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Quality appraisal of clinical practice guidelines for diabetes mellitus published in China between 2007 and 2017

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**Quality appraisal of clinical practice guidelines for diabetes mellitus
published in China between 2007 and 2017**

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Abstract

Objective: The aim of this study was to systematically evaluate the quality of the clinical practice guidelines (CPGs) for diabetes mellitus published in China over the period of January 2007 to April 2017.

Methods: We searched the China National Knowledge Infrastructure (CNKI), Chinese Biomedical Literature database (CBM), VIP Database and WanFang databases and guideline websites for CPGs for diabetes mellitus published between January 2007 and April 2017 in China. Two reviewers independently screened the literature according to the inclusion and exclusion criteria and extracted data. We applied the AGREE II instrument to assess methodological quality of the included guidelines.

Results: A total of 98 guidelines were identified. The scores of the six domains of AGREE II were as follows (mean \pm SD): scope and purpose (54.8 \pm 6.8%), stakeholder involvement (32.1 \pm 9.3%), rigor of development (20.2 \pm 10.8%), clarity of presentation (56.9 \pm 10.9%), applicability (19.2 \pm 8.7%), and editorial independence (1.6 \pm 4.6%). The mean score in each domain of quality of Chinese diabetes CPGs was lower than that of CPGs published worldwide but higher than the mean score of Chinese guidelines of all topics.

Conclusions: A large number of Chinese diabetes CPGs have been produced. Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement. Chinese guideline developers should pay more attention to the transparency of methodology, and use the AGREE II instrument to develop and report guidelines.

Trial registration: Not applicable

Key words: Clinical practice guidelines; diabetes mellitus; Quality assessment; AGREE II

Strengths and limitations of this study

- The systematic review of CPGs for diabetes mellitus quality attempted to cover all guidelines published on diabetes over the past one decade in China. Our structured and explicit approach increases the validity of the findings.
- We used the AGREE II instrument, which is a scientific and valid tool to assess the quality of CPGs.
- CPG developers did not report all the details in developing guidelines even if they included some of the items listed in AGREE in process. The score of AGREE II may underestimate the methodological quality of guidelines.
- The AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations.

Introduction

Diabetes mellitus has become one of the leading causes of mortality and burden of disease worldwide, especially in China, which is now home to the largest number of diabetics worldwide [1]. The prevalence of diabetes mellitus among adults in China has increased substantially in recent decades, rising from 0.7% in 1980 to 10.9% in 2013 [1-4]. During the recent years, the government and organizations have started to pay more attention to this chronic disease, and national clinical practice guidelines (CPGs) for diabetes mellitus are also increasingly produced and disseminated. CPGs are defined as “statements that include recommendations intended to optimize patient care, which are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” [5]. High-quality guidelines provide explicit recommendations for clinical practice, helping to manage health conditions and reduce the use of unnecessary, ineffective or harmful interventions [6]. CPGs for diabetes mellitus have been developed to help optimize the management of the condition and improve the quality, appropriateness and cost-effectiveness of patient care [7]. However, the potential of CPGs to improve patient care and resource use largely depends on the rigor of their development as well as the dissemination and implementation strategies [8, 9]. To the best of our knowledge, there has been no systematic evaluation of guidelines on diabetes mellitus in China. The growing number of guidelines may result in increasing variability and conflicts among guideline recommendations. Hence, we aimed to systematically review the existing Chinese guidelines for diabetes mellitus, assess their quality and eventually help Chinese guideline developers better follow methodological standards while developing guidelines in the future.

Identification of guidelines

We conducted a computerized search of four major academic databases: CBM (Chinese Biomedical Literature database, <http://www.sinomed.ac.cn/>), WanFang Data (Chinese Medicine Premier, <http://www.wanfangdata.com.cn/>), VIP (Chinese Journals Full-text Database, <http://data.whlib.ac.cn/>), and CNKI (China National Knowledge Infrastructure, <http://www.cnki.net/>). We used the same search strategy in all databases and restricted the search to guidelines published in China from January 2007 through April 2017. The search strategy included Chinese translations of terms such as “guideline” and “diabetes mellitus” (Table 1). In addition, we searched guidelines for diabetes mellitus on several websites and search engines, including Google and *Chinese Diabetes Mellitus Association* (<http://www.zhtnxbh.org/>). We also searched all articles published in Chinese Journal of Evidence-Based Medicine, Chinese Journal of Diabetes Mellitus and Chinese Journal of Diabetes before April 2017 manually. Old or variant versions of guidelines where a new version was available, and guidelines not originally developed in China (such as Chinese versions of foreign CPGs, and adapted versions of CPGs from other countries), were excluded.

Table 1 search strategies

Search terms	Explanation
#1 “zhinan” or “zhiyin” or “gongshi” or “caoan”	“zhinan”, “zhiyin”, “gongshi” and “caoan” mean “guideline” in Chinese
#2 “tangniaobing” or “xiaokezheng” or DM or NIDDM or IDDM or MODY or	“tangniaobing” means diabetes mellitus in Chinese. “xiaokezheng” is a term used by

T2DM or T1DM

doctors of traditional Chinese medicine to
refer to diabetes mellitus

#3 #1 and #2

*We used Zhinan as a subject heading in the abstract database CBM, and the terms “zhinan”, “zhiyin”, “gongshi” and “caoran” in the title of the paper in the other three full text databases WANFANG, VIP and CNKI.

Screening and data extraction

All studies were independently reviewed for eligibility by two researchers (Ke LX, Liu L). Disagreements were resolved by face-to-face discussion, or in case of persistent disagreement, by consultation with a third researcher (Gao YT). We first screened the titles and abstracts, and in the next steps, the full texts of publications considered relevant. All included studies were imported in ENDNOTE. We first conducted one preliminary trial of data extraction. The extraction strategy was then discussed and agreed upon all researchers, and formal data collection was performed. Data extraction was done in Excel. For the validity and accuracy of data, the data collection was completed by two researchers independently. Disagreements were resolved by discussion.

Evaluation of guidelines

AGREE II is an international, rigorously developed, and validated instrument for evaluating CPGs [10, 11]. It consists of 23 key items organized within six domains. Each item in a domain is given a score from 1 (strongly disagree) to 7 (strongly agree). The score for each domain is obtained by summing all the scores of the individual reviewers for all items in a domain and then standardizing as follows: (obtained score - minimal possible score) / (maximal possible score - minimal possible score) [12]. All authors who were involved in assessing the guidelines using AGREE II had taken a formal training on the AGREE Enterprise website. We initially conducted two rounds of pilot appraisals with a total of 10 guidelines and discussed discrepancies, ensuring that all reviewers came to an agreement in understanding each item of AGREE II. Each guideline was independently evaluated by four reviewers.

Statistical analysis

We present the means and standard deviations (SD) for AGREE II domain scores, and the number of cases and corresponding percentages for categorical variables. Data for each domain was analyzed by Microsoft Excel 2013. Intra-class correlation coefficients (ICCs) were used for testing interrater reliability among the four reviewers [13]. We started the formal appraisal only after ICC reached at least 0.8 in the pilot appraisals. We tested the statistical significance of differences between subgroups using Independent-Samples T test with SPSS 19.0. All tests were two-sided, and P values < 0.05 were considered statistically significant. Besides, we compared the scores of Chinese diabetes CPGs with those of Chinese CPGs [14] and CPGs published worldwide [15] of all topics.

Results

Literature Search

Our systematic search yielded 8065 records, of which 3641 were excluded as duplicates. A total of 3979 records were excluded due to irrelevant topic after title and abstract screening,

and 335 after reviewing full text. Twenty further guidelines were still excluded after evaluation. Eight guidelines were identified in the supplementary website search, and no guidelines in the manual searches of the three journals. Finally, 98 eligible guidelines were included in our analysis (Figure 1).

Characteristics of the guidelines

The publication year of the included CPGs ranged between 2009 and 2017 (Figure 2). The year with highest number of published diabetes CPGs (23) was 2011. Nine of the CPGs were updates of previous versions. The databases, exact terms and the time period of the search were accurately described in five guidelines. Seventeen guidelines targeted Type 2 Diabetes mellitus, two guidelines Type 1 Diabetes mellitus, two guidelines juvenile diabetes mellitus, and one guideline latent autoimmune diabetes mellitus of adults (LADA). Some guidelines focused on complications only, including cardiovascular disease (five guidelines), diseases of the nerval system (five guidelines), kidney disease (five guidelines), hypertension (four guidelines), diabetic retinopathy (three guidelines), and diabetic foot (three guidelines). Seven guidelines reported that they received funding from governments, and two guidelines reported that they received funding from other academic organizations. Sixty guidelines were published in the Chinese Science Citation Database (CSCD), and one guideline online in Wiley Online Library (wileyonlinelibrary.com).

AGREE II results

The ICC for AGREE II assessment in the study was 0.929 (95% CI 0.910-0.942). It indicates that appraisers reached an agreement about the items in AGREE II. The scores of the included guidelines included are summarized in Table 2.

Table 2 AGREE II score of guidelines included

Domains	Content	Mean score (X±SD, %)	Score segmentation [number of guidelines(%)]			
			<25%	25%~50%	50%~75%	>75%
Domain 1	Scope and purpose	54.8±6.8	0 (0.0)	27 (27.6)	71 (72.4)	0 (0.0)
Domain 2	Stakeholder involvement	32.1±9.3	21 (21.5)	75 (76.5)	2 (2.0)	0 (0.0)
Domain 3	Rigor of development	20.2±10.8	81 (82.7)	15 (15.3)	2 (2.0)	0 (0.0)
Domain 4	Clarity of presentation	56.9±10.9	1 (1.0)	27 (27.6)	70 (71.4)	0 (0.0)
Domain 5	Applicability	19.2±8.7	74 (75.5)	24 (24.5)	0 (0.0)	0 (0.0)
Domain 6	Editorial independence	1.6±4.6	98 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)

Scope and purpose

The mean ± SD in this domain was 54.8%±6.8%, ranging from 37.0% to 70.4%. The mean score was the second highest among the domains. Most guidelines performed well in this domain, with no guidelines scoring below 25%.

Stakeholder involvement

The mean \pm SD for the overall score for this domain was $32.1 \pm 9.3\%$ (range 14.8–72.2%). Twenty-eight guidelines referred to methodologists or evidence-based experts in the guideline development stage, and none involved patients in the development process. Only two CPGs scored at least 50%.

Rigor of development

Two CPGs scored at least 50% in the domain “rigor of development”. The overall score in this domain was poor, with a mean \pm SD of $20.2 \pm 10.8\%$ (range 1.4–77.1%). Five CPGs described the systematic methods for searching and selecting evidence, 40 CPGs described the strengths and limitations of the body of evidence clearly, 29 CPGs used a nominal group technique or consensus-development conference, 81 CPGs considered the health benefits, side effects and risks in formulating the recommendations, 91 CPGs indicated a link between the supporting evidence and the recommendations, and four CPGs were reviewed externally before publication. Nine guidelines were updated versions of older guidelines, but none of these described a procedure for updating the guideline.

Clarity of presentation

Overall, the mean score for this domain was the highest among all domains, and only one guideline scored less than 25%. Recommendations were specific and unambiguous in all CPGs albeit to various degrees. Four CPGs did not present the different options for management of the condition or health issue, and in one CPG key recommendations were not identifiable.

Applicability

The mean \pm SD for the overall quality score for this domain was $19.2 \pm 8.7\%$ (range 0–37.5%). Fourteen CPGs provided advice or tools on how the recommendations could be put into practice. Similarly, 14 CPGs described facilitators and barriers to its application. Fourteen CPGs considered the potential resource implications of applying the recommendations, and 87 CPGs presented monitoring or auditing criteria. Seventy-four guidelines scored less than 25% for this domain.

Editorial independence

The scores for this domain were the lowest among all domains, with all 98 guidelines scoring less than 25%. Only one guideline reported that there were no conflicts of interest. Nine CPGs reported that they received funding from governments (seven guidelines) or academic organizations (two guidelines). However, these nine guidelines failed to report whether the views of the funding body influenced the content of the guideline or not.

Scores of AGREE II in each domain based on different classification criteria

We conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses. Table 3 shows the domain scores and P values for different subgroups of the guidelines. Guidelines published in 2017 scored higher than those published earlier in stakeholder involvement, rigor of development and editorial independence. CPGs of integrated traditional Chinese and Western medicine performed clearly better than CPGs on Western or traditional Chinese medicine in all domains. Guidelines that reported external funding scored better than guidelines that reported no funding in editorial independence. Guidelines that involved methodologists scored higher than guidelines not reporting methodologists and the differences were statistically significant in Stakeholder involvement and

Rigor of development. To some extent, reporting methodologists could increase the scores in Stakeholder involvement and Rigor of development. The difference between guidelines published in CSCD and non-CSCD journals was not statistically significant.

Comparison of AGREE II scores between Chinese diabetes CPGs and CPGs published worldwide

The scores of Chinese CPGs on diabetes were clearly higher than those of Chinese CPGs of all topics on average (Figure 3). The scores of Chinese diabetes CPGs were below the international average of CPGs on all topics, but the difference was small in most domains. Only for editorial independence the Chinese CPGs on diabetes scored lower than Chinese guidelines on average, and substantially lower than all guidelines internationally.

Discussion

It is astonishing that almost 100 domestic guidelines of diabetes mellitus have been published in China in just mere one decade. We found that annual number of CPGs for diabetes mellitus published in domestic Chinese journals increased dramatically up to 2011, after which the number has remained fairly stable during the last few years. At the same time, the quality of the CPGs in some AGREE II domains, such as “Stakeholder involvement”, “Rigor of development” and “editorial independence”, improved slightly.

The increasing number indicates that more and more Chinese diabetes CPGs are being applied to clinical practice. Government agencies and the general and subspecialty medical societies in China promote the use of domestic guidelines in healthcare instead of merely adopting foreign guidelines, to account for the characteristics and needs of Chinese patients and clinicians. Meanwhile, the number of published randomized controlled trials and systematic reviews in China is increasing quickly, which may be associated with rapid increase in burden of diabetics. This has laid the groundwork for development of guidelines.

The mean score in each domain of the quality of Chinese diabetes CPGs was slightly lower than that of CPGs published worldwide. The difference can be at least partly explained by the selection criteria: the review by Alonso-Coello et al included guidelines that are indexed in Medline and therefore likely to be of high quality, whereas our study tried to find all guidelines on a specific topic in one country. However, there was a huge gap between the Chinese diabetes CPGs and CPGs published worldwide in the domain “editorial independence”: this domain was also the one that had lowest score overall. Conflicts of interest are a significant issue worldwide, as can introduce bias into almost every step of the guideline development process [16]. Our results show that there are serious reporting flaws for potential conflicts of interest for the members of the guideline development groups in Chinese CPGs. Most foreign and international organizations, such as the WHO, have their own COI disclosure policies for members of guideline panels [17], but until now, only few Chinese guideline-developing organizations have implemented such policies. Unlike in most other countries, in China the majority of guidelines are developed by professional committees, and despite reporting no external funding, many of these guidelines may be supported by pharmaceutical companies. It is critically important that guideline developers attend to declarations of potential conflicts of interest in a proactive, reasoned, transparent and defensible manner. An efficient way to decrease the influence of pharmaceutical companies could be to establish a government-controlled public foundation to develop guidelines.

On the other hand, Chinese diabetes CPGs did relatively well in contrast to the overall mean scores among Chinese guidelines. The scores in most domains were higher in CPGs for diabetes mellitus than that in guidelines published in China in general. The most important reason is that the time period on which the two studies focus was not the same, Chen et al focusing on CPGs in 1993-2010. Our study only paid attention to recent CPGs, of which the quality became better with time goes by. Another possible explanation is that the diabetes guidelines focus on a major disease where a large amount of high quality evidence is available.

Many factors are capable of influencing the quality of CPGs. From the perspective of the funders, the quality of guidelines developed by organizations reporting a funding source was higher than those that did not report any funding. The scores of guidelines with methodologists taking part in were higher than those not reporting methodologists. Evidence based methods could improve the quality of CPGs, especially in Stakeholder involvement and Rigor of development. The guideline development groups involved methodological experts who could ensure that methodological checks were correctly applied and that the development process was fully documented [18]. Developing guidelines based on the methodology of evidence-based medicine could improve the quality of CPGs [19]. Yao et al [20] conducted a study comparing the quality of traditional Chinese medicine (TCM) CPGs with non-TCM CPGs, and the result showed that the quality of TCM CPGs was much better. The quality of traditional Chinese medicine CPGs was higher than that of CPGs for Western medicine, which was compliant with the results of the study of Yao et al. It means that traditional medicine has drawn a lot of attraction and the relevant studies are becoming more scientific.

Strengths and limitations

Our review has several strengths. First, the systematic review of CPGs for diabetes mellitus quality attempted to cover all guidelines published on diabetes over the past one decade in China. Our structured and explicit approach increases the validity of the findings. Second, we used the AGREE II instrument, which is a scientific and valid tool to assess the quality of CPGs. Furthermore, we conducted two rounds (for a total of 10 guidelines) of pilot appraisals and resolved disagreements, which further enhanced the confidence in our results.

This review has also limitations. Our study was restricted to English and Chinese language guidelines, which excluded a small number of additional guidelines. Furthermore, CPG developers did not report all the details in developing guidelines even if they included some of the items listed in AGREE in process. Therefore, the score of AGREE II may underestimate the methodological quality of guidelines. Lastly, the AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations.

Conclusion

A large number of CPGs for diabetes mellitus have been produced in China. Generally speaking, the quality of Chinese diabetes CPGs scored relatively well in comparison with other guidelines according to the evaluation by the AGREE II instrument. However, there is still room for improvement, especially in the aspect of editorial independence. Reporting the full texts of CPGs and conflicts of interests according to AGREE II checklists and abiding to the principles of evidence-based medicine can further improve the quality of guidelines.

Conflict of interest

For all authors, there are no potential conflicts of interest, including no relevant financial interests

in any company or institution that might benefit from this publication.

Figure legends

Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

Figure 2. Number of clinical practice guidelines on diabetes published annually from 2007 to 2017 in China

Figure 3. Domain scores in CPGs published worldwide, Chinese CPGs of all topics, and Chinese CPGs on diabetes.

Data sharing

No additional data are available.

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

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Authors' contributions

YTG and YLC wrote the protocol. JJW, XYS, LXX and HW were responsible for the identification of guidelines, screening and data extraction. LL, HW, XFL, DKW and YTG evaluated the guidelines. YTG, YMM and JE authored this manuscript.

