospital grades($P=0.028$), length of practitioners' practice ($P=0.006$), education background (PhD, $P=0.027$; Master, $P=0.002$), evidence-based medicine skills acquired in work unit ($P=0.012$), and medical specialty of practitioner (General Practice, $P=0.006$; Surgery, $P=0.043$).

Conclusion: Despite general acknowledgement of the importance of guidelines, the use of guidelines was not as frequent as might have been expected. To optimize the likelihood of adherence to guidelines, guideline implementation should follow an actively developed dissemination plan incorporating features associated with adherence in our study.

Background

Health research, practice, and policy focuses on improving delivery, organization, and outcomes of care. Clinical Practice Guidelines (CPGs) that collate evidence-based recommendations for physicians and other health professionals are critical in this regard [1, 2], and the number of guidelines being published are increasing annually [3]. Guideline implementation, a complex and challenging task [4], requires a change in clinician behavior [5]. Poor implementation may lead to suboptimal patient outcomes as it may

miss out on beneficial therapies and may fail to avoid preventable harm, while wasting limited health care resources[4]. An effective implementation strategy involves inclusion of stakeholders in guideline development, identification and overcoming of barriers by assessing individual and organizational preparedness, and capturing the adherence of guidelines via audit and feedback.

269 guidelines were produced by 256 Chinese developers and 115 were published in Chinese medical journals, yet no systematic studies have evaluated strategies that examine barriers and factor related to adherence [6]. Recognizing this information gap, we investigated the determinants of their implementation and explored the association between guideline adherence and survey participant characteristics in a nationwide study.

Methods

After having obtained ethics approval, we designed and conducted a robust survey study between January 2019 to July 2019 which complies with recommended methods [7] and aims to maximize compliance with reporting guidelines [8].

Framework

A multitude of factors, including enablers and barriers of guideline adherence, clinician, organization, and system levels, may influence whether and how guidelines are used[9-12].In order to formally assess the determinants of guideline implementation, we used the following literature and resources for the conceptualization of our research framework: (a) ideas of implementability formalized by Gagliardi et al. consisting of 22 elements within eight domains, including adaptability, usability, validity, applicability, communicability, accommodation, implementation, and evaluation[13]; (b) Guideline Implementability Appraisal (GLIA and GLIA 2.0) tool to provide information about implementability to authoring groups enabling them to decide on content in anticipation of potential problems in implementation[[14] and taking into account executability, decidability, validity, flexibility, effect on process of care, measurability, novelty/innovation, and computability[5]; (c) Qualitative approach to exploring the medical practitioners' experiences and perceptions regarding guideline implementation with general, open-ended and non-leading questions having developed a basic understanding of the reaction of medical practitioners and system mechanism to the introduction of guidelines; (d) Systematic reviews of guideline implementation[15-17] literature with five main areas identified: (i) the guideline, (ii) the target health care professional user, (iii) the patient characteristics, (iv) the work environment, and (v) the implementation strategy; (e) Systematic examination of the content of guideline development manuals to identify implementation methodology of known organizations[18-22]; and (f) Behavior change and social-cognitive theory advocated and applied in implementation research for improving understanding of determinants of evidence-based medicine (EBM) practice and guideline use [23-25].

Questionnaire construction, piloting and reliability testing

A bespoke questionnaire, consisting of four parts, was developed as a self-administered survey and its design was based on recommended methods [7]. The aim of the survey was to investigate barriers and enablers related to guideline adherence. First, the survey instrument covered background information about the participants (qualifications, education level, clinical department, years of practice) and some specific questions related to guideline implementation (e.g, “Did you take EBM or EBM related education?”, “Do you agree that high-quality guidelines provide basic guidance for healthcare delivery?”, “Are you are willing to acquire and read high quality guideline?”, and “To what extent do you think you are applying the guidelines in your clinical practice?”). A 4-point Likert scale was used to rate the extent of guideline adherence.

The second section captured knowledge of a broad and comprehensive range of the methods and processes for producing guidelines with 17 items. Questionnaire items were based on the manuals considered in our framework section (e) as mentioned above, with particular reference to NICE and WHO [20, 21]. The third section consisted of four multiple choice items relating to barriers to guideline acquisition and 15 multiple choice items relating to barriers to guideline implementation which were categorized into three areas: existing intrinsic flaw of guideline (seven items); deficient or incomplete system mechanism and external environment (five items); and awareness and ability of clinicians (three items). The fourth part consisted of questions which looked at methods for improving guideline implementation; this consisted of seven multiple choice items which addressed external enablers and four multiple choice items which adopted a microcosmicperspective to focus on internal enablers relating to the guideline implementation. The full questionnaire is provided in Appendix 1.

The readability and content validity of the questionnaire were tested by five guideline development experts, six clinical EBM experts and 20 clinical experts from different medical specialties. All experts commented on the clarity and relevance of each survey item. There was agreement among the experts on the clarity and relevance of most of the included items, and we revised some items to improve clarity. Before implementing the study survey, we tested for repeatability by administering the questionnaires to the same population of 40 participants twice, with a two-week interval in between the first and second survey. The test–retest reliability coefficient was excellent at 0.80 (1=perfect repeatability).

Survey sampling, questionnaire administration and data collection

A cross-sectional survey was used and it took into account the differences of geographical location and the number of medical institutions. We used a multi-stage stratified sampling strategy based on China's economic regions (the East with seven provinces and three municipalities; the Middle with six provinces; the West with 11 provinces and one municipality; and the Northeast with three provinces). Two to five provinces were selected for each region with two to three cities selected for every province, and each city included both secondary and tertiary hospitals. Sampling procedures for hospitals was decided by Medical Standards Bureau of Management Center of Medical Management Services, National Health Commission of the People's Republic of China Mainland based on Proportion Report of Hospital Institutions of Health Statistics Yearbook 2018[26]. We did not include Hong Kong, Macao or Taiwan in

this survey. In total, 32 cities from three provinces and two municipalities in the East, three provinces in the Middle, three provinces and one municipality in the West, and two provinces in the Northeast were chosen. More provinces and municipalities were selected from the East because there is a higher concentration of medical institutions in that region. Doctors in each hospital were recruited using the hospitals' directories which held a database of their ID numbers. Licensed doctors, pharmacists and nurses, regardless of specialty, with over five years of continuous working experience of providing direct or indirect clinical care optimizing health promotion, wellness, and disease prevention were invited to take part in the survey.

The survey was administered during the period of January 2019 to July 2019[27]. Four researchers were each allocated to one of the regions and all used the agreed set of instructions included in the protocol. The researcher explained the nature and purpose of the study to the participants in a meeting room. Informed consent was obtained before the printed copies of questionnaires were distributed. Participation was voluntary and participants could withdraw from the study at any time. The survey data were anonymized. Data were entered and validated by Epidata (version 3.1, Odense Denmark, EpiData Association, 2010). Questionnaires with more than 10% of data missing were excluded from the analysis.

Data analysis

We hypothesized that the use of guidelines is associated with demographic characteristics, attitudes, and knowledge. All included data were analyzed using SPSS, version 17.0 (SPSS, Chicago, IL, USA). Categorical variables from survey items were described using frequencies and percentages. Continuous variables were reported as median with interquartile range (IQR; 25–75% percentile) or mean with standard deviation (SD) as appropriate. Chi-squared test was used to explore if there were differences in the barriers to guideline implementation based on the different grade of hospitals. Two-sided p values of less than 0.05 was considered to be statistically significant.

Univariate and multivariate analyses were carried out using logistic regression. The dependent variable was the self-reported guideline adherence, and the independent variables were region, hospital grade, years of practice, education background, professional title, EBM education in college, EBM education in work unit, participation in guideline development, acknowledgment of guideline for clinical practice, knowledge score, and professional practice area. Factors with $P<0.1$ in the univariate analysis were included into the multivariate analysis to identify the independent determinants of guideline adherence. The associations are reported as adjusted odds ratios (ORs) with 95% confidence interval (95% CI). Two-sided $p<0.05$ was considered to be statistically significant.

Results

In total, 1984 questionnaires were administered in 51 hospitals (30 tertiary public hospitals and 21 secondary public hospitals) located in all the main cities in 11 provinces and three municipalities in China (Figure 1). Of these, 252 questionnaires were excluded because of missing answers (>10% of data missing). The overall response rate was 87.3% (n=1732/1984; 1234 and 498 in tertiary and secondary

hospitals respectively). As shown in Table 1 the respondents included staff from a wide range of specialties. The specialties “Medicine” and “Surgery” represented 22% and 15.7% of the survey sample, respectively. The median years of participants’ practice was 15.0 (± 10.3) years. Although more than half of participants (54.3%) had received EBM or related education, only a small proportion had participated in the development of guidelines (14.7%). Nearly all participants considered guidelines to be an essential or basic guidance for healthcare delivery (Table 1).

Knowledge for CPGs development

Most of the respondents (94.5%, range: 85.4% - 98.2%) agreed or strongly agreed with all methodological items. Out of all the items considered to be an important component of the key methodology in the development of guidelines, “conducting a systematic and comprehensive search for evidence” was the item that was strongly agreed or agreed upon by the highest proportion of the surveyed population (98.2%) (Appendix 2).

Barriers and enablers of guideline adherence

Overall, 1313 (77.1%) participants reported frequent or very frequent use of guidelines (61.8% participants were using Chinese guidelines). Only 50 (2.9%) participants seldomly used guidelines even though they were aware of the guidelines (Table 1). Table 2 shows barriers to acquisition and implementation of guidelines. A noteworthy finding with regards to the acquisition of guidelines was that over half of the participants were too busy to pursue acquisition (58.6%). The most frequent barrier in implementation of guidelines was “lack of education or training in guideline use”, as reported by 787 participants (46.2%). The other most cited implementation barriers were that the “wording of recommendations were too simple or that the scope of the recommendations were too broad”, as reported by 746 participants (43.8%), “lack of agreement between different guidelines dealing with a similar topic” as reported by 699 participants (41.1%), “ambiguity and lack of clarity of recommendations” as reported by 697 participants (41.0%) and “lack of evidence from Chinese sample” as reported by 654 participants (38.4%).

When compared to the answers provided by participants in tertiary hospitals, more health care practitioners in secondary hospitals thought that the lack of a conducive atmosphere to encourage guideline use (P 0.001), lack of education or training (P 0.001), guideline implementation affects physician’s income (P 0.001) were barriers of guideline use (Figure 2).

When compared to the answers provided by participants from secondary hospitals, more health care practitioners in tertiary hospitals thought that the lack of validity (P 0.001), delayed updates (P 0.001), lack of agreement between different guidelines(P 0.001), low quality of underlying evidence (P 0.001), lack of evidence from Chinese sample (P =0.001), ambiguity and lack of clarity of recommendations (P 0.001) and overly simplistic wording or overly broad scope of recommendations (P 0.001) were barriers in guideline implementation(Figure 2).