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Table 3 Scores of AGREE II based on different classification criteria

Sub-analysis	Number of guidelines (%)	Domain scores (mean±SD, %)					
		Scope and purpose	Stakeholder involvement	Rigor of development	Clarity of presentation	Applicability	Editorial independence
Developing organization							
Chinese Medical Diabetes Association	60(61.1%)	54.9±6.8	31.7±8.3	20.7±9.2	58.4±8.4	20.3±8.6	1.3±4.1
Specially formed group*	18(18.4%)	55.1±8.0	32.8±13.9	19.8±15.8	56.2±12.1	17.9±10.9	2.6±6.5
National Health and Family Planning Commission	2(2.1%)	45.4±9.2	27.8±2.6	13.5±17.2	41.7±32.7	13.9±0.0	0.0±0.0
Ministry of Public Health	1(1.0%)	44.4	16.7	4.2	29.6	0.0	0.0
Hospitals	1(1.0%)	59.3	31.5	21.5	59.3	16.7	0.0
Collaboration of two or more organizations	14(14.3%)	56.1±5.5	33.5±5.3	19.7±9.8	56.0±12.0	18.2±7.2	0.8±3.0
Others	2(2.1%)	52.8±3.9	39.8±11.8	25.0±7.9	53.7±10.5	18.8±6.9	8.3±11.8
P-value	/	0.36	0.54	0.77	0.18	0.48	0.35
Type of guidelines							
Diagnosis and treatment	27(27.6)	55.8±7.9	30.3±6.3	18.6±6.6	59.2±7.9	22.3±9.5	1.6±4.8
Treatment	22(22.4%)	54.5±7.8	33.6±10.8	22.4±14.8	55.6±14.1	20.3±9.0	0.6±3.0
Management	14(14.3%)	53.4±6.0	31.0±6.3	18.3±6.9	56.1±10.3	14.9±5.3	1.2±4.5
Prevention and treatment	9(9.2%)	54.9±3.6	29.2±6.5	20.0±3.8	61.3±3.0	19.6±9.1	1.2±3.5
Technology\$	6 (6.1%)	51.2±2.2	38.9±6.6	18.6±6.9	53.4±10.0	16.7±4.6	2.8±6.8
Medication\$\$	5(5.1%)	56.7±7.9	34.8±7.6	22.5±7.5	58.1±11.2	19.2±9.1	0.0±0.0
Prevention	1(1.0%)	68.5	37.0	24.3	64.8	29.2	0.0

Health care	1(1.0%)	59.3	14.8	7.6	40.7	15.3	0.0
Comprehensive #	13(13.3%)	54.4±6.6	33.0±14.8	22.2±17.9	54.1±14.6	15.8±8.9	4.1±6.5
P-value	/	0.49	0.25	0.84	0.52	0.19	0.64
Publication year							
2009	3(3.0%)	59.9±7.7	26.5±8.8	15.7±6.5	53.1±10.9	22.2±2.8	0.0±0.0
2010	7(7.1%)	52.1±8.1	28.8±6.2	14.7±4.3	50.8±10.8	13.5±11.9	2.4±6.3
2011	23(23.5%)	56.2±6.5	32.3±7.3	21.2±6.3	60.5±8.1	22.3±8.6	0.5±2.3
2012	13(13.3%)	53.3±6.2	34.5±12.9	23.5±17.6	54.6±11.6	16.0±7.2	3.2±6.2
2013	10(10.2%)	53.9±8.5	27.8±6.3	15.4±4.6	54.3±10.8	19.4±11.2	1.7±5.3
2014	12(12.2%)	56.8±7.8	32.7±8.4	19.6±5.3	60.6±6.8	22.7±9.7	1.4±4.8
2015	9(9.2%)	54.1±5.6	31.1±5.9	22.8±5.4	61.7±5.4	20.4±7.6	1.2±3.7
2016	14(14.3%)	53.0±6.1	32.1±7.5	18.6±9.5	53.2±15.1	16.1±2.9	0.8±3.0
2017	7(7.1%)	56.3±8.0	38.6±17.7	25.4±24.5	56.3±16.1	17.3±9.8	4.4±7.5
P-value	/	0.58	0.38	0.42	0.20	0.13	0.59
Western medicine or traditional Chinese medicine							
Western medicine	78(79.6%)	53.7±6.7	31.2±7.3	18.9±7.3	56.5±11.9	18.2±8.3	1.3±4.4
Traditional Chinese medicine	14(14.3%)	58.6±5.9	31.1±7.5	19.9±4.8	58.7±5.6	21.8±9.7	1.6±4.0
Integrated medicine	6(6.1%)	59.3±7.9	44.4±22.1	36.9±31.5	60.8±1.4	24.3±8.5	4.6±7.2
P-value	/	0.01	0.002	0.001	0.53	0.11	0.23
Participation of methodologists in guideline development							
Methodologists involved	27(27.6%)	55.6±7.2	36.9±11.4	25.2±16.8	58.3±10.0	19.8±6.6	1.4±4.2
Not reported	71(72.4%)	54.6±6.9	30.2±7.6	18.3±6.6	56.4±11.3	19.0±9.4	1.6±4.7
P-value	/	0.52	0.01	0.048	0.45	0.67	0.77
External funding							
No reported external funding	85(86.7%)	55.2±6.6	32.3±8.3	19.7±9.6	56.6±11.4	19.7±8.3	0.5±2.6
External funding reported	13(13.3%)	52.6±8.7	30.6±14.4	23.2±17.0	58.8±6.8	15.9±10.7	8.8±7.5

P-value	/	0.19	0.54	0.25	0.31	0.13	0.001
Indexation in Chinese Sciences Citation Database(CSCD)							
Indexed in CSCD	60	54.0±7.0	32.4±8.6	20.0±10.4	56.9±10.6	17.8±8.2	2.0±5.2
Not indexed in CSCD	37	56.1±6.8	32.0±10.0	20.8±11.5	57.4±11.4	21.5±9.2	1.0±3.4
P-value	/	0.14	0.65	0.82	0.98	0.46	0.27

*: Groups specifically formed for developing the guideline; members were staff from different hospitals.

\$: refers to guidelines about the use of medical equipment, e.g. insulin injection needle.

\$\$: refers to guidelines about the use of specific drugs, e.g. insulin.

#: refers to guidelines covering more than two types of guidelines.

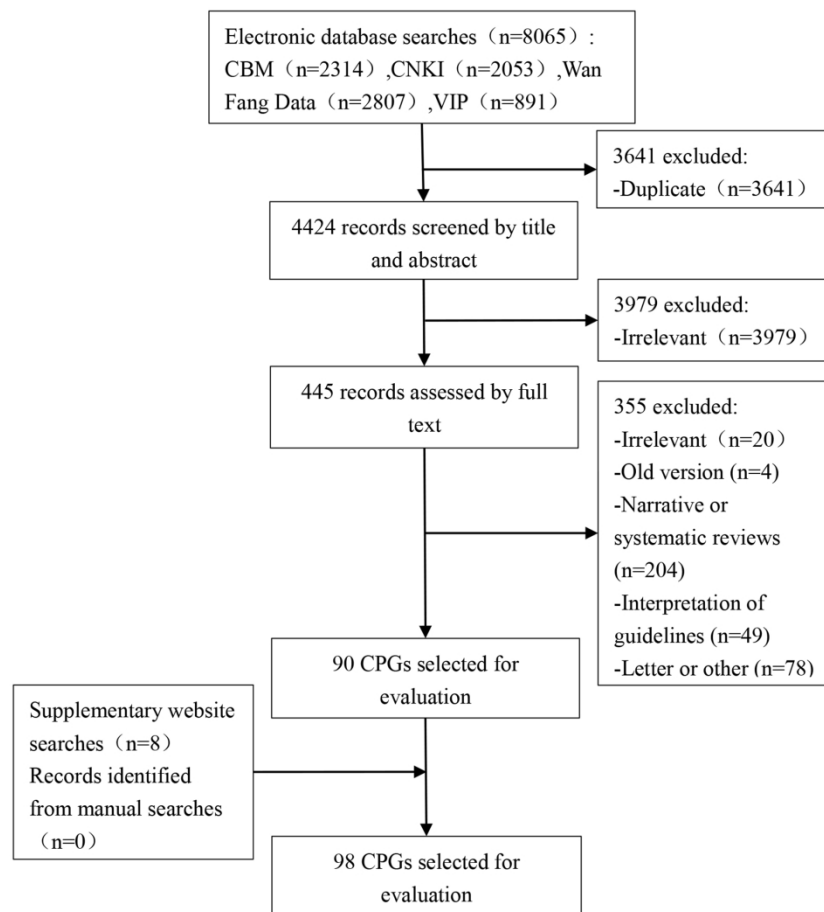


Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

874x874mm (72 x 72 DPI)

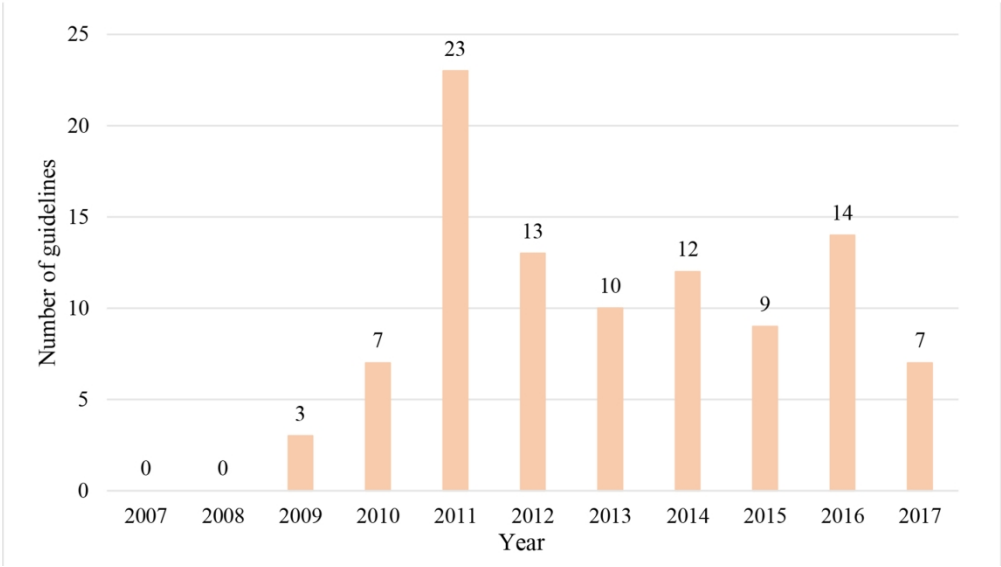


Figure 2. Number of clinical practice guidelines on diabetes published annually from 2007 to 2017 in China
1208x709mm (72 x 72 DPI)

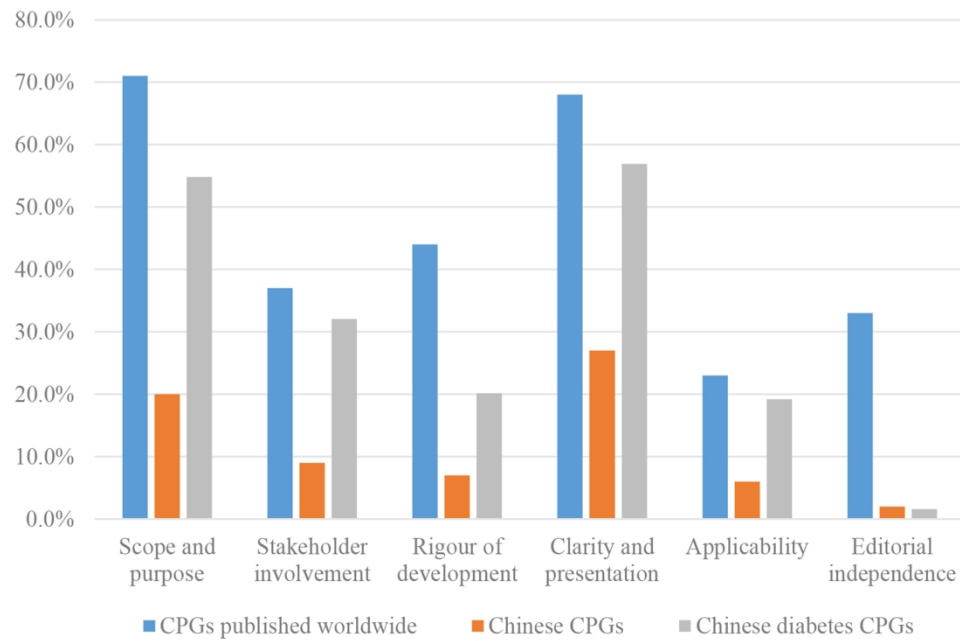


Figure 3. Domain scores in CPGs published worldwide, Chinese CPGs of all topics, and Chinese CPGs on diabetes.

1333x920mm (72 x 72 DPI)

Standards for Reporting Qualitative Research (SRQR)

No	Topic	Item	Page
	Title and abstract		
S1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
S2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2
	Introduction		
S3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	3
S4	Purpose or research question	Purpose of the study and specific objectives or questions	3
	Methods		
S5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale	3-4
S6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	Not report
S7	Context	Setting/site and salient contextual factors; rationale	3
S8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale	3
S9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	Not applicable
S10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale	3-4
S11	Data collection instruments and technologies	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	3-4
S12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	3-4

S13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/deidentification of excerpts	4
S14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	4
S15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	4
	Results/findings		
S16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	5
S17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	5
	Discussion		
S18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	7-8
S19	Limitations	Trustworthiness and limitations of findings	8
	Other		
S20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	9
S21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting	9

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Quality appraisal of clinical practice guidelines for diabetes mellitus published in China between 2007 and 2017 using the AGREE II instrument

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Manuscripts

Quality appraisal of clinical practice guidelines for diabetes mellitus published in China between 2007 and 2017 using the AGREE II instrument

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Abstract

Objective The aim of this study was to systematically evaluate the quality of the clinical practice guidelines (CPGs) for diabetes mellitus published in China over the period of January 2007 to April 2017.

Methods We searched the China National Knowledge Infrastructure (CNKI), Chinese Biomedical Literature database (CBM), VIP Database and WanFang databases and guideline websites for CPGs for diabetes mellitus published between January 2007 and April 2017 in China. Two reviewers independently screened the literature according to the inclusion and exclusion criteria and extracted data. We used the AGREE II tool (Canadian Institutes of Health Research, Ottawa, Canada) to evaluate the quality of the included guidelines, calculated the scores of each domain, and evaluated the consistency among the assessors via use of the intragroup correlation coefficient. And then we compared the results with Chinese CPGs and international CPGs. Subgroups were preset for subgroup analysis.

Results A total of 98 guidelines were identified. The scores of the six domains of AGREE II were described in median (interquartile range) as follows: scope and purpose 53.7(50.0-59.7), stakeholder involvement 31.5(27.3-37.0), rigor of development 19.1(15.3-22.2), clarity of

presentation 59.3(50.0-64.8), applicability 18.1(13.9-25.7), and editorial independence 0.0(0.0-0.0). The mean score in each domain of quality of Chinese diabetes CPGs was lower than that of CPGs published worldwide but higher than the mean score of Chinese guidelines of all topics. The correlation coefficient within the group was 0.96, suggesting that the consistency between the evaluators was good. The results of the subgroup analysis showed that the updated version of the guidelines scored higher than the non-updated guidelines in all five fields (except for “field six: editorial independence”); notably the guidelines published by international organizations scored higher than the Chinese guidelines in each field.

Conclusions A large number of Chinese diabetes CPGs have been produced. Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement. Chinese guideline developers should pay more attention on the transparency of methodology, and use the AGREE II instrument to develop and report guidelines.

Key words Clinical practice guidelines; diabetes mellitus; Quality assessment; AGREE II

Strengths and limitations of this study

1. Covered all guidelines published on diabetes over the past one decade in China. It has the potential to contribute significantly in the upscaling guideline development.
2. Use of a structured, validated tool.
3. Conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses.
4. Our study was restricted to English and Chinese language guidelines, which excluded a small number of additional guidelines.
5. The AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations.

Summary

1. The quality of Chinese diabetes CPGs scored relatively well in comparison with other guidelines.
2. There is still room for improvement, especially in the aspect of editorial independence.

Introduction

Diabetes mellitus has become one of the leading causes of mortality and burden of disease worldwide, especially in China, which is now home to the largest number of diabetics worldwide [1]. The prevalence of diabetes mellitus among adults in China has increased substantially in recent decades, rising from 0.7% in 1980 to 10.9% in 2013^[1-4]. During the recent years, the government and organizations have started to pay more attention to this chronic disease, and national clinical practice guidelines (CPGs) for diabetes mellitus are also increasingly produced and disseminated. CPGs are defined as “statements that include recommendations intended to optimize patient care, which are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options”^[5]. High-quality guidelines provide explicit recommendations for clinical practice, helping to manage health conditions and reduce the use of unnecessary, ineffective or harmful interventions^[6]. CPGs for diabetes mellitus have been developed to help optimize the management of the condition and improve the quality, appropriateness and cost-effectiveness of patient care^[7]. However, the potential of CPGs to improve patient care and resource use largely depends on the rigor of their development as well as the dissemination and implementation strategies^[8, 9]. To the best of our knowledge, there has been no systematic

evaluation of guidelines on diabetes mellitus in China. The growing number of guidelines may result in increasing variability and conflicts among guideline recommendations. China currently lacks capacity for evidence-based guideline development and coordination by a central agency. Most Chinese guideline users rely on recommendations developed by professional groups that lack demonstration of transparency (including conflict of interest management and evidence synthesis) and quality. In addition, misperceptions about the role of guidelines in assisting practitioners as opposed to providing rules requiring adherence, and a perception that traditional Chinese medicine (TCM) cannot be appropriately incorporated in guidelines are present^[10]. Hence, we aimed to systematically review the existing Chinese guidelines for diabetes mellitus, assess their quality and eventually help Chinese guideline developers better follow methodological standards while developing guidelines in the future. However, the assessment of the content validity is not a part of this review as the instrument used in the review only assesses the reporting of the different items and not the clinical content. We will pay attention to the consistency of recommendations in different included guidelines loosely as well.

Identification of guidelines

We conducted a computerized search of four major academic databases: CBM (Chinese Biomedical Literature database, <http://www.sinomed.ac.cn/>), WanFang Data (Chinese Medicine Premier, <http://www.wanfangdata.com.cn/>), VIP (Chinese Journals Full-text Database, <http://data.whlib.ac.cn/>), and CNKI (China National Knowledge Infrastructure, <http://www.cnki.net/>). We used the same search strategy in all databases and restricted the search to guidelines published in China from January 2007 through April 2017. The search strategy included Chinese translations of terms such as “guideline” and “diabetes mellitus” (Table 1). In addition, we searched guidelines for diabetes mellitus on several websites and search engines, including Google scholar and Chinese Diabetes Mellitus Association (<http://www.zhtnbnxh.org/>). Grey literature will be covered by systematically searching publications of all relevant diabetes societies and associations and other health organizations for CPGs that meet our inclusion criteria. If full text of guidelines could not be found, we will contact the author or the development agency. We also searched all articles published in Chinese Journal of Evidence-Based Medicine, Chinese Journal of Diabetes Mellitus and Chinese Journal of Diabetes before April 2017 manually. To identify guidelines published outside of indexed journals, our search of key databases will be supplemented with a search of the grey literature. This will be covered by systematically searching publications of all relevant diabetes societies and associations and other health organizations for CPGs that meet our inclusion criteria. We searched the PubMed specifically restricted to Chinese CPGs to retrieve the Chinese diabetes CPGs guidelines. Old or variant versions of guidelines where a new version was available, and guidelines not originally developed in China (such as Chinese versions of foreign CPGs, and adapted versions of CPGs from other countries), were excluded.