Appendix 3 showed data on enablers and we found that the utilization of various media, short format presentations, linking of guidelines to patient electronic medical records, identification of the possible barriers, facilitators, or feasible solutions, and provision are important guideline implementation tools.

Features associated with guideline adherence

Multivariate analysis showed that adherence was associated with regions (Northeast OR 2.02, 95% CI 1.42-2.88, *P*<0.001; West OR 1.53, 95% CI 1.07-2.18, *P*=0.02; Middle OR 2.16, 95% CI 1.48-3.15, *P*<0.001 compared with the East), hospital grades (OR 0.70, 95% CI 0.50-0.96, *P*=0.028), practitioners' years of practice (OR 1.03, 95% CI 1.01-1.05, *P*=0.006), education background (PhD OR 1.90, 95% CI 1.07-3.37, *P*=0.027; Master OR 2.11, 95% CI 1.31-3.41, *P*=0.002 compared with Junior college degree), EBM skills acquired in work unit (OR 1.44, 95% CI 1.08-1.92, *P*=0.012), and specialty (General practice OR 2.06, 95% CI 1.23-3.45, *P*=0.006; Surgery OR 1.49, 95% CI 1.01-2.19, *P*=0.043). Participants in the Northeast, Middle, and West regions were more likely than those in the East region to consider using guidelines. Participants in secondary public hospitals showed higher self-reported guideline adherence than those in tertiary public hospitals. The longer the years of practice and the higher the education background, the more likely participants were to considered guideline use. We found that EBM or EBM-related education in work unit is significantly associated with self-reported guideline adherence.

No associations were found between professional titles (chief physician or professor of medicine, associate senior doctor or associate chief physician), EBM or related education in college, acknowledgment of guidelines providing basic guidance for clinical practice, participation in the development of guidelines, and knowledge scores for guideline development (Table 3).

Discussion

Main findings

Our survey found that over two-thirds of practitioners used guidelines frequently or very frequently and had a positive attitude towards the guidelines' potential impact on their clinical practice. The key barriers to guideline use were lack of education or training, overly simplistic wording of recommendations or overly broad scope of recommendations, and disagreement between guidelines on the same topic. Secondary hospitals showed higher adherence than tertiary hospitals. Guideline adherence was associated with regions, hospital grades, practitioners' years of practice, education background, EBM skills acquired in work unit, and general practice or surgical specialty.

Strengths and limitations

To our knowledge this is the first nationally representative survey that used a reliable and validated instrument to examine the factors influencing guideline implementation among Chinese health care practitioners. With an excellent response rate and geographical coverage, we believe that our results should be representative of other parts of China. However, as Hong Kong, Macao and Taiwan were

omitted from the survey, and that we did not include first level hospitals and grass-roots medical and health institutions, these limitations should be borne in mind with respect to generalizability. Furthermore, the cross-sectional design limits inferences concerning causal relationships. Finally, as in all self-reported data, social desirability bias may lead to an overestimation of guideline use. Overall, we believe that the quality of our data is sufficiently strong for use in the development of implementation strategies that target the identified barriers to guideline implementation.

Interpretation of findings

Nothing could be more frustrating to a guideline developer than failure of its implementation. Our study, focusing on a global view, found that unimpeded promotion, multichannel and multiform guideline presentation combined with extensive education and training of all health care practitioners were considered paramount for guideline implementation. In contrast to our study where guideline use was high, it has been observed that few Chinese medical doctors follow them. The poor knowledge of guideline-related information has also been documented in Chinese primary care [28,29]. Concerns about how the perceived need for high level of resource hinders guideline implementation have been addressed by developing a framework for stratifying guideline recommendations according to health care setting level [26,31]. There is no doubt that Chinese guideline developers will improve guideline recommendations in such a way that they will be more applicable to different health care settings in China in the future [32-36].

Organizational or managerial support (e.g. protected work time for training) influences the implementation of guidelines. Our survey showed that the lack of education or training for guideline use and incomplete system mechanism or environment contributed as barriers to guideline implementation. A survey in primary care, where only 11.3% of respondents used guidelines, reported lack of training as a key barrier, which is consistent with our findings [30]. Workforce education should be interprofessional in scope and integrated in practice[24, 37-39].The major stakeholders, including representatives of the various practitioner and patient groups as well as local administrators and policy makers, should be engaged [40].

We found that ambiguity in the wording of the recommendations confused practitioners and hampered uptake of guidelines, as reported previously [41]. Key action statements should be clear and precise so as to prevent inappropriate practice variation [42]. Confidence in ability to practice the recommended behavior is key to its implementation [43-45]. Style, content, and format consistency with transparency in rationale and congruence with organization-specific policies can improve implementation [41,46]. With the development of information technology [47], adapting the form of presentation for mobile devices, pocket guides, wall posters and summary versions are badly needed for just-in-time accessibility.

Guideline implementation plans tailored to overcome the potential barriers identified in advance are more likely to improve professional practice compared with passive dissemination of guidelines [10,42]. There are many known features that influence the journey of evidence and guidelines from publication into practice [9,11,15,17,48,49,50]. Features intrinsic to guideline development, including stakeholder

involvement during all stages from its conception and content development to formatting and dissemination, are now recognized as important components [12,21]. Responding to the recognized need for understanding why guideline implementation works in some contexts and not in others, our study sheds light directly on this matter through a national representative survey.

Conclusion And Implications

Our survey provides a comprehensive, valid and generalizable snapshot to understand the state of guideline implementation in China, with lessons for other countries and regions. Major challenges lie ahead in: (a) making guidelines more accessible at the point of care; (b) strengthening guideline construction, focusing on unambiguous presentation of recommendations with bespoke implementation tools; and (c) training medical staff for embracing guidelines. In conclusion, guideline development should tailor the content for effective dissemination and, for optimizing the likelihood of adherence, guideline implementation should follow a bespoke plan incorporating features identified through our study.

List Of Abbreviations

CPGs: Clinical Practice Guidelines; GLIA: Guideline Implementability Appraisal; IQR: interquartile range; SD: standard deviation; OR: odds ratios; CI: confidence interval;

Declarations

Ethics approval and consent to participate

Approval was obtained from the ethics committee of Zhongnan Hospital of Wuhan University (No. 2019020). Verbal Informed consent was obtained before the questionnaires were distributed, and this was approved by the ethics committee.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

All the authors (Ying-hui Jin, Li-Ming Tan, Khalid S. Khan, Tong Deng, Chao Huang, Fei Han, Jing Zhang, Qiao Huang, Di Huang, Dan-qi Wang, Yu Wang, Xian-tao Zeng, Qiang Wang, Xing-huan Wang) declare no

competing financial interests. Ying-hui Jin, Xian-tao Zeng, Qiang Wang and Xing-huan Wang have conducted several clinical practice guidelines.

Funding

This study was supported by grants from the National Key Research and Development Program of China (No. 2016YFC0106300). The funding body did not have any role in the study and writing of the manuscript.

Authors' contributions

QW and XHW conceived and designed the study, and critically reviewed the manuscript. YH J, LMT, QW, XHW and KSK developed questionnaire. YHJ, CH, FH, JZ, DH, DQW, YW, XTZ and TD collected the data. YHJ and QH analyzed and interpreted the data. YHJ and LMT wrote the manuscript.

All authors read and approved the manuscript.

Acknowledgements

We extend special thanks for the contribution of consultant experts and health care practitioners for the development of the instrument and the cooperation of all study units. We also thank Kristy Yiu for English assistance.

Author information

Center for Evidence-Based and Translational Medicine, Zhongnan Hospital of Wuhan University, Wuhan 430071, China. Center for Evidence-Based and Translational Medicine, Wuhan University, Wuhan, 430071, China.

Ying-hui Jin, Jing Zhang, Qiao Huang, Di Huang, Dan-qi Wang, Yu Wang, Xian-tao Zeng, Xing-huan Wang

The Second People's Hospital of Huaihua, Huaihua, Hunan, China. Address: Wuxi Road, Hecheng District, Huaihua Hunan, 418200, China

Li-Ming Tan

Women's Health Research Unit, Queen Mary University of London, UK, Centre for Primary Care and Public Health, Barts and the London School of Medicine

Khalid S. Khan

Department of General Surgery, Huaihe Hospital of Henan University, Kaifeng 475000, China.

Tong Deng

National Center for Medical Service Administration, National Health and Family Planning Commission, Beijing, 100044, China

Chao Huang, Qiang Wang

Emergency Department, Xuan Wu Traditional Chinese Medicine Hospital Beijing, Beijing 10000, China

Fei Han

References

1. Gagliardi AR, Brouwers MC. Integrating guideline development and implementation: analysis of guideline development manual instructions for generating implementation advice. Implement Sci. 2012;7:67.
2. IOM. Clinical practice guidelines we can trust. National Academies Press. 2011.
3. Shekelle PG. Clinical practice guidelines: what's next? JAMA. 2018;320:757-8.
4. Pronovost PJ. Enhancing physicians' use of clinical guidelines. JAMA. 2013;310:2501-2.
5. Kashyap N, MD, Dixon J. GuideLine implementability appraisal v. 2.0. http://nutmeg.med.yale.edu/glia/login.htm. 2018. Accessed 4 Dec 2018.
6. Chen YL, Wang C, Shang HC, Yang KH, Susan LN. Clinical practice guidelines in China. BMJ. 2018;360:j5158.
7. Burns KE, Duffett M, Kho ME, Meade MO, Adhikari NK, Sinuff T, Cook DJ. A guide for the design and conduct of self-administered surveys of clinicians. CMAJ. 2008;179:245-52.
8. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. BMJ. 2007;335:806-8.
9. Mowatt G, Grimshaw JM, Davis DA, Mazmanian PE. Getting evidence into practice: the work of the Cochrane Effective Practice and Organization of care Group (EPOC). J Contin Educ Health Prof. 2001;21:55-60.
10. Baker R, Camosso-Stefinovic J, Gillies C, Baker R, Camosso-Stefinovic J, Gillies C, Shaw EJ, Robertson N. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. Cochrane Database Syst Rev. 2010:CD005470.
11. Flottorp SA, Oxman AD, Krause J, Nyokabi RM. A checklist for identifying determinants of practice: a systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. Implement Sci. 2013;8:35.
12. Kastner M, Bhattacharyya O, Hayden L, Brouwers M. Guideline uptake is influenced by six implementability domains for creating and communicating guidelines: a realist review. J Clin Epidemiol. 2015;68:498-509.