Table 1 search strategies

	Search terms	Explanation
#1*	“zhinan” or “zhiyin” or “gongshi” or “caoan”	“zhinan”, “zhiyin”, “gongshi” and “caoan” mean “guideline” in Chinese
#2	“tangniaobing” or “xiaokezheng” or DM or NIDDM or IDDM or MODY or	“tangniaobing” means diabetes mellitus in Chinese. “xiaokezheng” is a term used by

T2DM or T1DM

doctors of traditional Chinese medicine to
refer to diabetes mellitus

#3 #1 and #2

*We used Zhinan as a subject heading in the abstract database CBM, and the terms “zhinan”, “zhiyin”, “gongshi” and “caoran” in the title of the paper in the other three full text databases WANFANG, VIP and CNKI.

Screening and data extraction

All studies were independently reviewed for eligibility by two researchers (Ke LX, Liu L). Disagreements were resolved by face-to-face discussion, or in case of persistent disagreement, by consultation with a third researcher (Gao YT). We first screened the titles and abstracts, and in the next steps, the full texts of publications considered relevant. All included studies were imported in ENDNOTE. We first conducted one preliminary trial of data extraction. The extraction strategy was then discussed and agreed upon all researchers, and formal data collection was performed. Data extraction was done in Excel. For the validity and accuracy of data, the data collection was completed by two researchers independently. Disagreements were resolved by discussion.

Evaluation of guidelines

AGREE II is an international, rigorously developed, and validated instrument for evaluating CPGs^[11, 12]. It consists of 23 key items organized within six domains. Each item in a domain is given a score from 1 (strongly disagree) to 7 (strongly agree). The score for each domain is obtained by summing all the scores of the individual reviewers for all items in a domain and then standardizing as follows: (obtained score - minimal possible score) / (maximal possible score - minimal possible score)^[13]. All authors who were involved in assessing the guidelines using AGREE II had taken a formal training on the AGREE Enterprise website. We initially conducted two rounds of pilot appraisals with a total of 10 guidelines and discussed discrepancies, ensuring that all reviewers came to an agreement in understanding each item of AGREE II. Each guideline was independently evaluated by four reviewers.

Patient and Public Involvement statement

Patients were not involved in our study.

Statistical analysis

We present the means and standard deviations (SD) for AGREE II domain scores, and the number of cases and corresponding percentages for categorical variables. Data for each domain was analyzed by Microsoft Excel 2013. Intra-class correlation coefficients (ICCs) were used for testing interrater reliability among the four reviewers^[14]. We started the formal appraisal only after ICC reached at least 0.8 in the pilot appraisals. We confirmed whether data was in accordance with normal distribution at the beginning with SPSS 25.0. If it was normally distributed, we would use one-way ANOVA to compute the P value between the differences of multi-groups. If it was not normally distributed, we described the data in median (interquartile range). And then we tested the statistical significance of differences between subgroups using Kruskal-Wallis test with SPSS 25.0. We could use LSD-t to do comparison between two domains. All tests were two-sided, and P values < 0.05 were considered statistically significant. Besides, we

compared the scores of Chinese diabetes CPGs with those of Chinese CPGs [15] and CPGs published worldwide [16] of all topics.

Results

Literature Search

Our systematic search yielded 8065 records, of which 3641 were excluded as duplicates. A total of 3979 records were excluded due to irrelevant topic after title and abstract screening, and 335 after reviewing full text. Twenty further guidelines were still excluded after evaluation. Eight guidelines were identified in the supplementary website search, and no guidelines in the manual searches of the three journals. Finally, 98 eligible guidelines were included in our analysis (Figure 1).

Characteristics of the guidelines

The publication year of the included CPGs ranged between 2009 and 2017 (Figure 2). The year with highest number of published diabetes CPGs (23) was 2011. Nine of the CPGs were updates of previous versions. The databases, exact terms and the time period of the search were accurately described in five guidelines. Seventeen guidelines targeted Type 2 Diabetes mellitus, two guidelines Type 1 Diabetes mellitus, two guidelines juvenile diabetes mellitus, and one guideline latent autoimmune diabetes mellitus of adults (LADA). Some guidelines focused on complications only, including cardiovascular disease (five guidelines), diseases of the nerval system (five guidelines), kidney disease (five guidelines), hypertension (four guidelines), diabetic retinopathy (three guidelines), and diabetic foot (three guidelines). Seven guidelines reported that they received funding from governments, and two guidelines reported that they received funding from other academic organizations. Sixty guidelines were published in the Chinese Science Citation Database (CSCD), and one guideline online in Wiley Online Library (wileyonlinelibrary.com). Characteristics of the guidelines were displayed in Supplementary 1.

AGREE II results

The ICC for AGREE II assessment in the study was 0.929 (95% CI 0.910-0.942). It indicates that appraisers reached an agreement about the items in AGREE II. The scores of the included guidelines included are summarized in Table 2. The data was not a normal distribution by analyzing in the test of normality with SPSS, so the data was described in median (interquartile range). However, the difference of mean score and median score was subtle, mean score could be used to analyze in some extent. Subgroup analysis across domains has been done. And the findings showed that scores in different domains were statistically significant (P=0.000). Differences between scores in domain 1 and domain 4(P=0.097)/domain 3 and domain 5 (P=0.441) were not statistically significant. That is to say, there is a high degree of consistency between the two domains.

Table 2 AGREE II score of guidelines included

Domains	Content	Median score(interquartile range, %)	Mean score (X±SD, %)	Score segmentation [number of guidelines(%)]			
				<25%	25%~50%	50%~75%	>75%
Domain 1	Scope and purpose	53.7(50.0-59.7)	54.8±6.8	0 (0.0)	27 (27.6)	71 (72.4)	0 (0.0)
Domain	Stakeholder	31.5(27.3-37.0)	32.1±9.3	21 (21.5)	75 (76.5)	2 (2.0)	0 (0.0)

2	involvement						
Domain	Rigor of	19.1(15.3-22.2)	20.2±10.8	81 (82.7)	15 (15.3)	2 (2.0)	0 (0.0)
3	development						
Domain	Clarity of	59.3(50.0-64.8)	56.9±10.9	1 (1.0)	27 (27.6)	70 (71.4)	0 (0.0)
4	presentation						
Domain	Applicability	18.1(13.9-25.7)	19.2±8.7	74 (75.5)	24 (24.5)	0 (0.0)	0 (0.0)
5							
Domain	Editorial	0.0(0.0-0.0)	1.6±4.6	98(100.0)	0 (0.0)	0 (0.0)	0 (0.0)
6	independence						
P-value		0.02	0.00	-	-	-	-

Scope and purpose

The mean ± SD in this domain was 53.7(50.0-59.7). The median score was the second highest among the domains. Most guidelines performed well in this domain, with no guidelines scoring below 25%.

Stakeholder involvement

The median score for the overall score for this domain was 31.5(27.3-37.0). Twenty-eight guidelines referred to methodologists or evidence-based experts in the guideline development stage, and none involved patients in the development process. Only two CPGs scored at least 50%.

Rigor of development

Two CPGs scored at least 50% in the domain “rigor of development”. The overall score in this domain was poor, with a median of 19.1(15.3-22.2). Five CPGs described the systematic methods for searching and selecting evidence, 40 CPGs described the strengths and limitations of the body of evidence clearly, 29 CPGs used a nominal group technique or consensus-development conference, 81 CPGs considered the health benefits, side effects and risks in formulating the recommendations, 91 CPGs indicated a link between the supporting evidence and the recommendations, and four CPGs were reviewed externally before publication. Nine guidelines were updated versions of older guidelines, but none of these described a procedure for updating the guideline.

Clarity of presentation

Overall, the mean score for this domain was the highest among all domains, and only one guideline scored less than 25%. Recommendations were specific and unambiguous in all CPGs albeit to various degrees. Four CPGs did not present the different options for management of the condition or health issue, and in one CPG key recommendations were not identifiable.

Applicability

The mean ± SD for the overall quality score for this domain was 18.1(13.9-25.7). Fourteen CPGs provided advice or tools on how the recommendations could be put into practice. Similarly, 14 CPGs described facilitators and barriers to its application. Fourteen CPGs considered the potential resource implications of applying the recommendations, and 87 CPGs presented monitoring or auditing criteria. Seventy-four guidelines scored less than 25% for this domain.

Editorial independence

The scores for this domain were the lowest among all domains, with all 98 guidelines scoring

less than 25%. Only one guideline reported that there were no conflicts of interest. Nine CPGs reported that they received funding from governments (seven guidelines) or academic organizations (two guidelines). However, these nine guidelines failed to report whether the views of the funding body influenced the content of the guideline or not.

Scores of AGREE II in each domain based on different classification criteria

We conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses. Table 3 shows the domain scores and P values for different subgroups of the guidelines. Guidelines published in 2017 scored higher than those published earlier in “stakeholder involvement”, “rigor of development” and “editorial independence”. CPGs of integrated traditional Chinese and Western medicine performed clearly better than CPGs on Western or traditional Chinese medicine in all domains. Guidelines that reported external funding scored better than guidelines that reported no funding in editorial independence. Guidelines that involved methodologists scored higher than guidelines not reporting methodologists and the differences were statistically significant in “Stakeholder involvement” and “Rigor of development”. To some extent, reporting methodologists could increase the scores in “Stakeholder involvement” and “Rigor of development”. The difference between guidelines published in CSCD and non-CSCD journals was not statistically significant, developing organization and type of guidelines as well.

Comparison of AGREE II scores between Chinese diabetes CPGs and CPGs published worldwide

Alonso-Coello et al. ^[16] used the AGREE II tool to evaluate 42 guidelines published between 1980 and 2010. The results showed that the average scores of the 42 guidelines in the 6 AGREE II domains were 64%, 35%, 43%, 60%, 22%, and 30%, respectively, as compared with the Chinese guidelines, which had a larger gap in the "rigor of development" and "editorial independence" domains as a result of some of the included guidelines not reporting clearly the user populations for the guidelines and the guidelines methodology. Chen et al. 2012^[15] used the AGREE II tools to evaluate 269 CPGs in China in all fields, with the results of 64%, 52%, 48%, 81%, 43%, and 26%, respectively. The scores of Chinese CPGs on diabetes were clearly higher than those of Chinese CPGs of all topics on average (Figure 3). The scores of Chinese diabetes CPGs were below the international average of CPGs on all topics, but the difference was small in most domains. Only for “editorial independence” the Chinese CPGs on diabetes scored lower than Chinese guidelines on average, and substantially lower than all guidelines internationally.

Discussion

It is astonishing that almost 100 domestic guidelines of diabetes mellitus have been published in China in just mere one decade. We found that annual number of CPGs for diabetes mellitus published in domestic Chinese journals increased dramatically up to 2011, after which the number has remained fairly stable during the last few years. At the same time, the quality of the CPGs in some AGREE II domains, such as “Stakeholder involvement”, “Rigor of development” and “editorial independence”, improved slightly.

The increasing number indicates that more and more Chinese diabetes CPGs are being applied to clinical practice. Government agencies and the general and subspecialty medical societies in China promote the use of domestic guidelines in healthcare instead of merely

adopting foreign guidelines, to account for the characteristics and needs of Chinese patients and clinicians. Meanwhile, the number of published randomized controlled trials and systematic reviews in China is increasing quickly, which may be associated with rapid increase in burden of diabetics. This has laid the groundwork for development of guidelines.

In the 6 major fields of the AGREE II tool scoring system, only the score of Domain 1, “scope and purpose” and Domain 4 “clarity of presentation” were > 50%; as such, the scores of the other 4 fields need to be improved upon. The low score of Domain 2, “stakeholder involvement,” was because most of the guidelines included in the present study did not take into account the multidisciplinary intersections of the participants, as well as the preferences and values of the target population. The low score of Domain 3, “rigor of development,” means that generally those guidelines failed to show that they have conducted a systematic review on the best available evidences^[17]. The low score was possibly due to that the reporting on the approach to its development lacked transparency. Several of included guidelines did not report the methods of the systematic literature search, forming their recommendations and screening of evidence. Additionally, the low score of Domain 5, “applicability,” suggested that most guidelines development agencies ignored the guidelines’ application, and that most guidelines did not provide relevant supporting documents or recommendations or emphasize the promotion and hindrance factors in the application process. In fact, failure to address the issue of implementation and to provide clear, practical advice can have important consequences. The low score of Domain 6, “editorial independence,” was likely due to the lack of disclosure of funding sources and related conflicts of interest. Failure to address the issue of implementation and to provide clear, practical advice can have important consequences. The Chinese DR guidelines’ score was lower than that of international DR guidelines in this field, indicating that the Chinese Guidance Group has not paid enough attention to the interests of the members of the disclosure group and to declaring clearly the views of the sponsors. If a conflict of interest is not declared, the recommendations may be affected by multiple interests and biased. It may not be that the quality of the guidelines themselves are low but rather the quality of the nonstandard report of the guidelines^[18,19]. The low scores of these domains may be due to actual problems in guideline development, but because of the nature of the AGREE scoring, they may also simply be due to insufficient clarity and communication of the process used^[20].

The mean score in each domain of the quality of Chinese diabetes CPGs was slightly lower than that of CPGs published worldwide. The difference can be at least partly explained by the selection criteria: the review by Alonso-Coello et al included guidelines that are indexed in Medline and therefore likely to be of high quality, whereas our study tried to find all guidelines on a specific topic in one country. However, there was a huge gap between the Chinese diabetes CPGs and CPGs published worldwide in the domain “editorial independence”: this domain was also the one that had lowest score overall. Conflicts of interest are a significant issue worldwide, as can introduce bias into almost every step of the guideline development process^[21]. Our results show that there are serious reporting flaws for potential conflicts of interest for the members of the guideline development groups in Chinese CPGs. Most foreign and international organizations, such as the WHO, have their own COI disclosure policies for members of guideline panels^[22], but until now, only few Chinese guideline-developing organizations have implemented such policies. Unlike in most other countries, in China the majority of guidelines are developed by professional

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committees, and despite reporting no external funding, many of these guidelines may be supported by pharmaceutical companies. It is critically important that guideline developers attend to declarations of potential conflicts of interest in a proactive, reasoned, transparent and defensible manner. An efficient way to decrease the influence of pharmaceutical companies could be to establish a government-controlled public foundation to develop guidelines.

Comparison of adopted guideline with its parental guidelines were conducted, with the results displayed in Table 4. Alonso-Coello et al.^[16] represented the quality of international CPGs, as compared with the Chinese guidelines, which had a larger gap in the "rigor of development" and "editorial independence" domains. The wide variability observed in these scores is worrying, since these domains directly reflect the reliability of the guidelines. Some of the included guidelines did not report the specific process of development and a conflict of interest as well. Holmer et al.^[23] used the AGREE II tools to evaluate 24 CPGs in the field of blood glucose management of type 2 diabetes mellitus, ultimately gaining results of 64%, 52%, 48%, 81%, 43%, and 26%, respectively. Included guidelines in our study covers all contexts involved with diabetes mellitus, while Holmer et al. only focused on blood glucose management of type 2 diabetes mellitus. That might be the reason why scores of guidelines in study of Holmer et al. behaved much better than the Chinese diabetes CPGs. Chen et al. 2012^[15] used the AGREE II tools to evaluate 269 CPGs in China in all fields. These results suggested that the Chinese guidelines still had some problems in terms of participation and application, mainly because of lacked considerations about the participants in development of guidelines, and absence of the relevant report. Therefore, guidelines makers subsequently should consider the participation of multidisciplinary personnel and provide some guidance in application. Besides, the guidelines report should follow the RIGHT report statement^[24] in order to ensure the transparency of the guidelines. China currently lacks capacity for evidence-based guideline development and coordination by a central agency [46]. On the other hand, Chinese diabetes CPGs did relatively well in contrast to the overall mean scores among Chinese guidelines. The scores in most domains were higher in CPGs for diabetes mellitus than that in guidelines published in China in general. The most important reason is that the time period on which the two studies focus was not the same, Chen et al focusing on CPGs in 1993-2010. Our study only paid attention to recent CPGs, of which the quality became better with time goes by. Another possible explanation is that the diabetes guidelines focus on a major disease where a large amount of high quality evidence is available. Several studies revealed that there are considerable variations and even conflicting recommendations concerning type 2 diabetes mellitus management from different guidelines^[25,26]. While recommendations in Chinese diabetes CPGs were relatively consistent.

Table 4 Comparison of adopted guideline with its parental guidelines

AGREE II domains	Mean scores in different studies(%)			
	Chinese diabetes CPGs	Alonso-Coello et al. 2010 ^[16]	Holmer et al. ^[23]	Chen et al. 2012 ^[15]
Domain 1: Scope and purpose	54.8	64	64	19
Domain 2: Stakeholder involvement	32.1	35	52	8
Domain 3: Rigor of development	20.2	43	48	7
Domain 4: Clarity of presentation	56.9	60	81	26
Domain 5: Applicability	19.2	22	43	6

Domain 6: Editorial independence	1.6	30	26	2
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Many factors are capable of influencing the quality of CPGs. From the perspective of the funders, the quality of guidelines developed by organizations reporting a funding source was higher than those that did not report any funding. The scores of guidelines with methodologists taking part in were higher than those not reporting methodologists. Evidence based methods could improve the quality of CPGs, especially in Stakeholder involvement and Rigor of development. The guideline development groups involved methodological experts who could ensure that methodological checks were correctly applied and that the development process was fully documented^[27]. Developing guidelines based on the methodology of evidence-based medicine could improve the quality of CPGs^[28]. Yao et al^[29] conducted a study comparing the quality of traditional Chinese medicine (TCM) CPGs with non-TCM CPGs, and the result showed that the quality of TCM CPGs was much better. The quality of traditional Chinese medicine CPGs was higher than that of CPGs for Western medicine, which was compliant with the results of the study of Yao et al. It means that traditional medicine has drawn a lot of attraction and the relevant studies are becoming more scientific.

Strengths and limitations

Our review has several strengths. First, the systematic review of CPGs for diabetes mellitus quality attempted to cover all guidelines published on diabetes over the past one decade in China. Our structured and explicit approach increases the validity of the findings. Second, we used the AGREE II instrument, which is a scientific and valid tool to assess the quality of CPGs. Furthermore, we conducted two rounds (for a total of 10 guidelines) of pilot appraisals and resolved disagreements, which further enhanced the confidence in our results. The extensive search strategy covering both indexed and grey literature, use of multiple appraisers who will complete training and calibration to assess the quality of CPGs, and application of the AGREE II instrument, which has established validity and reliability, are all strengths of this review and may help the delivery of better care.

This review has also limitations. Our study was restricted to English and Chinese language guidelines, which excluded a small number of additional guidelines. Furthermore, CPG developers did not report all the details in developing guidelines even if they included some of the items listed in AGREE in process. Therefore, the score of AGREE II may underestimate the methodological quality of guidelines. Lastly, the AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations. Currently, there is an ongoing research project, The AGREE - REX: Recommendation Excellence project that aims at developing and validating a new tool that will complement the AGREE II by assessing the clinical credibility and implementability of CPGs.^[10] Current review covers the period from, 2007 -2017, however comparison was made, with 2010 and 2012 publication data. Clinical guideline development are very dynamic process progresses every year, so the comparison should just be a reference.