13. Gagliardi AR, Brouwers MC, Palda VA, Lemieux-Charles L, Grimshaw GM. How can we improve guideline use? A conceptual framework of implementability. Implement Sci. 2011;6:26.
14. Shiffman RN, Dixon J, Brandt C, Essaihi A, Hsiao A, Michel G, O'Connell R. The GuideLine Implementability Appraisal (GLIA): development of an instrument to identify obstacles to guideline implementation. BMC Med Inform Decis Mak. 2005;5:23.
15. Francke AL, Smit MC, de Veer AJ, Mistiaen P. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. BMC Med Inform Decis Mak. 2008;8:38.
16. Medves J, Godfrey C, Turner C, Paterson M, Durando P. Systematic review of practice guideline dissemination and implementation strategies for healthcare teams and team-based practice. Int J Evid Based Health. 2010;8:79-89.
17. Gagliardi AR, Alhabib S, members of Guidelines International Network Implementation Working G. Trends in guideline implementation: a scoping systematic review. Implement Sci. 2015;10:54.
18. Center MG. Japan council for quality health care: minds handbook for clinical practice guideline development. http://www.en.jcqhc.or.jp. 2018. Accessed on 5 Dec 2018.
19. NCEC. Guideline developers manual. http://www.lenus.ie/hse/handle/10147/317480. 2018. Accessed on 5 Dec 2018.
20. WHO. Handbook for guideline development. http://www.who.int/publications/guidelines /handbook_2nd_ed.pdf?ua=1. Accessed on 5 Dec 2018.
21. NICE. Developing Nice guidelines, the manual. Available at:https://www.nice.org.uk/process/pmg20/chapter/introduction-and-overview. 2018. Accessed on 5 Dec 2018.
22. SIGN. A guideline developer’s handbook. http://www.sign.ac.uk/sign-50.html. 2018. Accessed on 5 Dec 2018.
23. Godin G, Belanger-Gravel A, Eccles M, Grimshaw J. Healthcare professionals' intentions and behaviours: a systematic review of studies based on social cognitive theories. Implement Sci. 2008;3:36.
24. Davies P, Walker AE, Grimshaw JM. A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. Implement Sci. 2010;5:14.
25. Fishbein M, I. A. Belief, attitude, intention and behavior: an introduction to theory and research. Reading, MA: Addison-Wesley. 1975.
26. China NHCotPsRo. China’s health statistics yearbook 2018. Peking Union Medical College Press. 2018.

27. Kelley K, Clark B, Brown V, Sitzia J. Good practice in the conduct and reporting of survey research. Int J Qual Health Care. 2003;15:261-6.
28. Khan KS, Ball E, Fox CE, Meads C. Systematic reviews to evaluate causation: an overview of methods and application. Evid Based Med. 2012;17:137-41.
29. Liu M, Zhang C, Zha Q, Yang W, Ya Y, Zhong L, Bian Z, Han X, Lu A. A national survey of Chinese medicine doctors and clinical practice guidelines in China. BMC Complement Altern Med. 2017;17:451.
30. Zeng L, Li Y, Zhang L, Liu G, Zhang Y, Zhen S, et al. Guideline use behaviours and needs of primary care practitioners in China: a cross-sectional survey. BMJ Open. 2017;7:e015379.
31. Carlson RW, Scavone JL, Koh WJ, McClure JS, Greer BE, Kumar R, et al. NCCN framework for resource stratification: a framework for providing and improving global quality oncology care. J Natl Compr Canc Netw. 2016;14:961-9.
32. Jin Y, Li Z, Han F, Huang D, Huang Q, Cao Y, et al. Barriers and enablers for the implementation of clinical practice guidelines in China: a mixed-method study. BMJ Open. 2019, 9:e026328.
33. Chen Y, Hu S, Wu L, Fang X, Xu W, Shen G. Clinical practice guidelines for hypertension in China: a systematic review of the methodological quality. BMJ Open. 2015;5:e008099.
34. Jiang M, Liao LY, Liu XQ, He WQ, Guan WJ, Chen H, et al. Quality assessment of clinical practice guidelines for respiratory diseases in China: a systematic appraisal. Chest 2015;148:759-66.
35. Jin Y, Wang Y, Zhang Y, Ma Y, Li Y, Lu C, et al. Nursing practice guidelines in China do need reform: a critical appraisal using the AGREE II instrument. Worldviews Evid Based Nurs. 2016;13:124-38.
36. Yao L, Chen Y, Wang X, Shi X, Wang Y, Guo T, et al. Appraising the quality of clinical practice guidelines in traditional Chinese medicine using AGREE II instrument: a systematic review. Chinese J of EBM. 2016;16:1331-1337.
37. Coomarasamy A, Khan KS. What is the evidence that postgraduate teaching in evidence based medicine changes anything? A systematic review. BMJ. 2004;329:1017.
38. IDF. Guide for guidelines. https://www.idf.org/our-activities/advocacy-awareness/resources-and-tools/81:clinical-guideline-development.html. Accessed on 5 Dec 2018.
39. MaHTAS. Manual on development and implementation of evidence-based clinical practice guidelines. http://www.moh.gov.my/english.php/pages/view/117. 2018. Accessed on 5 Dec 2018.
40. NZGG. Handbook for the preparation of explicit evidenced-based clinical practice guidelines. http://www.health.govt.nz/about-ministry/ministry-health-websites/new-zealand-guidelines-group. 2018. Accessed on 5 Dec 2018.
41. Yang N, Yu Y, Zhang A, Estill J, Wang X, Zheng M, et al. Reporting, presentation and wording of recommendations in clinical practice guideline for gout: a systematic analysis. BMJ Open. 2019;9:e024315.

42. Rosenfeld RM, Shiffman RN. Clinical practice guideline development manual: a quality-driven approach for translating evidence into action. Otolaryngol Head Neck Surg. 2009;140:S1-43.
43. Michie S, Johnston M. Changing clinical behaviour by making guidelines specific. BMJ. 2004;328:343-5.
44. Dobbins M, Hanna SE, Ciliska D, Manske S, Cameron R, SL Mercer, et al. A randomized controlled trial evaluating the impact of knowledge translation and exchange strategies. Implement Sci. 2009;4:61.
45. KHA-CARI. KHACARI guideline development manual. http://www.cari.org.au/docs/KHACARI_Guideline_development_%20manual. Accessed on 5 Dec 2018.
46. Ramerman L, Hoekstra PJ, de Kuijper G. Exploring barriers and facilitators in the implementation and use of guideline recommendations on antipsychotic drug prescriptions for people with intellectual disability. J Appl Res Intellect Disabil. 2018;31:1062-70.
47. Institute NLR. The 15th national reading survey. National Library J. 2018;27:38.
48. Byrnes A, Young A, Mudge A, Banks M, Bauer J. Exploring practice gaps to improve perioperative nutrition care (EXPERIENCE Study): a qualitative analysis of barriers to implementation of evidence-based practice guidelines. Eur J Clin Nutr. 2019;73:94-101.
49. Dizon JM, Grimmer K, Louw Q, Machingaidze S, Parker H, Pillen H. Barriers and enablers for the development and implementation of allied health clinical practice guidelines in South African primary healthcare settings: a qualitative study. Health Res Policy Syst. 2017;15:79.
50. Kulier R, Gee H, Khan KS. Five steps from evidence to effect: exercising clinical freedom to implement research findings. BJOG. 2008;115:1197-202.

Tables

Table 1 Characteristics of survey participants

Characteristic	Category	n (%)
Region	The East	710 (41.0%)
	The Middle	361 (20.8%)
	The West	384 (22.2%)
	The Northeast	277 (16.0%)
Grade of hospitals	Tertiary hospital	498 (28.8%)
	Secondary hospital	1234 (71.2%)
Professional practice area	Oncology (including hemolymph neoplasm)	93 (5.7%)
	Stomatology/ophthalmology/otorhinolaryngology	85 (5.2%)
	Medicine	360 (22.0%)
	Surgery	256 (15.7)
	ICU or emergency	62 (3.8%)
	Anesthesia	72 (4.4%)
	Gynaecology/obstetrics	39 (2.4%)
	Traditional Chinese medicine	95 (5.8%)

	Pediatrics	108 (6.6%)
	Clinical pharmacy	157 (9.6%)
	Radiography or medical imaging	81 (5.0%)
	General practice or comprehensive health care	145 (8.9%)
	Nursing	83 (5.1%)
Years of practice		15.0±10.3
Education background	PHD’s	180 (10.6%)
	Master’s	419 (24.7%)
	Bachelor’s	893 (52.5%)
	Junior college	208 (12.2%)
Professional title	Chief physician or professor of medicine	264 (16.5%)
	Associate senior doctor or associate chief physician or associate professor	369 (23.1%)
	Intermediate	526 (32.9%)

	Primary	440 (27.5%)
Have you ever received any EBM or related education in college	Yes	894 (54.3%)
	No	754 (45.8%)
Have you ever received any EBM or related education in work unit	Yes	1210 (73.1%)
	No	445 (26.9%)
Do you think high-quality guidelines provide basic guidance for clinical practice	Yes	1672 (97.4%)
	No	44 (2.6%)
Willing to acquire and study high quality guideline	Yes	1687 (98.2%)
	No	31 (1.8%)
Self-reported guideline adherence	Seldom	50 (2.9%)
	Sometimes	339 (19.9%)
	Frequently	1127 (66.2%)
	Very frequently	186 (10.9%)

What kind of guidelines you use	Foreign guideline	199 (12.2%)
	Translated version from foreign guideline	425 (26.0%)
	Chinese version	1009 (61.8%)
Have you ever participated in the development of guidelines	Yes	251 (14.7%)
	No	1458 (85.3%)
If so, what role of participating in guideline development	Chairman	12 (11.0%)
	Final reviewer	33 (30.3%)
	Developer	36 (33.0%)
	Other	28 (25.7%)

Table 2 Barriers to guideline acquisition and implementation

Barriers	n (%)
Acquisition	
So busy with work, no time to search for guidelines	992(58.6%)
Limited knowledge of searching for guidelines	631(37.1%)
Less convenient to search for or download foreign language guidelines	894(52.5%)
Difficulty in searching for high quality guidelines	516(30.4%)
Implementation	
Wording too simple or recommendations too broad to solve the patient's practical problem	746(43.8%)
Ambiguity and lack of clarity of recommendations	697(41.0%)
Methods of rating of evidence or recommendations too complex to understand	592(34.8%)
Lack of evidence from Chinese sample	654(38.4%)
Low quality of underlying evidence	365(21.4%)
Lack of agreement between different guidelines dealing with a similar topic	699(41.1%)
Guidelines deemed impractical for use in local setting due to resource factors, such as lack of staff, materials or funding	605(35.5%)
Guideline implementation affects physician's income	153(9.0%)
Language barriers associated with international guidelines	638(37.5%)
Delayed updates	398(23.4%)
Worry about legal issues because of conflict with usual practice	513(30.1%)
Lack of validity, due to high possibility of the existence of conflict of interest	272(16.0%)
Guideline use is unnecessary, because three level ward-round system can safeguard medical treatment quality	123(7.2%)
Lack of education or training in guideline use	787(46.2%)
Lack of atmosphere to encourage guideline use, for example lack of support from leaders or no culture of EBM	320(18.8%)