Conclusion

A large number of CPGs for diabetes mellitus have been produced in China. Generally speaking, the quality of Chinese diabetes CPGs scored relatively well in comparison with other guidelines according to the evaluation by the AGREE II instrument. However, there is still room for improvement, especially in the aspect of editorial independence. Reporting the full texts of

CPGs and conflicts of interests according to AGREE II checklists and abiding to the principles of evidence-based medicine can further improve the quality of guidelines.

Supplementary data

Supplementary data are available online at https://pan.baidu.com/s/1KxyaEEqcSm_5Y0IWccuUIQ.

Contributorship Statement

CHEN Yaolong conceived the study idea and is the guarantor. WANG Jinjing, LUO Xufei, Mu Yiming and GAO Yuting devised the study methodology. LIU Lian³, SONG Xiaoyang⁴, Ke Lixin⁴, WANG Hao developed the search strategy and in screened the guidelines, extracted the data and appraised guidelines. LB and LT provided the methodological support. GAO Yu-ting wrote the first draft. LIAO Zhihong, Mu Yiming, CHEN Yaolong and Janne Estill read the drafts, provided the comments, and agreed on the final version of the manuscript. Luo XF, Song XY, LIAO Zhihong, Chen Yaolong contributed to the modify and language help of the article.

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Conflict of interest

For all authors, there are no potential conflicts of interest, including no relevant financial interests in any company or institution that might benefit from this publication.

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Table 3 Scores of AGREE II based on different classification criteria

Sub-analysis	Number of guidelines (%)	Domain scores (mean±SD, %)					
		Scope and purpose	Stakeholder involvement	Rigor of development	Clarity of presentation	Applicability	Editorial independence
Developing organization							
Chinese Medical Diabetes Association	60(61.1%)	54.9±6.8	31.7±8.3	20.7±9.2	58.4±8.4	20.3±8.6	1.3±4.1
Specially formed group*	18(18.4%)	55.1±8.0	32.8±13.9	19.8±15.8	56.2±12.1	17.9±10.9	2.6±6.5
National Health and Family Planning Commission	2(2.1%)	45.4±9.2	27.8±2.6	13.5±17.2	41.7±32.7	13.9±0.0	0.0±0.0
Ministry of Public Health	1(1.0%)	44.4	16.7	4.2	29.6	0.0	0.0
Hospitals	1(1.0%)	59.3	31.5	21.5	59.3	16.7	0.0
Collaboration of two or more organizations	14(14.3%)	56.1±5.5	33.5±5.3	19.7±9.8	56.0±12.0	18.2±7.2	0.8±3.0
Others	2(2.1%)	52.8±3.9	39.8±11.8	25.0±7.9	53.7±10.5	18.8±6.9	8.3±11.8
P-value	/	0.36	0.54	0.77	0.18	0.48	0.35
Type of guidelines							
Diagnosis and treatment	27(27.6)	55.8±7.9	30.3±6.3	18.6±6.6	59.2±7.9	22.3±9.5	1.6±4.8
Treatment	22(22.4%)	54.5±7.8	33.6±10.8	22.4±14.8	55.6±14.1	20.3±9.0	0.6±3.0
Management	14(14.3%)	53.4±6.0	31.0±6.3	18.3±6.9	56.1±10.3	14.9±5.3	1.2±4.5
Prevention and treatment	9(9.2%)	54.9±3.6	29.2±6.5	20.0±3.8	61.3±3.0	19.6±9.1	1.2±3.5
Technology\$	6 (6.1%)	51.2±2.2	38.9±6.6	18.6±6.9	53.4±10.0	16.7±4.6	2.8±6.8
Medication\$\$	5(5.1%)	56.7±7.9	34.8±7.6	22.5±7.5	58.1±11.2	19.2±9.1	0.0±0.0
Prevention	1(1.0%)	68.5	37.0	24.3	64.8	29.2	0.0

Health care	1(1.0%)	59.3	14.8	7.6	40.7	15.3	0.0
Comprehensive #	13(13.3%)	54.4±6.6	33.0±14.8	22.2±17.9	54.1±14.6	15.8±8.9	4.1±6.5
P-value	/	0.49	0.25	0.84	0.52	0.19	0.64
Publication year							
2009	3(3.0%)	59.9±7.7	26.5±8.8	15.7±6.5	53.1±10.9	22.2±2.8	0.0±0.0
2010	7(7.1%)	52.1±8.1	28.8±6.2	14.7±4.3	50.8±10.8	13.5±11.9	2.4±6.3
2011	23(23.5%)	56.2±6.5	32.3±7.3	21.2±6.3	60.5±8.1	22.3±8.6	0.5±2.3
2012	13(13.3%)	53.3±6.2	34.5±12.9	23.5±17.6	54.6±11.6	16.0±7.2	3.2±6.2
2013	10(10.2%)	53.9±8.5	27.8±6.3	15.4±4.6	54.3±10.8	19.4±11.2	1.7±5.3
2014	12(12.2%)	56.8±7.8	32.7±8.4	19.6±5.3	60.6±6.8	22.7±9.7	1.4±4.8
2015	9(9.2%)	54.1±5.6	31.1±5.9	22.8±5.4	61.7±5.4	20.4±7.6	1.2±3.7
2016	14(14.3%)	53.0±6.1	32.1±7.5	18.6±9.5	53.2±15.1	16.1±2.9	0.8±3.0
2017	7(7.1%)	56.3±8.0	38.6±17.7	25.4±24.5	56.3±16.1	17.3±9.8	4.4±7.5
P-value	/	0.58	0.38	0.42	0.20	0.13	0.59
Western medicine or traditional Chinese medicine							
Western medicine	78(79.6%)	53.7±6.7	31.2±7.3	18.9±7.3	56.5±11.9	18.2±8.3	1.3±4.4
Traditional Chinese medicine	14(14.3%)	58.6±5.9	31.1±7.5	19.9±4.8	58.7±5.6	21.8±9.7	1.6±4.0
Integrated medicine	6(6.1%)	59.3±7.9	44.4±22.1	36.9±31.5	60.8±1.4	24.3±8.5	4.6±7.2
P-value	/	0.01	0.002	0.001	0.53	0.11	0.23
Participation of methodologists in guideline development							
Methodologists involved	27(27.6%)	55.6±7.2	36.9±11.4	25.2±16.8	58.3±10.0	19.8±6.6	1.4±4.2
Not reported	71(72.4%)	54.6±6.9	30.2±7.6	18.3±6.6	56.4±11.3	19.0±9.4	1.6±4.7
P-value	/	0.52	0.01	0.048	0.45	0.67	0.77
External funding							
No reported external funding	85(86.7%)	55.2±6.6	32.3±8.3	19.7±9.6	56.6±11.4	19.7±8.3	0.5±2.6
External funding reported	13(13.3%)	52.6±8.7	30.6±14.4	23.2±17.0	58.8±6.8	15.9±10.7	8.8±7.5

P-value	/	0.19	0.54	0.25	0.31	0.13	0.001
Indexation in Chinese Sciences Citation Database(CSCD)							
Indexed in CSCD	60	54.0±7.0	32.4±8.6	20.0±10.4	56.9±10.6	17.8±8.2	2.0±5.2
Not indexed in CSCD	37	56.1±6.8	32.0±10.0	20.8±11.5	57.4±11.4	21.5±9.2	1.0±3.4
P-value	/	0.14	0.65	0.82	0.98	0.46	0.27

*: Groups specifically formed for developing the guideline; members were staff from different hospitals.

\$: refers to guidelines about the use of medical equipment, e.g. insulin injection needle.

\$\$: refers to guidelines about the use of specific drugs, e.g. insulin.

#: refers to guidelines covering more than two types of guidelines.

Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

Figure2. Number of clinical practice guidelines on diabetes published annually from 2007 to 2017 in China

Figure 3. Domain scores in CPGs published worldwide, Chinese CPGs of all topics, and Chinese CPGs on diabetes.

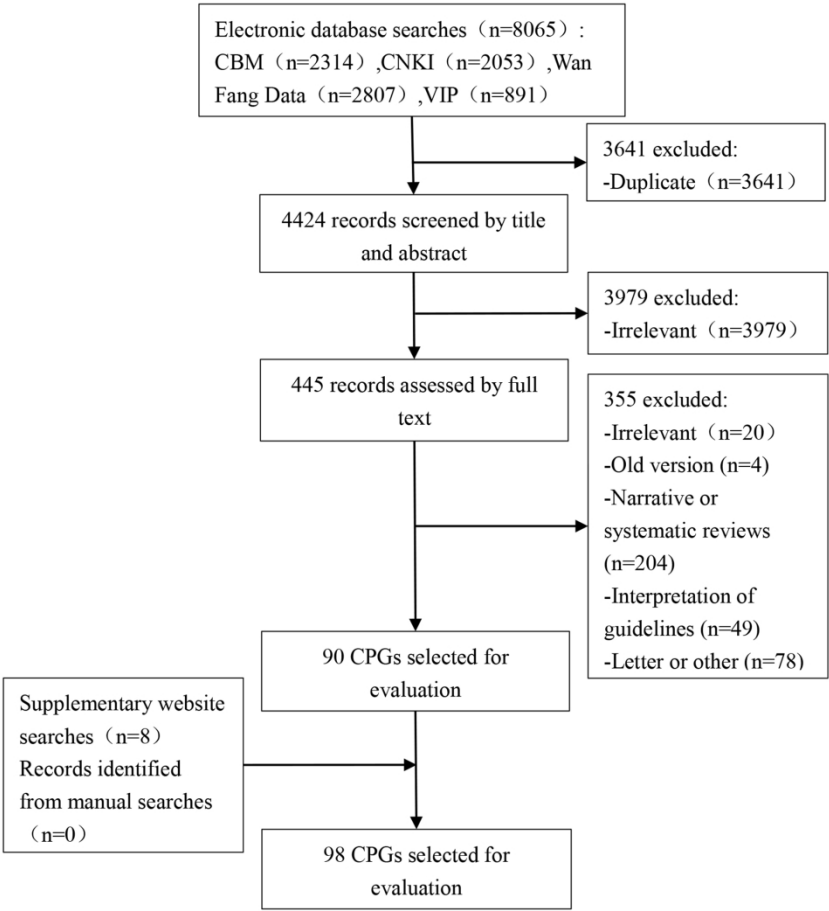


Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

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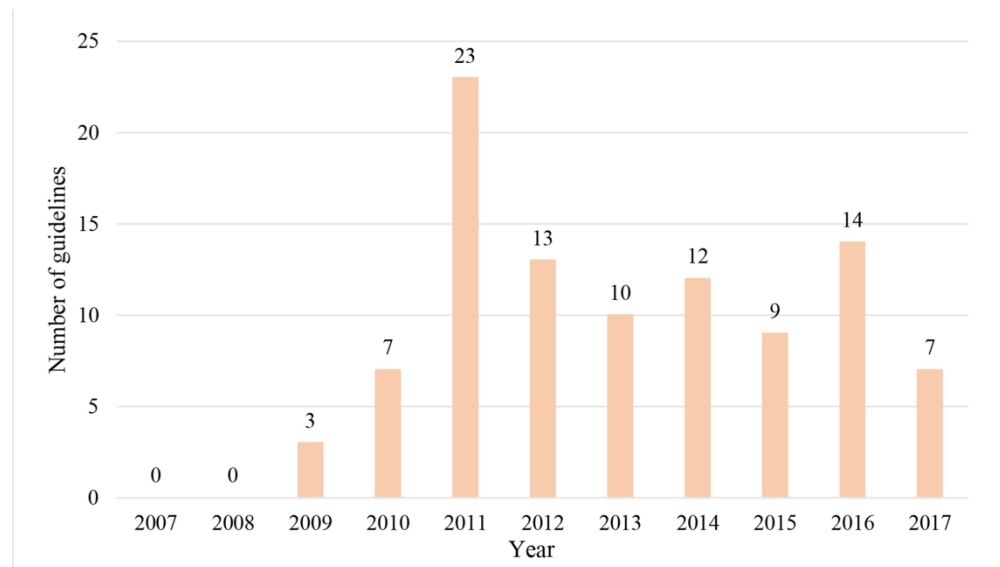


Figure 2. Number of clinical practice guidelines on diabetes published annually from 2007 to 2017 in China

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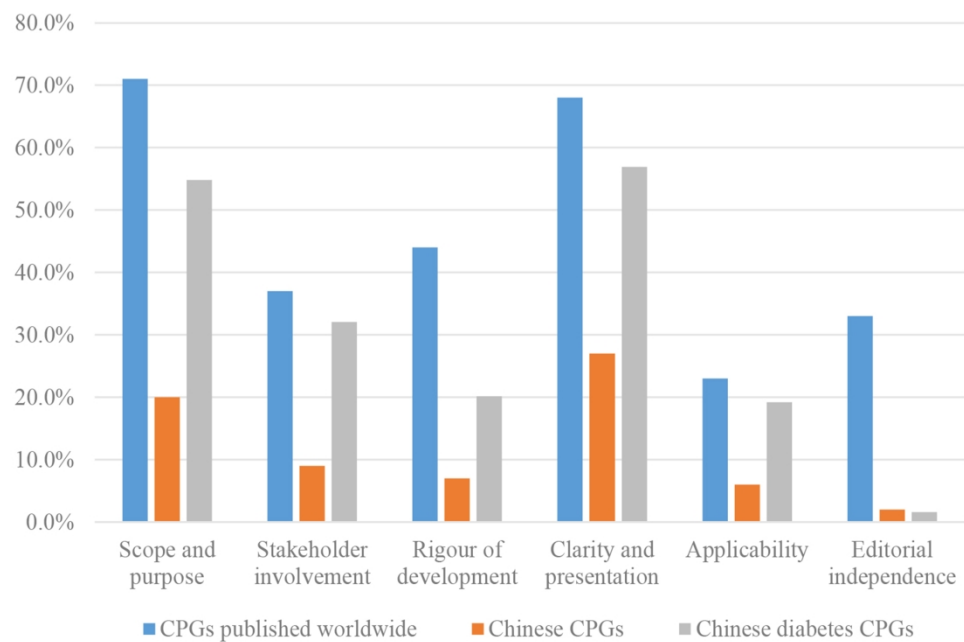


Figure 3. Domain scores in CPGs published worldwide, Chinese CPGs of all topics, and Chinese CPGs on diabetes.

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The title of the guide	Published institution	Year of publica tion	Publication	Targeted patient	Guide version	Situation of Chinese and Western Medicine	Type of guide	Is there fundin g	Whether the database, search terms and retrieval time are clearly described	Whether a conflict of interest statement has been reported	Is there a methodolog ist involved	Whether an update was reported	Whether to categorize the quality of evidence and recommend ations
Guidelines for the diagnosis and treatment of diabetic ketoacidosis in children (2009 edition) ^[1]	Endocrinology and Metabolism Group, Pediatrics Branch, Chinese Medical Association	2009	Chinese Journal of Pediatrics	Diabetic ketoacidosis in children	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No
Diagnostic criteria for diagnosis of diabetic peripheral neuropathy (draft for comments) ^[2]	Endocrine Genetic Metabolism Group of Chinese Medical Association	2009	Chinese Journal of Diabetes	Diabetic peripheral neuropathy	Original	Chinese and Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No
China Diabetes Care and Education Guide ^[3]	China Diabetes Care and Education Guide	2009	China Diabetes Care and Education Guide	Diabetic patients	Original	Western Medicine	Nursin g and educati on	No	No	No	No	No	No
China Diabetes Medical Nutrition Treatment Guide (2010) ^[4]	Chinese Medical Association Diabetes Branch	2010	People's Military Medical Publishing House	Diabetic patients	Original	Western Medicine	Treatm ent	Yes	Yes	No	No	Yes	推荐强度
Guide to insulin therapy for childhood and adolescent diabetes (2010 edition) ^[5]	Endocrinology and Metabolism Group, Pediatrics Branch, Chinese Medical Association	2010	Chinese Journal of Pediatrics	Diabetic children	Original	Western Medicine	Treatm ent	No	No	No	No	No	No
Chinese expert consensus on blood glucose management in ischemic stroke/transient ischemic attack ^[6]	Chinese expert consensus group for blood glucose management in ischemic stroke/transient ischemic attack	2010	Chinese Journal of Internal Medicine	Ischemic stroke / transient cerebral ischemia (covering TLA)	Original	Western Medicine	Manag ement	Yes	No	No	No	No	No
Chinese expert consensus on comprehensive management of multiple cardiovascular risk factors in diabetic patients ^[7]	Chinese Medical Association Cardiovascular Physician Branch	2010	Chinese Journal of Hypertension	Cardiovascu lar disease	Original	Western Medicine	Manag ement	No	No	No	No	No	No
Chinese Expert Consensus on Blood Glucose	Peking University	2010	Prevention and	Stability	Updated	Western	Manag	No	No	No	No	No	No

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Management in Patients with Stable Coronary Heart Disease (Revised Discussion Paper) ^[8]	People's Hospital		treatment of cardiovascular and cerebrovascular diseases	coronary heart disease		Medicine	ement							
Obstructive sleep apnea and diabetes expert consensus ^[9]	Chinese Medical Association Respiratory Diseases Branch Sleep Group	2010	Chinese Journal of Tuberculosis and Respiratory	Obstructive sleep apnea (OSA)	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No	No
Expert consensus on treatment of viral hepatitis-associated diabetes ^[10]	Expert Committee on the Treatment of Viral Hepatitis Related Diabetes	2011	Chinese Journal of Hepatology (electronic version)	Viral hepatitis associated diabetes (vdh)	Original	Western Medicine	Treatment	No	No	No	No	No	No	Quality of evidence
Guidelines for the diagnosis and treatment of chronic wounds (2011 edition) ^[11]	Chinese Medical Association Trauma Branch Organizational Rehabilitation Professional Committee (Group)	2011	Chinese clinician	Diabetes	Updated	Western Medicine	Treatment	No	Yes	No	No	No	No	No
Surgical treatment of diabetes experts consensus ^[12]	Chinese and Western Medicine Diabetes Branch	2011	Chinese Journal of Diabetes	Diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No	No
Diabetes erectile dysfunction Chinese medicine diagnosis and treatment standard ^[13]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese Medicine	Diagnosis and treatment	No	No	No	No	Yes	No	No
Diabetes Mellitus with Metabolic Syndrome ^[14]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese and Western Medicine	Diagnosis and treatment	No	No	No	No	Yes	No	No
Diabetes combined with hypertension Chinese medicine diagnosis and treatment standards ^[15]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese and Western Medicine	Diagnosis and treatment	No	Yes	No	No	Yes	No	No
Diabetes combined with osteoporosis Chinese medicine diagnosis and treatment standards ^[16]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Osteoporosis	Original	Chinese Medicine	Diagnosis and treatment、Prevention and	No	No	No	No	No	No	No