Table 3 Determinants associated with guidelines adherence

Variables	Univariate logistic regression		Multivariate logistic regression	
	OR (95% CI)	p value	OR (95% CI)	*P* value
on				
ıe Northeast	2.60(1.87,3.60)	<0.001	2.02(1.42,2.88)	<0.001
e West	1.98 (1.46,2.69)	<0.001	1.53(1.07,2.18)	0.02
e Middle	2.68(1.95,3.67)	<0.001	2.16(1.48,3.15)	<0.001
e East	1.000		1.000	
ital grade				
tiary hospital	0.61 (0.47,0.80)	<0.001	0.70(0.50,0.96)	0.028
condary hospital	1.000		1.000	
s of practice	1.03 (1.02,1.04)	<0.001	1.03(1.01,1.05)	0.006
ation background				
D’s	1.93 (1.21,3.09)	0.006	1.90 (1.07,3.37)	0.027
ster’s	2.08(1.39,3.10)	<0.001	2.11 (1.31,3.41)	0.002
chelor’s	1.62(1.12,2.33)	0.01	1.34(0.88,2.02)	0.169
ıior college	1.000		1.000	
ssional title				
ief physician or professor of medicine	1.86(1.32,2.62)	<0.001	0.68(0.37,1.24)	0.208
ociate senior doctor or associate chief physician	2.08 (1.53,2.84)	<0.001	0.94(0.60,1.47)	0.78

ermediate	1.57(1.18,2.08)	0.002	1.01 (0.72,1.43)	0.951
mary	1.000		1.000	
or EBM related education in college	1.17 (0.94,1.47)	0.166		
or EBM related education in work unit	1.54(1.19,1.99)	0.001	1.44 (1.08,1.92)	0.012
cipation in the development of guidelines	0.77(0.56,1.05)	0.101		
owledgment of guideline providing basic guidance for cal practice	4.01(2.04,7.86)	<0.001	2.10 (0.98,4.50)	0.055
vledge scores for guideline development	1.00 (0.99,1.02)	0.887		
essional practice area				
or emergency	1.23(0.74,2.04)	0.433	1.05(0.61,1.82)	0.848
atrics	1.75(1.08,2.82)	0.023	0.97(0.56,1.70)	0.908
ecology/obstetrics	1.68(0.88,3.19)	0.115	1.10 (0.56,2.17)	0.774
ing	2.03 (1.14,3.66)	0.016	1.74 (0.94,3.23)	0.077
atology/ophthalmology/otorhinolaryngology	0.74(0.44,1.23)	0.244	0.88(0.51,1.52)	0.639
thesia	1.66(0.90,3.05)	0.106	1.27(0.66,2.45)	0.483
eral practice or comprehensive health care	2.64(1.66,4.19)	<0.001	2.06(1.23,3.45)	0.006
ery	1.92(1.33,2.76)	<0.001	1.49(1.01,2.19)	0.043
logy	2.13(1.25,3.60)	0.005	1.47 (0.82,2.64)	0.191
cal pharmacy	0.64 (0.43,0.96)	0.03	0.74 (0.48,1.15)	0.18

ɔgraphy or medical imaging	1.50(0.83,2.70)	0.179	1.25(0.67,2.33)	0.486
itional Chinese medicine	1.77(0.80,3.90)	0.157	1.64 (0.68,3.98)	0.271
cine	1.000		1.000	

Abbreviations: CI=confidence interval; OR=odds ratio

Figures

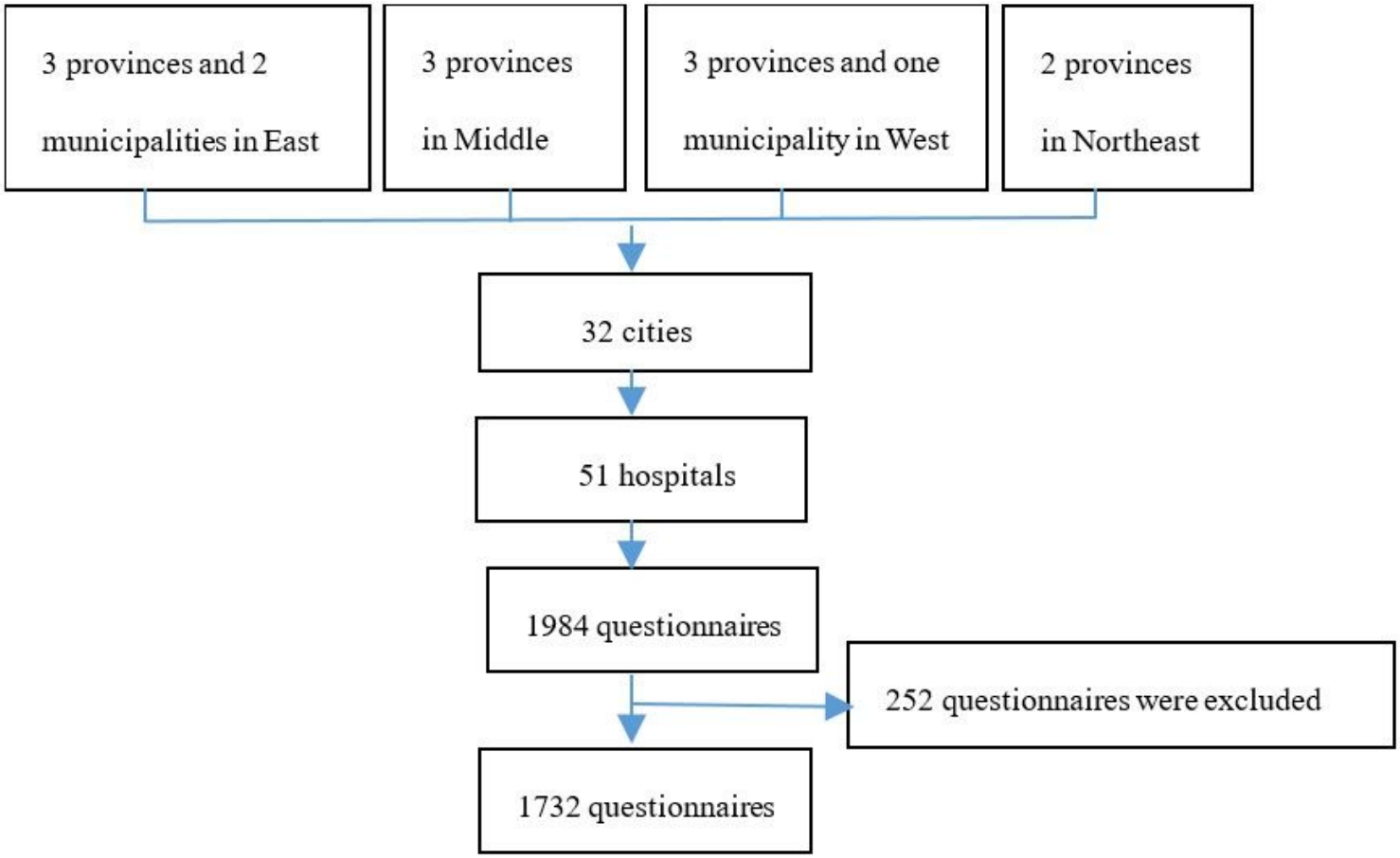

Figure 1

Flow chart of distribution and collection of questionnaires

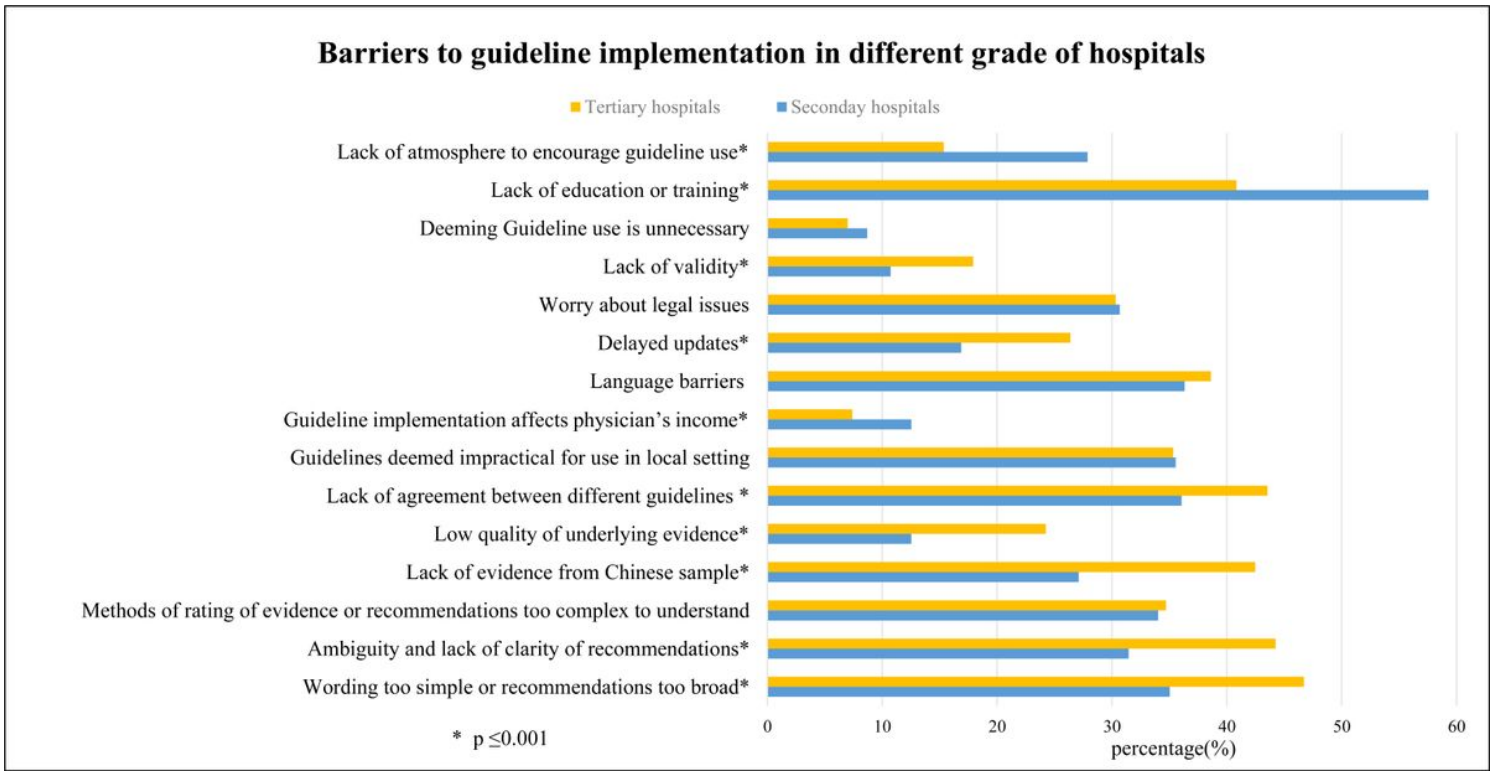

Figure 2

Barriers to guideline implementation in secondary versus tertiary hospitals

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile1.docx
- Additionalfile2.docx
- Additionalfile3.docx
- Additionalfile4.doc