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Diabetes combined with dermatological Chinese medicine diagnosis and treatment standards ^[17]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Skin disease	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Pre-diabetes Chinese medicine diagnosis and treatment standard ^[18]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Pre-diabetes	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Diabetic neurogenic bladder Chinese medicine diagnosis and treatment standard ^[19]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Neurogenic bladder	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic nephropathy ^[20]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Kidney disease	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetic kidney disease Chinese medicine diagnosis and treatment standard ^[21]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Kidney disease	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic retinopathy ^[22]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Retinopathy (DR)	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetic retinopathy Chinese medicine diagnosis and treatment standard ^[23]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Retinopathy (DR)	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Diabetes TCM Guidelines ^[24]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Diabetes	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetes TCM Prevention Guide Diabetes Foot ^[25]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Diabetic foot (DF)	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No

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Diabetes TCM diagnosis and treatment standard ^[26]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic peripheral neuropathy ^[27]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Peripheral neuropathy	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Expert consensus on HbA1c control targets in Chinese adult type 2 diabetes ^[28]	Chinese Medical Association Endocrine Branch	2011	Journal of Endocrinology and Metabolism	Chinese adult type 2 diabetes	Original	Western Medicine	Prevention and treatment	No	No	No	No	No	No
Chinese Diabetes Patients in the Management of Insulin Use Education ^[29]	Chinese Medical Association Diabetes Branch	2011	Chinese Medical Association Diabetes Branch	Chinese Diabetic patients	Original	Western Medicine	Management	No	No	No	No	No	No
Chinese Diabetes Surgery Expert Guidance (2010) ^[30]	Endocrinology Surgery Group, Chinese Medical Association Surgery Branch	2011	Chinese Journal of Practical Surgery	Diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
China Diabetes Drug Injection Technical Guide (2011 Edition) ^[31]	Chinese Medical Association Diabetes Branch	2011	Chinese Journal of General Practitioners	Diabetes	Original	Western Medicine	Application	No	No	No	No	No	Both
Chinese blood glucose monitoring clinical application guide ^[32]	Chinese Medical Association Diabetes Branch	2011	Chinese Journal of Diabetes	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	No
China insulin pump treatment guide ^[33]	Chinese Medical Association Association of Endocrinology and Metabolism	2011	China Medical Frontier Magazine (electronic version)	Diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No
Consensus on the diagnosis and treatment of occult autoimmune diabetes (LADA) in adults ^[34]	Chinese Medical Association Diabetes Branch	2012	Chinese Journal of Diabetes	Autoimmune diabetes	Original	Western Medicine	Diagnosis and treatment	No	No	No	Yes	No	No
Expert guidance on blood pressure control in patients with hypertension and type 2 diabetes ^[35]	China Medical Association "Medical Quality Miles •	2012	China Medical Frontier Magazine	Hypertension with diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No

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	Antihypertensive in Action" TRIP Project Expert Committee		(electronic version)											
Screening intervention for microalbuminuria in patients with hypertension and diabetes ^[36]	Editorial Board of China Hypertension Magazine	2012	Chinese Journal of Hypertension	Hypertension and Diabetic patients	Original	Western Medicine	Screening and intervention	No	No	No	Yes	No	No	
Early consensus on screening and management of abnormal glucose metabolism in cardiovascular medicine ^[37]	Early Screening and Management Expert Group on Cardiovascular Glucose Metabolism Abnormalities	2012	Chinese Journal of Internal Medicine	Cardiovascular diseases	Original	Western Medicine	Screening and management	No	No	No	Yes	No	No	
Guidelines for the diagnosis and treatment of type 1 diabetes in China ^[38]	Chinese Medical Association Diabetes Branch	2012	People's Health Publishing House	Type 1 diabetes	Original	Western Medicine	Diagnosis and treatment	No	No	No	Yes	No	No	
Expert consensus on prevention and treatment of type 2 diabetes with dyslipidemia in China ^[39]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with blood lipids	Original	Western Medicine	Prevention and treatment	No	No	No	Yes	No	No	
Expert consensus on the application of insulin secretagogue in Chinese adult type 2 diabetes ^[40]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	Quality of evidence	
Clinical Application Guide for Dynamic Blood Glucose Monitoring in China (2012 Edition) ^[41]	Chinese Medical Association Diabetes Society	2012	Chinese Journal of Frontier Medicine (Electronic Edition)	Diabetes	Updated	Western Medicine	Application	No	No	No	Yes	No	No	
Expert consensus on hypoglycemia management in Chinese patients with diabetes ^[42]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Management	No	No	No	Yes	No	No	
Expert consensus on blood pressure management in Chinese patients with diabetes ^[43]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and	Diabetes	Original	Western Medicine	Prevention and management	No	No	No	Yes	No	Quality of evidence	

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Chinese Diabetes Exercise Guidelines ^[44]	Chinese Medical Association Diabetes Society	2012	Metabolism International Journal of Endocrinology and Metabolism	Diabetes	Original	Chinese and Western Medicine	Treatm ent	No	No	No	Yes	No	Both
Diabetes Screening and Diagnosis of the Health Industry Standard of the People's Republic of China ^[45]	Ministry of Health of the People's Republic of China	2012	Practical Blindness Prevention Technology	Diabetes	Original	Western Medicine	Screeni ng and diagno sis	No	No	No	No	No	No
Screening and management criteria for type 2 diabetes patients with lower extremity arterial disease ^[46]	Chinese Medical Association Diabetes Society	2012	China Diabetes Journal	Type 2 Diabetes Mellitus with Lower Extremity Arterial Diseases	Original	Western Medicine	Screeni ng and treatme nt	No	No	No	No	No	No
Expert consensus on prevention of type 2 diabetes in Chinese adults ^[47]	Chinese Medical Association Endocrinology Branch	2014	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Preven tion	No	No	No	No	No	Quality of evidence
Chinese expert consensus on clinical application of insulin in adults with type 2 diabetes ^[48]	Endocrinology Branch of Chinese Medical Association	2013	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No
Simplified procedure for diagnosis and treatment of blood pressure and microalbuminuria in patients with hypertension and diabetes ^[49]	Chinese Association of Hypertension Professional Committee	2013	Chinese Journal of Hypertension	High Blood Pressure with Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No
Expert guidance on blood pressure control in patients with hypertension and type 2 diabetes (2013 edition) ^[50]	Cardiovascular Physician Branch of Chinese Medical Doctor Association	2013	Chinese Journal of Hypertension	Hypertensio n with Type 2 Diabetes	Updated	Western Medicine	Treatm ent	No	No	No	No	No	No
Diabetes Medical Nutrition Therapy Expert Consensus ^[51]	Individual	2013	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Treatm ent and prevent ion	No	No	No	No	No	No
Consensus on Diagnosis and Treatment of Diabetic Peripheral Neuropathy ^[52]	Electromyography and Clinical	2013	Chinese Journal of	Diabetic Peripheral	Original	Western Medicine	Diagno sis and	No	No	No	No	No	No

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	Neuroelectrophysiology Group of Chinese Medical Association Neurology Branch International Vascular Union China Branch Diabetes Foot Professional Committee		Neurology	Neuropathy			treatme nt							
Diabetes Foot Treatment Guide ^[53]		2013	Journal of interventional radiology	Diabetic foot	Original	Western Medicine	Diagno sis and treatme nt	Yes	No	No	No	No	No	
New consensus diagnosis for short-term insulin intensive therapy for type 2 diabetes ^[54]	Chinese Medical Association Diabetes Branch	2013	Chinese Medical Journal	New diagnosis of type 2 diabetes	Original	Western Medicine	Treatm ent	No	No	No	No	No	No	
Expert consensus on the goal of hyperglycemia management in Chinese adult hospitalized patients ^[55]	Chinese Medical Association Endocrinology Branch	2013	Chinese Journal of Endocrinology and Metabolism	Chinese adult hospitalized patients with high blood sugar	Original	Western Medicine	Manag ement	No	No	No	No	No	Quality of evidence	
Guidelines for the diagnosis and treatment of high blood sugar crisis in China ^[56]	Chinese Medical Association Diabetes Branch	2013	China Diabetes Journal	Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No	
Expert consensus on non-invasive examination of early macrovascular disease in type 2 diabetes ^[57]	Chinese Medical Association Association of Endocrinology and Metabolism	2013	China Circulation Magazine	Early macrovascu lar disease in type 2 diabetes	Original	Western Medicine	Diagno sis and Treatm ent	No	No	No	No	No	No	
Guidelines for the diagnosis and treatment of pregnancy complicated with diabetes (2014) ^[58]	Department of Obstetrics and Gynecology, Chinese Medical Association Obstetrics and Gynecology Elderly Endocrinology Metabolism Committee	2014	Chinese Journal of Obstetrics and Gynecology	Pregnancy with diabetes	Updated	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	Quality of evidence	
Expert consensus on diagnosis and treatment of diabetes in the elderly (2013 edition) ^[59]	of Geriatrics Association of Chinese Society of Gerontology	2104	Chinese Journal of Internal Medicine	Elderly diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	Both	
Shanghai Type 2 Diabetes Surgery Management Regulations (2014 Trial Version) ^[60]	Shanghai Medical Doctor Association General Surgery Branch	2014	Chinese Journal of Practical	Shanghai type 2 diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No	

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Surgery													
Expert consensus on prevention and treatment of diabetic nephropathy (2014 edition) ^[61]	Chinese Medical Association Diabetes Branch Microvascular Complications Group	2014	China Diabetes Journal	Diabetic nephropathy	Original	Western Medicine	Prevention and treatment	No	No	No	No	No	No
Guidelines for clinical diagnosis and treatment of diabetic retinopathy in China ^[62]	Department of Ophthalmology, Chinese Medical Association	2014	Chinese Journal of Ophthalmology	Diabetic retinopathy	Original	Western Medicine	Diagnosis and treatment screening、	No	No	No	No	No	No
Expert opinion on the application of oral hypoglycemic drugs in cardiovascular disease and diabetes ^[63]	Individual	2014	Chinese Journal of Internal Medicine	Cardiovascular diseases	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for the Prevention and Treatment of Type 2 Diabetes in China (2013 Edition) ^[64]	Chinese Medical Association Diabetes Branch	2014	China Diabetes Journal	Type 2 diabetes in China	Updated	Western Medicine	Prevention and treatment	No	No	No	No	No	No
The same species of islet transplantation technology management specifications (draft for comments) ^[65]	National Health and Family Planning Commission of the People's Republic of China	2016	Journal of Wuhan University (Medical Science Edition)	Diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
Guidelines for Surgical Treatment of Obesity and Type 2 Diabetes in China (2014) ^[66]	Chinese Medical Doctor Association Surgeons Branch Obesity and Diabetes Surgeons Committee	2014	Chinese Journal of Practical Surgery	Chinese obesity and type 2 diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
Chinese Diabetes Blood Ketone Monitoring Expert Consensus ^[67]	Chinese Medical Association Endocrinology Branch	2014	Chinese Journal of Endocrinology and Metabolism	Chinese Diabetes Blood Ketone	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No
China Insulin Pump Therapy Guide (2014 Edition) ^[68]	Chinese Medical Association Association of Endocrinology and Metabolism	2014	Clinical Diabetes	Diabetes	Updated	Western Medicine	Treatment	No	No	No	No	No	No
Expert opinion on the clinical use of insulin	Endocrine and	2015	Drug	Diabetes	Original	Western	Applic	No	No	No	Yes	No	No

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aspart 30 1 time a day ^[69]	Metabolic Center of China-Japan Friendship Hospital		evaluation			Medicine	ation							
Expert advice on clinical application of insulin aspart 50 ^[70]	Department of Endocrinology, PLA General Hospital	2015	Drug evaluation	Diabetes	Original	Western Medicine	Applic ation	No	No	No	Yes	No	No	
Traditional Chinese Medicine Evidence- Based Clinical Practice Guide for Diabetic Foot Ulcer ^[71]	Chinese Medicine Association Surgical Branch	2015	Chinese Journal of Integrated Traditional and Western Medicine	Diabetic foot ulcer	Original	Western Medicine	Practic e	Yes	No	No	No	No	Both	
Expert consensus on determination of haemoglobin A1c ^[72]	Expert consensus committee for determination of haemoglobin A1c	2011	Chinese Journal of Diabetes Mellitus	Diabetes	Original	Western Medicine	treatme nt	No	No	No	Yes	No	No	
Expert consensus on clinical diagnosis of adult diabetic nephropathy in China ^[73]	Chinese Medical Association Endocrinology Branch	2015	Chinese Journal of Endocrinology and Metabolism	Diabetic kidney disease	Original	Western Medicine	Diagno sis	No	No	No	Yes	No	Quality of evidence	
China's chronic disease prevention and treatment primary doctor diagnosis and treatment manual (diabetes volume) 2015 edition ^[74]	Individual	2015	China Diabetes Journal	Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No	
Chinese stroke blood glucose management guidelines ^[75]	National Health and Family Planning Commission Stroke Prevention and Treatment Engineering Committee	2015	Diabetes World: Clinical	Diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No	
Chinese Diabetes Medical Nutrition Treatment Guide (2013) ^[76]	Chinese Medical Association Diabetes Branch	2015	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Treatm ent	No	Yes	No	No	Yes	Both	
China Clinical Application Guide for Blood Glucose Monitoring (2015 Edition) ^[77]	Chinese Medical Association Diabetes Branch	2015	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Monito r	No	No	No	Yes	No	No	
Principle of Oral Hypoglycemic Drugs for Type 2 Diabetes Complicated with Chronic Kidney Disease Chinese Expert Consensus (Updated 2015) ^[78]	Chinese Medical Association Association of Endocrinology and Metabolism	2015	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with chronic kidney disease	Updated	Western Medicine	Treatm ent	No	No	No	Yes	Yes	No	

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Portable blood glucose meter clinical operation and quality management norms Chinese expert consensus ^[79]	Chinese Medical Association Laboratory Medicine Branch	2016	Chinese Medical Journal	Blood glucose monitoring patient	Original	Western Medicine	Management	No	No	No	Yes	No	No
Metformin Clinical Application Expert Consensus (2016 Edition) ^[80]	Individual	2016	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Application	No	No	No	Yes	Yes	Both
Quick advice guide based on clinical application of incretin-treated drugs ^[81]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	Both
Sodium-glucose co-transporter 2 (SGLT2) inhibitor clinically reasonable Application China expert advice ^[82]	Individual	2016	Chinese Diabetes Journal	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	No
Expert consensus on clinical use of diabetic microcirculatory disorders (draft for comments) ^[83]	China Microcirculation Society Diabetes and Microcirculation Committee	2016	Drug evaluation	Diabetic microcirculatory disorder	Original	Chinese and Western Medicine	Application	No	No	No	No	No	Both
Perioperative blood glucose management expert consensus (fast version) ^[84]	Chinese Medical Association Anesthesia Branch	2016	Journal of clinical anesthesiology	Perioperative patient	Original	Western Medicine	Management	No	No	No	No	No	No
Pre-mixed insulin clinical application expert consensus (2016 edition) ^[85]	Chinese Medical Association Endocrinology Branch	2016	Drug evaluation	Diabetes	Updated	Western Medicine	Treatment	No	No	No	No	Yes	No
Chinese insulin therapy guide for type 1 diabetes ^[86]	Chinese Medical Association Diabetes Branch	2016	Chinese Diabetes Journal	Type 1 diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	Both
Expert consensus on integrated management of type 2 diabetes and obesity in China ^[87]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with obese patients	Original	Western Medicine	Management	No	No	No	No	No	No
Expert consensus on postprandial hyperglycemia management in Chinese patients with type 2 diabetes ^[88]	Individual	2016	Chinese Diabetes Journal	Type 2 diabetes	Original	Western Medicine	Management	No	No	No	No	No	No
Guidelines for grading prevention of atherosclerotic cardiovascular and cerebrovascular diseases in Chinese adults with type 2 diabetes ^[89]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Chinese adult type 2 diabetes patients	Original	Western Medicine	Management、prevention、treatment	No	No	No	No	No	Quality of evidence

Guidelines for the diagnosis and treatment of diabetes after organ transplantation in China (2016 edition) ^[90]	Chinese Medical Association Organ Transplantation Branch Chinese Medical Association Organ Transplantation Branch	2016	Organ transplantation	Diabetic patients after organ transplantati on	Original	Western Medicine	nt Diagno sis and treatme nt、 prevent ion、 manag ement 、 screeni ng Diagno sis and treatme nt、 prevent ion Preven tion and manag ement	Yes	No	Yes	No	No	Quality of evidence
Pre-diabetes Chinese medicine evidence-based clinical practice guide ^[91]	Individual	2017	Chinese Medicine Journal	Prediabetes	Original	Chinese and Western Medicine	Diagno sis and treatme nt、 prevent ion	Yes	Yes	No	Yes	No	Both
Chinese Diabetes Prevention and Control Experts Consensus ^[92]	Expert Group on China Diabetes Prevention and Control Experts Consensus	2017	Chinese Journal of Preventive Medicine	Diabetes and high-risk groups	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No
Chinese Diabetes Foot Treatment Guide ^[93]	China Healthcare International Exchange Promotion Association Diabetes Foot Disease Branch	2017	Chinese Medical Journal	Diabetic foot disease patients	Original	Western Medicine	Diagno sis and treatme nt	Yes	No	No	No	No	No
Expert consensus on blood glucose management in hospitalized patients in China ^[94]	Chinese Physician Association Endocrine and Metabolism Physician Branch, China Hospitalized Patients Blood Glucose Management Expert Group	2017	Chinese Journal of Endocrinology and Metabolism	Adult patients with diabetes or hyperglyce mia hospitalized in non-endocrine department	Original	Western Medicine	Manag ement	No	No	No	No	No	No
Expert consensus on the clinical application of sulfonylureas (2016 edition) ^[95]	Group	2017	Drug evaluation	Type 2 diabetes	Updated	Western Medicine	Treatm ent	No	No	No	No	Yes	Quality of evidence
Chinese expert guidance for clinical application of basic insulin in type 2 diabetes	Group	2017	Chinese Journal of	Type 2 diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No

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in adults ^[96]								Diabetes									
Portable blood glucose meter clinical operation and quality management norms Chinese expert consensus ^[97]	Chinese Association of Medical Laboratory Medicine Branch	2016	Chinese Medical Journal	Blood glucose monitoring patient	Original	Western Medicine	Management	No	No	No	Yes	No	No				
Diabetes Metabolism Research and Reviews ^[98]	Group	2016	DIABETES/METABOLISM RESEARCH AND REVIEWS	Type 2 diabetes	Original	Western Medicine	Nursing	No	No	No	No	No	No				

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MOOSE Checklist

Criteria		Brief description of how the criteria were handled in the meta-analysis
Reporting of background should include		
2	Problem definition	To the best of our knowledge, there has been no systematic evaluation of guidelines on diabetes mellitus in China.
2	Hypothesis statement	Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement.
2	Description of study outcomes	Scores in each domain of AGREE II.
2	Type of exposure or intervention used	Diabetes mellitus
2	Type of study designs used	We searched the databases and guideline websites for CPGs for diabetes mellitus published between January 2007 and April 2017 in China. Two reviewers independently screened the literature according to the inclusion and exclusion criteria and extracted data. We used the AGREE II tool to evaluate the quality of the included guidelines.
2	Study population	We placed no restriction.
Reporting of search strategy should include		
1	Qualifications of searchers	The credentials of the two investigators Lian Liu and Lixin Ke are indicated in the author list.
3	Search strategy, including time period included in the synthesis and keywords	CBM (Chinese Biomedical Literature database, http://www.sinomed.ac.cn/), WanFang Data (Chinese Medicine Premier, http://www.wanfangdata.com.cn/), VIP (Chinese Journals Full-text Database, http://data.whlib.ac.cn/), and CNKI (China National Knowledge Infrastructure, http://www.cnki.net/). We used the same search strategy in all databases and restricted the search to guidelines published in China from January 2007 through April 2017. See Table 1 in the article
3	Databases and registries searched	CBM, WanFang Data, VIP, CNKI, Pubmed
3	Search software used, name and version, including special features	We did not employ a search software. EndNote was used to merge retrieved citations and eliminate duplications
3	Use of hand searching	We hand-searched bibliographies of retrieved papers for additional references,
5	List of citations located and	Details of the literature search process are outlined in the

	those excluded, including justifications	flow chart. The citation list is available upon request
3	Method of addressing articles published in languages other than English	We placed no restrictions on language; local scientists fluent in the original language of the article were contacted for translation
3	Method of handling abstracts and unpublished studies	We had contacted a few authors for unpublished studies on the association.
4	Description of any contact with authors	We contacted authors who published the guideline in the international journals for the full manuscript.
Reporting of methods should include		
3	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	Detailed inclusion and exclusion criteria were described in the methods section.
3	Rationale for the selection and coding of data	Data extracted from each of the studies were relevant to the population characteristics, study design. We first conducted one preliminary trial of data extraction. The extraction strategy was then discussed and agreed upon all researchers, and formal data collection was performed.
8	Assessment of confounding	Subgroups were preset for subgroup analysis. We conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses. Table 3 shows the domain scores and P values for different subgroups of the guidelines.
-	Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results	-
-	Assessment of heterogeneity	-
4	Description of statistical methods in sufficient detail to be replicated	Description of methods are detailed in the methods.
√	Provision of appropriate tables and graphics	We included 1 box detailing the terms used for database search, 1 flow chart, 1 summary table, 1 table of scores of AGREE II, 1 table of different subgroups of the guidelines, 1 figure shows number of clinical practice guidelines, 1 figure of comparison between domestic guidelines and international guidelines.
Reporting of results should include		
√	Graph summarizing individual study estimates and overall estimate	Supplementary 1
√	Table giving descriptive information for each study	Supplementary 1

	included	
-	Results of sensitivity testing	-
√	Indication of statistical uncertainty of findings	95% confidence intervals were presented with all summary estimates
Reporting of discussion should include		
-	Quantitative assessment of bias	-
√	Justification for exclusion	Old or variant versions of guidelines where a new version was available, and guidelines not originally developed in China (such as Chinese versions of foreign CPGs, and adapted versions of CPGs from other countries), were excluded.
√	Assessment of quality of included studies	We used the AGREE II tool to evaluate the quality of the included guidelines.
Reporting of conclusions should include		
√	Consideration of alternative explanations for observed results	The assessment of the content validity is not a part of this review as the instrument used in the review only assesses the reporting of the different items and not the clinical content.
√	Generalization of the conclusions	A large number of Chinese diabetes CPGs have been produced. Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement.
√	Guidelines for future research	Chinese guideline developers should pay more attention on the transparency of methodology, and use the AGREE II instrument to develop and report guidelines.
√	Disclosure of funding source	No separate funding was necessary for the article.

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Manuscripts

Quality appraisal of clinical practice guidelines for diabetes mellitus published in China between 2007 and 2017 using the AGREE II instrument

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Abstract

Objective The aim of this study was to systematically evaluate the quality of the clinical practice guidelines (CPGs) for diabetes mellitus published in China over the period of January 2007 to April 2017.

Methods We searched the China National Knowledge Infrastructure (CNKI), Chinese Biomedical Literature database (CBM), VIP Database and WanFang databases and guideline websites for CPGs for diabetes mellitus published between January 2007 and April 2017 in China. Two reviewers independently screened the literature according to the inclusion and exclusion criteria and extracted data. We used the AGREE II tool (Canadian Institutes of Health Research, Ottawa, Canada) to evaluate the quality of the included guidelines, calculated the scores of each domain, and evaluated the consistency among the assessors via use of the intragroup correlation coefficient. And then we compared the results with Chinese CPGs and international CPGs. We conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses.

Results A total of 98 guidelines were identified. The correlation coefficient within the group was 0.93, suggesting that the consistency between the evaluators was good. The scores of the six domains of AGREE II were described in median (interquartile range) as follows: scope and purpose

53.7(50.0-59.7), stakeholder involvement 31.5(27.3-37.0), rigor of development 19.1(15.3-22.2), clarity of presentation 59.3(50.0-64.8), applicability 18.1(13.9-25.7), and editorial independence 0.0(0.0-0.0). The mean score in each domain of quality of Chinese diabetes CPGs was lower than that of CPGs published worldwide but higher than the mean score of Chinese guidelines of all topics. A funding source, the updated version, organization and publishers of the guidelines, and target fields are all the factors influencing the quality of CPGs to a certain degree.

Conclusions A large number of Chinese diabetes CPGs have been produced. Their quality remain unsatisfactorily low compared with CPGs worldwide, there is still room for improvement. Chinese guideline developers should pay more attention on the transparency of methodology, and use the AGREE II instrument to develop and report guidelines.

Key words Clinical practice guidelines; diabetes mellitus; Quality assessment; AGREE II

Strengths and limitations of this study

1. Covered all guidelines published on diabetes over the past one decade in China. It has the potential to contribute significantly in the upscaling guideline development.
2. Use of a structured, validated tool.
3. Conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses.
4. Our study was restricted to English and Chinese language guidelines, which excluded a small number of additional guidelines.
5. The AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations.

Summary

1. The quality of Chinese diabetes CPGs scored relatively well in comparison with other guidelines.
2. There is still room for improvement, especially in the aspect of editorial independence.

Introduction

Diabetes mellitus has become one of the leading causes of mortality and burden of disease worldwide, especially in China, which is now home to the largest number of diabetics worldwide [1]. The prevalence of diabetes mellitus among adults in China has increased substantially in recent decades, rising from 0.7% in 1980 to 10.9% in 2013^[1-4]. During the recent years, the government and organizations have started to pay more attention to this chronic disease, and national clinical practice guidelines (CPGs) for diabetes mellitus are also increasingly produced and disseminated. CPGs are defined as “statements that include recommendations intended to optimize patient care, which are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” [5]. High-quality guidelines provide explicit recommendations for clinical practice, helping to manage health conditions and reduce the use of unnecessary, ineffective or harmful interventions [6]. CPGs for diabetes mellitus have been developed to help optimize the management of the condition and improve the quality, appropriateness and cost-effectiveness of patient care [7]. However, the potential of CPGs to improve patient care and resource use largely depends on the rigor of their development as well as the dissemination and implementation strategies [8, 9]. To the best of our knowledge, there has been no systematic evaluation of guidelines on diabetes mellitus in China. The growing number of guidelines may result in increasing variability and conflicts among guideline recommendations. China currently lacks capacity for evidence-based guideline development and coordination by a central agency. Most Chinese guideline users rely on

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recommendations developed by professional groups that lack demonstration of transparency (including conflict of interest management and evidence synthesis) and quality. In addition, misperceptions about the role of guidelines in assisting practitioners as opposed to providing rules requiring adherence, and a perception that traditional Chinese medicine (TCM) cannot be appropriately incorporated in guidelines are present^[10]. Hence, we aimed to systematically review the existing Chinese guidelines for diabetes mellitus, assess their quality and eventually help Chinese guideline developers better follow methodological standards while developing guidelines in the future. However, the assessment of the content validity is not a part of this review as the instrument used in the review only assesses the reporting of the different items and not the clinical content. We will pay attention to the consistency of recommendations in different included guidelines loosely as well.

Identification of guidelines

We conducted a computerized search of four major academic databases: CBM (Chinese Biomedical Literature database, <http://www.sinomed.ac.cn/>), WanFang Data (Chinese Medicine Premier, <http://www.wanfangdata.com.cn/>), VIP (Chinese Journals Full-text Database, <http://data.whlib.ac.cn/>), and CNKI (China National Knowledge Infrastructure, <http://www.cnki.net/>). We used the same search strategy in all databases and restricted the search to guidelines published in China from January 2007 through April 2017. The search strategy included Chinese translations of terms such as “guideline” and “diabetes mellitus” (Table 1). In addition, we searched guidelines for diabetes mellitus on several websites and search engines, including Google scholar and Chinese Diabetes Mellitus Association (<http://www.zhtnbxh.org/>). If full text of guidelines could not be found, we will contact the author or the development agency. We also searched all articles published in Chinese Journal of Evidence-Based Medicine, Chinese Journal of Diabetes Mellitus and Chinese Journal of Diabetes before April 2017 manually. To identify guidelines published outside of indexed journals, our search of key databases was supplemented with a search of the grey literature. Grey literature were covered by systematically searching publications of all relevant diabetes societies and associations and other health organizations for CPGs that meet our inclusion criteria. We searched the PubMed specifically restricted to Chinese CPGs to retrieve the Chinese diabetes CPGs. Old or variant versions of guidelines where a new version was available, and guidelines not originally developed in China (such as Chinese versions of foreign CPGs, and adapted versions of CPGs from other countries), were excluded.

Table 1 search strategies

Search terms	Explanation
#1* “zhinan” or “zhiyin” or “gongshi” or “caoran”	“zhinan”, “zhiyin”, “gongshi” and “caoran” mean “guideline” in Chinese
#2 “tangniaobing” or “xiaokezheng” or DM or NIDDM or IDDM or MODY or T2DM or T1DM	“tangniaobing” means diabetes mellitus in Chinese. “xiaokezheng” is a term used by doctors of traditional Chinese medicine to refer to diabetes mellitus
#3 #1 and #2	

*We used Zhinan as a subject heading in the abstract database CBM, and the terms “zhinan”, “zhiyin”, “gongshi” and “caoran” in the title of the paper in the other three full text databases WANFANG, VIP and CNKI.

Screening and data extraction

All studies were independently reviewed for eligibility by two researchers (Ke LX, Liu L). Disagreements were resolved by face-to-face discussion, or in case of persistent disagreement, by consultation with a third researcher (Gao YT). We first screened the titles and abstracts, and in the next steps, the full texts of publications considered relevant. All included studies were imported in ENDNOTE. We first conducted one preliminary trial of data extraction. The extraction strategy was then discussed and agreed upon all researchers, and formal data collection was performed. Data extraction was done in Excel. For the validity and accuracy of data, the data collection was completed by two researchers independently. Disagreements were resolved by discussion.

Evaluation of guidelines

AGREE II is an international, rigorously developed, and validated instrument for evaluating CPGs [11, 12]. It consists of 23 key items organized within six domains. Each item in a domain is given a score from 1 (strongly disagree) to 7 (strongly agree). The score for each domain is obtained by summing all the scores of the individual reviewers for all items in a domain and then standardizing as follows: (obtained score - minimal possible score)/ (maximal possible score - minimal possible score) [13]. All authors who were involved in assessing the guidelines using AGREE II had taken a formal training on the AGREE Enterprise website. We initially conducted two rounds of pilot appraisals with a total of 10 guidelines and discussed discrepancies, ensuring that all reviewers came to an agreement in understanding each item of AGREE II. Each guideline was independently evaluated by four reviewers.

Patient and Public Involvement statement

Patients were not involved in our study.

Statistical analysis

We present the means and standard deviations (SD) for AGREE II domain scores, and the number of cases and corresponding percentages for categorical variables. Data for each domain was analyzed by Microsoft Excel 2013 and SPSS 25.0. Intra-class correlation coefficients (ICCs) were used for testing interrater reliability among the four reviewers [14]. We started the formal appraisal only after ICC reached at least 0.8 in the pilot appraisals. We confirmed whether data was in accordance with normal distribution at the beginning with SPSS 25.0. If it was normally distributed, we would use one-way ANOVA to compute the P value between the differences of multi-groups. If it was not normally distributed, we described the data in median (interquartile range). And then we tested the statistical significance of differences among several subgroups (≥ 2) using Kruskal-Wallis test. The independent sample t-test was used to compare the statistical significance of differences between two groups. All tests were two-sided, and P values < 0.05 were considered statistically significant. Besides, we compared the scores of Chinese diabetes CPGs with those of Chinese CPGs [15] and CPGs published worldwide [16] of all topics.

Results

Literature Search

Our systematic search yielded 8065 records, of which 3641 were excluded as duplicates.

1 A total of 3979 records were excluded due to irrelevant topic after title and abstract screening,
2 and 335 after reviewing full text. Twenty further guidelines were still excluded after evaluation.
3 Eight guidelines were identified in the supplementary website search, one guideline was
4 retrieved by PubMed search, and no guidelines in the manual searches of the three journals.
5 Finally, 98 eligible guidelines were included in our analysis (Figure 1).

6 **Characteristics of the guidelines**

7 The publication year of the included CPGs ranged between 2009 and 2017. The year with
8 highest number of published diabetes CPGs (23) was 2011. Nine of the CPGs were updates of
9 previous versions. The databases, exact terms and the time period of the search were accurately
10 described in five guidelines. Seventeen guidelines targeted Type 2 Diabetes mellitus, two
11 guidelines Type 1 Diabetes mellitus, two guidelines juvenile diabetes mellitus, and one
12 guideline latent autoimmune diabetes mellitus of adults (LADA). Some guidelines focused on
13 complications only, including cardiovascular disease (five guidelines), diseases of the nerval
14 system (five guidelines), kidney disease (five guidelines), hypertension (four guidelines),
15 diabetic retinopathy (three guidelines), and diabetic foot (three guidelines). Seven guidelines
16 reported that they received funding from governments, and two guidelines reported that they
17 received funding from other academic organizations. Sixty guidelines were published in the
18 Chinese Science Citation Database (CSCD), and one guideline online in Wiley Online Library
19 (wileyonlinelibrary.com). Characteristics of the guidelines were displayed in Supplementary 1.

20 **AGREE II results**

21 The ICC for AGREE II assessment in the study was 0.929 (95% CI 0.910-0.942). It indicates
22 that appraisers reached an agreement about the items in AGREE II. The scores of the included
23 guidelines included are summarized in Table 2. The data was not a normal distribution by analyzing
24 in the test of normality with SPSS, so the data was descripted in median (interquartile range).
25 However, the difference of mean score and median score was subtle, mean score could be used to
26 analyze in some extent. Subgroup analysis across domains has been done.

27 **Table 2 AGREE II score of guidelines included**

Domains	Content	Median score(interquartile range, %)	Mean score (X±SD, %)	Score segmentation [number of guidelines(%)]			
				<25%	25%~50%	50%~75%	>75%
Domain 1	Scope and purpose	53.7(50.0-59.7)	54.8±6.8	0 (0.0)	27 (27.6)	71 (72.4)	0 (0.0)
Domain 2	Stakeholder involvement	31.5(27.3-37.0)	32.1±9.3	21 (21.5)	75 (76.5)	2 (2.0)	0 (0.0)
Domain 3	Rigor of development	19.1(15.3-22.2)	20.2±10.8	81 (82.7)	15 (15.3)	2 (2.0)	0 (0.0)
Domain 4	Clarity of presentation	59.3(50.0-64.8)	56.9±10.9	1 (1.0)	27 (27.6)	70 (71.4)	0 (0.0)
Domain 5	Applicability	18.1(13.9-25.7)	19.2±8.7	74 (75.5)	24 (24.5)	0 (0.0)	0 (0.0)
Domain 6	Editorial independence	0.0(0.0-0.0)	1.6±4.6	98 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)

1 Scope and purpose

2 The median score in this domain was 53.7(50.0-59.7). The median score was the second
3 highest among the domains. Most guidelines performed well in this domain, with no guidelines
4 scoring below 25%.

5 Stakeholder involvement

6 The median score for the overall score for this domain was 31.5(27.3-37.0). Twenty-eight
7 guidelines referred to methodologists or evidence-based experts in the guideline development
8 stage, and none involved patients in the development process. Only two CPGs scored at least
9 50%.

10 Rigor of development

11 Two CPGs scored at least 50% in the domain “rigor of development”. The overall score
12 in this domain was poor, with a median of 19.1(15.3-22.2). Five CPGs described the systematic
13 methods for searching and selecting evidence, 40 CPGs described the strengths and limitations
14 of the body of evidence clearly, 29 CPGs used a nominal group technique or consensus-
15 development conference, 81 CPGs considered the health benefits, side effects and risks in
16 formulating the recommendations, 91 CPGs indicated a link between the supporting evidence
17 and the recommendations, and four CPGs were reviewed externally before publication. Nine
18 guidelines were updated versions of older guidelines, but none of these described a procedure
19 for updating the guideline.

20 Clarity of presentation

21 Overall, the mean score for this domain was the highest among all domains, and only one
22 guideline scored less than 25%. Recommendations were specific and unambiguous in all CPGs
23 albeit to various degrees. Four CPGs did not present the different options for management of the
24 condition or health issue, and in one CPG key recommendations were not identifiable.

25 Applicability

26 The mean \pm SD for the overall quality score for this domain was 18.1(13.9-25.7). Fourteen
27 CPGs provided advice or tools on how the recommendations could be put into practice.
28 Similarly, 14 CPGs described facilitators and barriers to its application. Fourteen CPGs
29 considered the potential resource implications of applying the recommendations, and 87 CPGs
30 presented monitoring or auditing criteria. Seventy-four guidelines scored less than 25% for this
31 domain.

32 Editorial independence

33 The scores for this domain were the lowest among all domains, with all 98 guidelines scoring
34 less than 25%. Only one guideline reported that there were no conflicts of interest. Nine CPGs
35 reported that they received funding from governments (seven guidelines) or academic organizations
36 (two guidelines). However, these nine guidelines failed to report whether the views of the funding
37 body influenced the content of the guideline or not.

39 Scores of AGREE II in each domain based on different classification criteria

40 We conducted a subgroup analysis based on different classification criteria and compared
41 scores of each domain subgroup analyses. Table 3 shows the domain scores and P values for
42 different subgroups of the guidelines. We can know from Table 3 CPGs of integrated traditional
43 Chinese and Western medicine performed clearly better than CPGs on Western or traditional
44 Chinese medicine in all domains. Guidelines that reported external funding scored better than

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guidelines that did not report funding in editorial independence. Guidelines that involved methodologists scored higher than guidelines not reporting methodologists and the differences were statistically significant in “Stakeholder involvement” and “Rigor of development”. To some extent, reporting methodologists could increase the scores in “Stakeholder involvement” and “Rigor of development”. The difference between guidelines published in CSCD and non-CSCD journals was not statistically significant, developing organization and type of guidelines as well. The results of the subgroup analysis showed that the updated version of the guidelines scored higher than the non-updated guidelines in all five fields (except for “field six: editorial independence”).

Comparison of AGREE II scores between Chinese diabetes CPGs and CPGs published worldwide

Armstrong et al. [16] used the AGREE II tool to evaluate 415 individual CPGs published between 1992 and 2014. The results showed that the average scores of the guidelines in the 6 AGREE II domains were 75.8%, 52.6%, 51.3%, 80.0%, 37.1%, and 41.8%, respectively, as compared with the Chinese guidelines, which had a larger gap in all domains. Chen et al. 2012[15] used the AGREE II tools to evaluate 269 CPGs in China in all fields, with the results of 64%, 52%, 48%, 81%, 43%, and 26%, respectively. The scores of Chinese CPGs on diabetes were clearly higher than those of Chinese CPGs of all topics on average. The scores of Chinese diabetes CPGs were substantially lower than the international average of CPGs on all topics.

Discussion

Chinese diabetes CPGs have an advantage in quantity this decade

It is astonishing that almost 100 domestic guidelines of diabetes mellitus have been published in China in just mere one decade. We found that annual number of CPGs for diabetes mellitus published in domestic Chinese journals increased dramatically up to 2011, after which the number has remained fairly stable during the last few years.

The increasing number indicates that more and more Chinese diabetes CPGs are being applied to clinical practice. Government agencies and the general and subspecialty medical societies in China promote the use of domestic guidelines in healthcare instead of merely adopting foreign guidelines, to account for the characteristics and needs of Chinese patients and clinicians. Meanwhile, the number of published randomized controlled trials and systematic reviews in China is increasing quickly, which may be associated with rapid increase in burden of diabetics. This has laid the groundwork for development of guidelines.

Analysis of scores in each domain

An increasing amount of CPGs are being published. However, there is still much progress to be made as for quality of each domain. In the 6 major fields of the AGREE II tool scoring system, only the score of Domain 1, “scope and purpose” and Domain 4 “clarity of presentation” were > 50%; as such, the scores of the other 4 fields need to be improved upon. The low score of Domain 2, “stakeholder involvement,” was because most of the guidelines included in the present study did not take into account the multidisciplinary intersections of the participants, as well as the preferences and values of the target population. The low score of Domain 3, “rigor of development,” means that generally those guidelines failed to show that they have conducted a systematic review on the best available evidences [17]. The low score was possibly due to that the reporting on the approach to its development lacked transparency. Several of included guidelines did not report the methods of the systematic literature search, forming their recommendations and screening of evidence. Additionally, the low score of Domain 5,

“applicability,” suggested that most guidelines development agencies ignored the guidelines’ application, and that most guidelines did not provide relevant supporting documents or recommendations or emphasize the promotion and hindrance factors in the application process. In fact, failure to address the issue of implementation and to provide clear, practical advice can have important consequences. The low score of Domain 6, “editorial independence,” was likely due to the lack of disclosure of funding sources and related conflicts of interest. Only two of the included guidelines describes the methods by which potential COIs were sought and how COIs affected the recommendation development process. Failure to address the issue of implementation and to provide clear, practical advice can have important consequences. The Chinese DR guidelines’ score was lower than that of international DR guidelines in this field, indicating that the Chinese Guidance Group has not paid enough attention to the interests of the members of the disclosure group and to declaring clearly the views of the sponsors. If a conflict of interest is not declared, the recommendations may be affected by multiple interests and biased. It may not be that the quality of the guidelines themselves are low but rather the quality of the nonstandard report of the guidelines [18, 19]. The low scores of these domains may be due to actual problems in guideline development, but because of the nature of the AGREE scoring, they may also simply be due to insufficient clarity and communication of the process used [20].

Quality of Chinese diabetes CPGs were comparatively low

The mean score in each domain of the quality of Chinese diabetes CPGs was tremendously lower than that of CPGs published worldwide. The difference can be at least partly explained by the selection criteria: the review by Armstrong et al included guidelines that are indexed in Medline and therefore likely to be of high quality, whereas our study tried to find all guidelines on a specific topic in one country. Besides, there was a huge gap between the Chinese diabetes CPGs and CPGs published worldwide in the domain “editorial independence”: this domain was also the one that had lowest score overall. Conflicts of interest are a significant issue worldwide, as can introduce bias into almost every step of the guideline development process [21]. Our results show that there are serious reporting flaws for potential conflicts of interest for the members of the guideline development groups in Chinese CPGs. Most foreign and international organizations, such as the WHO, have their own COI disclosure policies for members of guideline panels [22], but until now, only few Chinese guideline-developing organizations have implemented such policies. Unlike in most other countries, in China the majority of guidelines are developed by professional committees, and despite reporting no external funding, many of these guidelines may be supported by pharmaceutical companies. It is critically important that guideline developers attend to declarations of potential conflicts of interest in a proactive, reasoned, transparent and defensible manner. An efficient way to decrease the influence of pharmaceutical companies could be to establish a government-controlled public foundation to develop guidelines. Alonso-Coello et al. [16] represented the quality of international CPGs, as compared with the Chinese guidelines, which had a larger gap in the “rigor of development” and “editorial independence” domains. The wide variability observed in these scores is worrying, since these domains directly reflect the reliability of the guidelines. Some of the included guidelines did not report the specific process of development and a conflict of interest as well. Holmer et al. [23] used the AGREE II tools to evaluate 24 CPGs in the field of blood glucose management of type 2 diabetes mellitus, ultimately gaining results of 64%, 52%, 48%, 81%, 43%, and 26%, respectively. Included guidelines in our study covers all contexts involved with diabetes mellitus, while Holmer et al. only focused on blood glucose management of type 2

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diabetes mellitus. That might be the reason why scores of guidelines in study of Holmer et al. behaved much better than the Chinese diabetes CPGs. Muhammad A. et al. [24] selected 7 evidence - based clinical practice guidelines for management of type 2 diabetes mellitus in adults after a series of group discussion meetings, and then required results of 89.7%, 82.7%, 82.1%, 95.1%, 77.6%, and 87.7%, respectively using the AGREE II tools. We can know that the quality of evidenced-based CPGs were much better to some extent. Chen et al. 2012[15] used the AGREE II tools to evaluate 269 CPGs in China in all fields. These results suggested that the Chinese guidelines still had some problems in terms of participation and application, mainly because of lacked considerations about the participants in development of guidelines, and absence of the relevant report. Therefore, guidelines makers subsequently should consider the participation of multidisciplinary personnel and provide some guidance in application. Besides, several studies revealed that there are considerable variations and even conflicting recommendations concerning type 2 diabetes mellitus management from different guidelines [25,26].

Factors influencing the quality of CPGs

Many factors are capable of influencing the quality of CPGs. From the perspective of the funders, the quality of guidelines developed by organizations reporting a funding source was higher than those that did not report any funding. The scores of guidelines with methodologists taking part in were higher than those not reporting methodologists. Evidence based methods could improve the quality of CPGs, especially in in Stakeholder involvement and Rigor of development. The guideline development groups involved methodological experts who could ensure that methodological checks were correctly applied and that the development process was fully documented [27]. Developing guidelines based on the methodology of evidence-based medicine could improve the quality of CPGs [28]. Yao et al [29] conducted a study comparing the quality of traditional Chinese medicine (TCM) CPGs with non-TCM CPGs, and the result showed that the quality of TCM CPGs was much better. The quality of traditional Chinese medicine CPGs was higher than that of CPGs for Western medicine, which was compliant with the results of the study of Yao et al. It means that traditional medicine has drawn a lot of attraction and the relevant studies are becoming more scientific.

Suggestions based on the results of the Chinese diabetes guidelines

First, (1) Evidence-based medicine emphasizes focusing on the current optimal clinical medicine and clinicians' skills, as well as taking patients' preferences and values into consideration. Guideline development based on the methodology of evidence-based medicine could improve the quality of CPGs. The development of guidelines should incorporate multidisciplinary experts. Also, (2) the guidelines can be registered during their development and should follow the contents of these to increase their transparency. Additionally, (3) the promotion and impediment factors should be described in detail during the guidelines application process, , while supporting tools for how the recommendations are to be applied in practice should be offered. (4) The development team members must also clearly state whether there is are any potential conflicts of interest, and it is recommended that the editor of the medical journal ask the guidelines developers to provide a conflicts of interest statement for all participating members as an attachment when delivering the guidelines. (5)A central agency in China directing the development of evidence-based guideline is definitely required [30].Lastly, the guidelines report should follow the RIGHT report statement [31] in order to ensure the transparency of the guidelines.

Strengths and limitations

Our review has several strengths. First, the systematic review of CPGs for diabetes mellitus

quality attempted to cover all guidelines published on diabetes over the past one decade in China. Our structured and explicit approach increases the validity of the findings. Second, we used the AGREE II instrument, which is a scientific and valid tool to assess the quality of CPGs. Furthermore, we conducted two rounds (for a total of 10 guidelines) of pilot appraisals and resolved disagreements, which further enhanced the confidence in our results. The extensive search strategy covering both indexed and grey literature, use of multiple appraisers who will complete training and calibration to assess the quality of CPGs, and application of the AGREE II instrument, which has established validity and reliability, are all strengths of this review and may help the delivery of better care.

This review has also limitations. Our study was restricted to English and Chinese language guidelines, which excluded a small number of additional guidelines. Furthermore, CPG developers did not report all the details in developing guidelines even if they included some of the items listed in AGREE in process. Therefore, the score of AGREE II may underestimate the methodological quality of guidelines. Lastly, the AGREE II instrument only assesses the reporting of the different items and not the content validity of the recommendations. Currently, there is an ongoing research project, The AGREE - REX: Recommendation Excellence project that aims at developing and validating a new tool that will complement the AGREE II by assessing the clinical credibility and implementation of CPGs.^[32] Current review covers the period from, 2007 -2017, however comparison was made, with 2010 and 2012 publication data. Clinical guideline development are very dynamic process progresses every year, so the comparison should just be a reference.

Conclusion

A large number of CPGs for diabetes mellitus have been produced in China. Generally speaking, the quality of Chinese diabetes CPGs scored relatively well in comparison with other guidelines according to the evaluation by the AGREE II instrument. However, there is still room for improvement, especially in the aspect of editorial independence. Reporting the full texts of CPGs and conflicts of interests according to AGREE II checklists and abiding to the principles of evidence-based medicine can further improve the quality of guidelines.

Data Sharing Statement

Supplementary data are available online at https://pan.baidu.com/s/1KxyaEEqcSm_5Y0IWccuUIQ.

Contributorship Statement

CHEN Yaolong conceived the study idea and is the guarantor. WANG Jinjing, LUO Xufei, Mu Yiming and GAO Yuting devised the study methodology. LIU Lian, Ke Lixin and GAO Yuting developed the search strategy and in screened the guidelines, extracted the data and appraised guidelines. SONG Xiaoyang and WANG Hao provided the methodological support. GAO Yuting wrote the first draft. LIAO Zhihong, Mu Yiming, CHEN Yaolong and Janne Estill read the drafts, provided the comments, and agreed on the final version of the manuscript. Luo Xufei, Song Xiaoyang, LIAO Zhihong and Chen Yaolong contributed to the modify and language help of the article.

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Conflict of interest

For all authors, there are no potential conflicts of interest, including no relevant financial interests in any company or institution that might benefit from this publication.

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Table 3 Scores of AGREE II based on different classification criteria

Sub-analysis	Number of guidelines (%)	Domain scores (mean±SD, %)					
		Scope and purpose	Stakeholder involvement	Rigor of development	Clarity of presentation	Applicability	Editorial independence
Developing organization							
Chinese Medical Diabetes Association	60(61.1%)	54.9±6.8	31.7±8.3	20.7±9.2	58.4±8.4	20.3±8.6	1.3±4.1
Specially formed group*	18(18.4%)	55.1±8.0	32.8±13.9	19.8±15.8	56.2±12.1	17.9±10.9	2.6±6.5
National Health and Family Planning Commission	2(2.1%)	45.4±9.2	27.8±2.6	13.5±17.2	41.7±32.7	13.9±0.0	0.0±0.0
Ministry of Public Health	1(1.0%)	44.4	16.7	4.2	29.6	0.0	0.0
Hospitals	1(1.0%)	59.3	31.5	21.5	59.3	16.7	0.0
Collaboration of two or more organizations	14(14.3%)	56.1±5.5	33.5±5.3	19.7±9.8	56.0±12.0	18.2±7.2	0.8±3.0
Others	2(2.1%)	52.8±3.9	39.8±11.8	25.0±7.9	53.7±10.5	18.8±6.9	8.3±11.8
P-value	/	0.36	0.54	0.77	0.18	0.48	0.35
Type of guidelines							
Diagnosis and treatment	27(27.6)	55.8±7.9	30.3±6.3	18.6±6.6	59.2±7.9	22.3±9.5	1.6±4.8
Treatment	22(22.4%)	54.5±7.8	33.6±10.8	22.4±14.8	55.6±14.1	20.3±9.0	0.6±3.0
Management	14(14.3%)	53.4±6.0	31.0±6.3	18.3±6.9	56.1±10.3	14.9±5.3	1.2±4.5
Prevention and treatment	9(9.2%)	54.9±3.6	29.2±6.5	20.0±3.8	61.3±3.0	19.6±9.1	1.2±3.5
Technology\$	6 (6.1%)	51.2±2.2	38.9±6.6	18.6±6.9	53.4±10.0	16.7±4.6	2.8±6.8
Medication\$\$	5(5.1%)	56.7±7.9	34.8±7.6	22.5±7.5	58.1±11.2	19.2±9.1	0.0±0.0
Prevention	1(1.0%)	68.5	37.0	24.3	64.8	29.2	0.0

Health care	1(1.0%)	59.3	14.8	7.6	40.7	15.3	0.0
Comprehensive #	13(13.3%)	54.4±6.6	33.0±14.8	22.2±17.9	54.1±14.6	15.8±8.9	4.1±6.5
P-value	/	0.49	0.25	0.84	0.52	0.19	0.64
Publication year							
2009	3(3.0%)	59.9±7.7	26.5±8.8	15.7±6.5	53.1±10.9	22.2±2.8	0.0±0.0
2010	7(7.1%)	52.1±8.1	28.8±6.2	14.7±4.3	50.8±10.8	13.5±11.9	2.4±6.3
2011	23(23.5%)	56.2±6.5	32.3±7.3	21.2±6.3	60.5±8.1	22.3±8.6	0.5±2.3
2012	13(13.3%)	53.3±6.2	34.5±12.9	23.5±17.6	54.6±11.6	16.0±7.2	3.2±6.2
2013	10(10.2%)	53.9±8.5	27.8±6.3	15.4±4.6	54.3±10.8	19.4±11.2	1.7±5.3
2014	12(12.2%)	56.8±7.8	32.7±8.4	19.6±5.3	60.6±6.8	22.7±9.7	1.4±4.8
2015	9(9.2%)	54.1±5.6	31.1±5.9	22.8±5.4	61.7±5.4	20.4±7.6	1.2±3.7
2016	14(14.3%)	53.0±6.1	32.1±7.5	18.6±9.5	53.2±15.1	16.1±2.9	0.8±3.0
2017	7(7.1%)	56.3±8.0	38.6±17.7	25.4±24.5	56.3±16.1	17.3±9.8	4.4±7.5
P-value	/	0.58	0.38	0.42	0.20	0.13	0.59
Western medicine or traditional Chinese medicine							
Western medicine	78(79.6%)	53.7±6.7	31.2±7.3	18.9±7.3	56.5±11.9	18.2±8.3	1.3±4.4
Traditional Chinese medicine	14(14.3%)	58.6±5.9	31.1±7.5	19.9±4.8	58.7±5.6	21.8±9.7	1.6±4.0
Integrated medicine	6(6.1%)	59.3±7.9	44.4±22.1	36.9±31.5	60.8±1.4	24.3±8.5	4.6±7.2
P-value	/	0.01	0.002	0.001	0.53	0.11	0.23
Participation of methodologists in guideline development							
Methodologists involved	27(27.6%)	55.6±7.2	36.9±11.4	25.2±16.8	58.3±10.0	19.8±6.6	1.4±4.2
Not reported	71(72.4%)	54.6±6.9	30.2±7.6	18.3±6.6	56.4±11.3	19.0±9.4	1.6±4.7
P-value	/	0.52	0.01	0.048	0.45	0.67	0.77
External funding							
No reported external funding	85(86.7%)	55.2±6.6	32.3±8.3	19.7±9.6	56.6±11.4	19.7±8.3	0.5±2.6

External funding reported	13(13.3%)	52.6±8.7	30.6±14.4	23.2±17.0	58.8±6.8	15.9±10.7	8.8±7.5
P-value	/	0.19	0.54	0.25	0.31	0.13	0.001
Indexation in Chinese Sciences Citation Database(CSCD)							
Indexed in CSCD	60(61.2%)	54.0±7.0	32.4±8.6	20.0±10.4	56.9±10.6	17.8±8.2	2.0±5.2
Not indexed in CSCD	37(37.8%)	56.1±6.8	32.0±10.0	20.8±11.5	57.4±11.4	21.5±9.2	1.0±3.4
P-value	/	0.14	0.65	0.82	0.98	0.46	0.27
Version							
Original	81(82.7%)	54.8±7.3	31.9±9.3	19.9±11.5	56.2±0.1	18.9±0.1	1.9±5.0
Updated	17(17.3%)	55.0±4.8	32.9±9.2	21.4±6.6	60.2±9.4	20.7±6.9	0.0±0.0
P value	/	0.14	0.43	0.38	0.30	0.20	0.00

*: Groups specifically formed for developing the guideline; members were staff from different hospitals.

\$: refers to guidelines about the use of medical equipment, e.g. insulin injection needle.

\$\$: refers to guidelines about the use of specific drugs, e.g. insulin.

#: refers to guidelines covering more than two types of guidelines.

Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

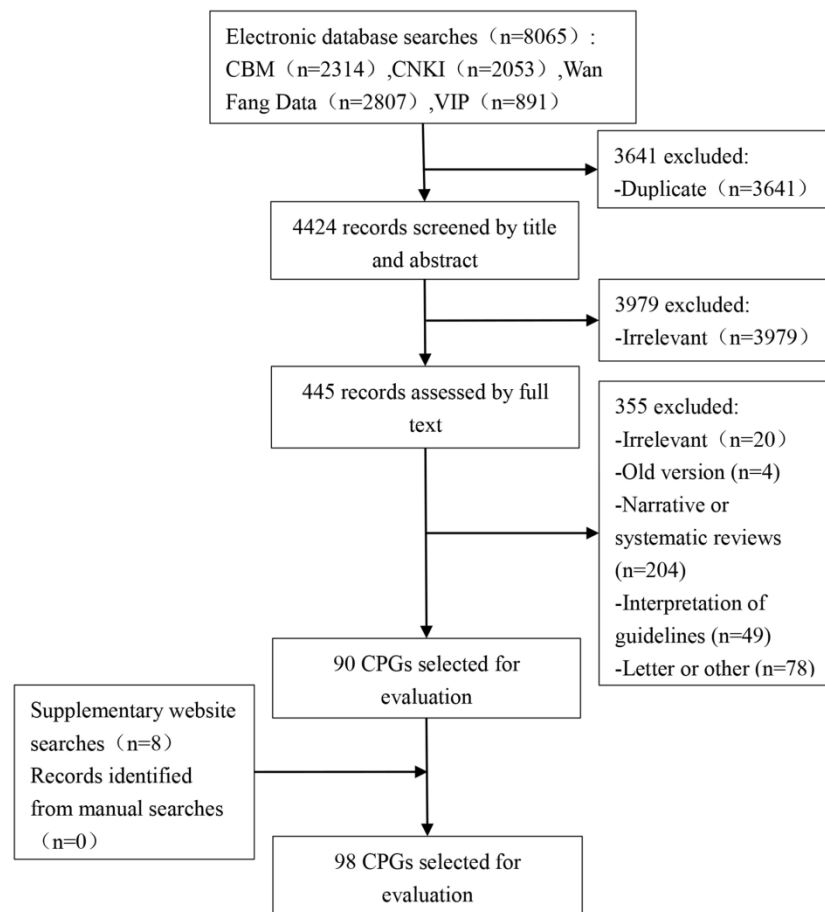


Figure 1. Flowchart of the literature search of Chinese CPGs for diabetes published between 2007 and 2017

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The title of the guide	Published institution	Year of publica tion	Publication	Targeted patient	Guide version	Situation of Chinese and Western Medicine	Type of guide	Is there fundin g	Whether the database, search terms and retrieval time are clearly described	Whether a conflict of interest statement has been reported	Is there a methodolog ist involved	Whether an update was reported	Whether to categorize the quality of evidence and recommend ations
Guidelines for the diagnosis and treatment of diabetic ketoacidosis in children (2009 edition) ^[1]	Endocrinology and Metabolism Group, Pediatrics Branch, Chinese Medical Association	2009	Chinese Journal of Pediatrics	Diabetic ketoacidosis in children	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No
Diagnostic criteria for diagnosis of diabetic peripheral neuropathy (draft for comments) ^[2]	Endocrine Genetic Metabolism Group of Chinese Medical Association	2009	Chinese Journal of Diabetes	Diabetic peripheral neuropathy	Original	Chinese and Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No
China Diabetes Care and Education Guide ^[3]	China Diabetes Care and Education Guide	2009	China Diabetes Care and Education Guide	Diabetic patients	Original	Western Medicine	Nursin g and educati on	No	No	No	No	No	No
China Diabetes Medical Nutrition Treatment Guide (2010) ^[4]	Chinese Medical Association Diabetes Branch	2010	People's Military Medical Publishing House	Diabetic patients	Original	Western Medicine	Treatm ent	Yes	Yes	No	No	Yes	推荐强度
Guide to insulin therapy for childhood and adolescent diabetes (2010 edition) ^[5]	Endocrinology and Metabolism Group, Pediatrics Branch, Chinese Medical Association	2010	Chinese Journal of Pediatrics	Diabetic children	Original	Western Medicine	Treatm ent	No	No	No	No	No	No
Chinese expert consensus on blood glucose management in ischemic stroke/transient ischemic attack ^[6]	Chinese expert consensus group for blood glucose management in ischemic stroke/transient ischemic attack	2010	Chinese Journal of Internal Medicine	Ischemic stroke / transient cerebral ischemia (covering TLA)	Original	Western Medicine	Manag ement	Yes	No	No	No	No	No
Chinese expert consensus on comprehensive management of multiple cardiovascular risk factors in diabetic patients ^[7]	Chinese Medical Association Cardiovascular Physician Branch	2010	Chinese Journal of Hypertension	Cardiovascu lar disease	Original	Western Medicine	Manag ement	No	No	No	No	No	No
Chinese Expert Consensus on Blood Glucose	Peking University	2010	Prevention and	Stability	Updated	Western	Manag	No	No	No	No	No	No

Management in Patients with Stable Coronary Heart Disease (Revised Discussion Paper) ^[8]	People's Hospital		treatment of cardiovascular and cerebrovascular diseases	coronary heart disease		Medicine	ement							
Obstructive sleep apnea and diabetes expert consensus ^[9]	Chinese Medical Association Respiratory Diseases Branch Sleep Group	2010	Chinese Journal of Tuberculosis and Respiratory	Obstructive sleep apnea (OSA)	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No	No
Expert consensus on treatment of viral hepatitis-associated diabetes ^[10]	Expert Committee on the Treatment of Viral Hepatitis Related Diabetes	2011	Chinese Journal of Hepatology (electronic version)	Viral hepatitis associated diabetes (vdh)	Original	Western Medicine	Treatment	No	No	No	No	No	No	Quality of evidence
Guidelines for the diagnosis and treatment of chronic wounds (2011 edition) ^[11]	Chinese Medical Association Trauma Branch Organizational Rehabilitation Professional Committee (Group)	2011	Chinese clinician	Diabetes	Updated	Western Medicine	Treatment	No	Yes	No	No	No	No	No
Surgical treatment of diabetes experts consensus ^[12]	Chinese and Western Medicine Diabetes Branch	2011	Chinese Journal of Diabetes	Diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No	No
Diabetes erectile dysfunction Chinese medicine diagnosis and treatment standard ^[13]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese Medicine	Diagnosis and treatment	No	No	No	No	Yes	No	No
Diabetes Mellitus with Metabolic Syndrome ^[14]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese and Western Medicine	Diagnosis and treatment	No	No	No	No	Yes	No	No
Diabetes combined with hypertension Chinese medicine diagnosis and treatment standards ^[15]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Updated	Chinese and Western Medicine	Diagnosis and treatment	No	Yes	No	No	Yes	No	No
Diabetes combined with osteoporosis Chinese medicine diagnosis and treatment standards ^[16]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Osteoporosis	Original	Chinese Medicine	Diagnosis and treatment、Prevention and	No	No	No	No	No	No	No

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Diabetes combined with dermatological Chinese medicine diagnosis and treatment standards ^[17]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Skin disease	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Pre-diabetes Chinese medicine diagnosis and treatment standard ^[18]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Pre-diabetes	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Diabetic neurogenic bladder Chinese medicine diagnosis and treatment standard ^[19]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Neurogenic bladder	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic nephropathy ^[20]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Kidney disease	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetic kidney disease Chinese medicine diagnosis and treatment standard ^[21]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Kidney disease	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic retinopathy ^[22]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Retinopathy (DR)	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetic retinopathy Chinese medicine diagnosis and treatment standard ^[23]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Retinopathy (DR)	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Diabetes TCM Guidelines ^[24]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Diabetes	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Diabetes TCM Prevention Guide Diabetes Foot ^[25]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Diabetic foot (DF)	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No

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Diabetes TCM diagnosis and treatment standard ^[26]	Chinese Medical Association Diabetes Branch	2011	World journal of Chinese and Western medicine	Diabetes	Original	Chinese Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for prevention and treatment of diabetic peripheral neuropathy ^[27]	Chinese Medicine Association	2011	Chinese Modern Medicine Distance Education	Peripheral neuropathy	Original	Chinese Medicine	Prevention and treatment	Yes	No	No	No	No	No
Expert consensus on HbA1c control targets in Chinese adult type 2 diabetes ^[28]	Chinese Medical Association Endocrine Branch	2011	Journal of Endocrinology and Metabolism	Chinese adult type 2 diabetes	Original	Western Medicine	Prevention and treatment	No	No	No	No	No	No
Chinese Diabetes Patients in the Management of Insulin Use Education ^[29]	Chinese Medical Association Diabetes Branch	2011	Chinese Medical Association Diabetes Branch	Chinese Diabetic patients	Original	Western Medicine	Management	No	No	No	No	No	No
Chinese Diabetes Surgery Expert Guidance (2010) ^[30]	Endocrinology Surgery Group, Chinese Medical Association Surgery Branch	2011	Chinese Journal of Practical Surgery	Diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
China Diabetes Drug Injection Technical Guide (2011 Edition) ^[31]	Chinese Medical Association Diabetes Branch	2011	Chinese Journal of General Practitioners	Diabetes	Original	Western Medicine	Application	No	No	No	No	No	Both
Chinese blood glucose monitoring clinical application guide ^[32]	Chinese Medical Association Diabetes Branch	2011	Chinese Journal of Diabetes	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	No
China insulin pump treatment guide ^[33]	Chinese Medical Association Association of Endocrinology and Metabolism	2011	China Medical Frontier Magazine (electronic version)	Diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No
Consensus on the diagnosis and treatment of occult autoimmune diabetes (LADA) in adults ^[34]	Chinese Medical Association Diabetes Branch	2012	Chinese Journal of Diabetes	Autoimmune diabetes	Original	Western Medicine	Diagnosis and treatment	No	No	No	Yes	No	No
Expert guidance on blood pressure control in patients with hypertension and type 2 diabetes ^[35]	China Medical Association "Medical Quality Miles •	2012	China Medical Frontier Magazine	Hypertension with diabetes	Original	Western Medicine	Treatment	No	No	No	Yes	No	No

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	Antihypertensive in Action" TRIP Project Expert Committee		(electronic version)										
Screening intervention for microalbuminuria in patients with hypertension and diabetes ^[36]	Editorial Board of China Hypertension Magazine	2012	Chinese Journal of Hypertension	Hypertension and Diabetic patients	Original	Western Medicine	Screening and intervention	No	No	No	Yes	No	No
Early consensus on screening and management of abnormal glucose metabolism in cardiovascular medicine ^[37]	Early Screening and Management Expert Group on Cardiovascular Glucose Metabolism Abnormalities	2012	Chinese Journal of Internal Medicine	Cardiovascular diseases	Original	Western Medicine	Screening and management	No	No	No	Yes	No	No
Guidelines for the diagnosis and treatment of type 1 diabetes in China ^[38]	Chinese Medical Association Diabetes Branch	2012	People's Health Publishing House	Type 1 diabetes	Original	Western Medicine	Diagnosis and treatment	No	No	No	Yes	No	No
Expert consensus on prevention and treatment of type 2 diabetes with dyslipidemia in China ^[39]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with blood lipids	Original	Western Medicine	Prevention and treatment	No	No	No	Yes	No	No
Expert consensus on the application of insulin secretagogue in Chinese adult type 2 diabetes ^[40]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	Quality of evidence
Clinical Application Guide for Dynamic Blood Glucose Monitoring in China (2012 Edition) ^[41]	Chinese Medical Association Diabetes Society	2012	Chinese Journal of Frontier Medicine (Electronic Edition)	Diabetes	Updated	Western Medicine	Application	No	No	No	Yes	No	No
Expert consensus on hypoglycemia management in Chinese patients with diabetes ^[42]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Management	No	No	No	Yes	No	No
Expert consensus on blood pressure management in Chinese patients with diabetes ^[43]	Endocrinology Branch of Chinese Medical Association	2012	Chinese Journal of Endocrinology and	Diabetes	Original	Western Medicine	Prevention and management	No	No	No	Yes	No	Quality of evidence

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Chinese Diabetes Exercise Guidelines ^[44]	Chinese Medical Association Diabetes Society	2012	Metabolism International Journal of Endocrinology and Metabolism	Diabetes	Original	Chinese and Western Medicine	Treatm ent	No	No	No	Yes	No	Both
Diabetes Screening and Diagnosis of the Health Industry Standard of the People's Republic of China ^[45]	Ministry of Health of the People's Republic of China	2012	Practical Blindness Prevention Technology	Diabetes	Original	Western Medicine	Screeni ng and diagno sis	No	No	No	No	No	No
Screening and management criteria for type 2 diabetes patients with lower extremity arterial disease ^[46]	Chinese Medical Association Diabetes Society	2012	China Diabetes Journal	Type 2 Diabetes Mellitus with Lower Extremity Arterial Diseases	Original	Western Medicine	Screeni ng and treatme nt	No	No	No	No	No	No
Expert consensus on prevention of type 2 diabetes in Chinese adults ^[47]	Chinese Medical Association Endocrinology Branch	2014	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Preven tion	No	No	No	No	No	Quality of evidence
Chinese expert consensus on clinical application of insulin in adults with type 2 diabetes ^[48]	Endocrinology Branch of Chinese Medical Association	2013	Chinese Journal of Endocrinology and Metabolism	Type 2 Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No
Simplified procedure for diagnosis and treatment of blood pressure and microalbuminuria in patients with hypertension and diabetes ^[49]	Chinese Association of Hypertension Professional Committee	2013	Chinese Journal of Hypertension	High Blood Pressure with Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No
Expert guidance on blood pressure control in patients with hypertension and type 2 diabetes (2013 edition) ^[50]	Cardiovascular Physician Branch of Chinese Medical Doctor Association	2013	Chinese Journal of Hypertension	Hypertensio n with Type 2 Diabetes	Updated	Western Medicine	Treatm ent	No	No	No	No	No	No
Diabetes Medical Nutrition Therapy Expert Consensus ^[51]	Individual	2013	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Treatm ent and prevent ion	No	No	No	No	No	No
Consensus on Diagnosis and Treatment of Diabetic Peripheral Neuropathy ^[52]	Electromyography and Clinical	2013	Chinese Journal of	Diabetic Peripheral	Original	Western Medicine	Diagno sis and	No	No	No	No	No	No

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	Neuroelectrophysiology Group of Chinese Medical Association Neurology Branch International Vascular Union China Branch Diabetes Foot Professional Committee		Neurology	Neuropathy			treatme nt							
Diabetes Foot Treatment Guide ^[53]		2013	Journal of interventional radiology	Diabetic foot	Original	Western Medicine	Diagno sis and treatme nt	Yes	No	No	No	No	No	No
New consensus diagnosis for short-term insulin intensive therapy for type 2 diabetes ^[54]	Chinese Medical Association Diabetes Branch	2013	Chinese Medical Journal	New diagnosis of type 2 diabetes	Original	Western Medicine	Treatm ent	No	No	No	No	No	No	No
Expert consensus on the goal of hyperglycemia management in Chinese adult hospitalized patients ^[55]	Chinese Medical Association Endocrinology Branch	2013	Chinese Journal of Endocrinology and Metabolism	Chinese adult hospitalized patients with high blood sugar	Original	Western Medicine	Manag ement	No	No	No	No	No	No	Quality of evidence
Guidelines for the diagnosis and treatment of high blood sugar crisis in China ^[56]	Chinese Medical Association Diabetes Branch	2013	China Diabetes Journal	Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No	No
Expert consensus on non-invasive examination of early macrovascular disease in type 2 diabetes ^[57]	Chinese Medical Association Association of Endocrinology and Metabolism	2013	China Circulation Magazine	Early macrovascu lar disease in type 2 diabetes	Original	Western Medicine	Diagno sis and Treatm ent	No	No	No	No	No	No	No
Guidelines for the diagnosis and treatment of pregnancy complicated with diabetes (2014) ^[58]	Department of Obstetrics and Gynecology, Chinese Medical Association Obstetrics and Gynecology Elderly Endocrinology Metabolism Committee	2014	Chinese Journal of Obstetrics and Gynecology	Pregnancy with diabetes	Updated	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No	Quality of evidence
Expert consensus on diagnosis and treatment of diabetes in the elderly (2013 edition) ^[59]	of Geriatrics Association of Chinese Society of Gerontology	2104	Chinese Journal of Internal Medicine	Elderly diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	No	No	No	Both
Shanghai Type 2 Diabetes Surgery Management Regulations (2014 Trial Version) ^[60]	Shanghai Medical Doctor Association General Surgery Branch	2014	Chinese Journal of Practical	Shanghai type 2 diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No	No

Surgery													
Expert consensus on prevention and treatment of diabetic nephropathy (2014 edition) ^[61]	Chinese Medical Association Diabetes Branch Microvascular Complications Group	2014	China Diabetes Journal	Diabetic nephropathy	Original	Western Medicine	Prevention and treatment	No	No	No	No	No	No
Guidelines for clinical diagnosis and treatment of diabetic retinopathy in China ^{62]}	Department of Ophthalmology, Chinese Medical Association	2014	Chinese Journal of Ophthalmology	Diabetic retinopathy	Original	Western Medicine	Diagnosis and treatment screening、	No	No	No	No	No	No
Expert opinion on the application of oral hypoglycemic drugs in cardiovascular disease and diabetes ^[63]	Individual	2014	Chinese Journal of Internal Medicine	Cardiovascular diseases	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No
Guidelines for the Prevention and Treatment of Type 2 Diabetes in China (2013 Edition) ^[64]	Chinese Medical Association Diabetes Branch	2014	China Diabetes Journal	Type 2 diabetes in China	Updated	Western Medicine	Prevention and treatment	No	No	No	No	No	No
The same species of islet transplantation technology management specifications (draft for comments) ^[65]	National Health and Family Planning Commission of the People's Republic of China	2016	Journal of Wuhan University (Medical Science Edition)	Diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
Guidelines for Surgical Treatment of Obesity and Type 2 Diabetes in China (2014) ^[66]	Chinese Medical Doctor Association Surgeons Branch Obesity and Diabetes Surgeons Committee	2014	Chinese Journal of Practical Surgery	Chinese obesity and type 2 diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	No
Chinese Diabetes Blood Ketone Monitoring Expert Consensus ^[67]	Chinese Medical Association Endocrinology Branch	2014	Chinese Journal of Endocrinology and Metabolism	Chinese Diabetes Blood Ketone	Original	Western Medicine	Diagnosis and treatment	No	No	No	No	No	No
China Insulin Pump Therapy Guide (2014 Edition) ^[68]	Chinese Medical Association Association of Endocrinology and Metabolism	2014	Clinical Diabetes	Diabetes	Updated	Western Medicine	Treatment	No	No	No	No	No	No
Expert opinion on the clinical use of insulin	Endocrine and	2015	Drug	Diabetes	Original	Western	Applic	No	No	No	Yes	No	No

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aspart 30 1 time a day ^[69]	Metabolic Center of China-Japan Friendship Hospital		evaluation			Medicine	ation							
Expert advice on clinical application of insulin aspart 50 ^[70]	Department of Endocrinology, PLA General Hospital	2015	Drug evaluation	Diabetes	Original	Western Medicine	Applic ation	No	No	No	Yes	No	No	
Traditional Chinese Medicine Evidence- Based Clinical Practice Guide for Diabetic Foot Ulcer ^[71]	Chinese Medicine Association Surgical Branch	2015	Chinese Journal of Integrated Traditional and Western Medicine	Diabetic foot ulcer	Original	Western Medicine	Practic e	Yes	No	No	No	No	Both	
Expert consensus on determination of haemoglobin A1c ^[72]	Expert consensus committee for determination of haemoglobin A1c	2011	Chinese Journal of Diabetes Mellitus	Diabetes	Original	Western Medicine	treatme nt	No	No	No	Yes	No	No	
Expert consensus on clinical diagnosis of adult diabetic nephropathy in China ^[73]	Chinese Medical Association Endocrinology Branch	2015	Chinese Journal of Endocrinology and Metabolism	Diabetic kidney disease	Original	Western Medicine	Diagno sis	No	No	No	Yes	No	Quality of evidence	
China's chronic disease prevention and treatment primary doctor diagnosis and treatment manual (diabetes volume) 2015 edition ^[74]	Individual	2015	China Diabetes Journal	Diabetes	Original	Western Medicine	Diagno sis and treatme nt	No	No	No	Yes	No	No	
Chinese stroke blood glucose management guidelines ^[75]	National Health and Family Planning Commission Stroke Prevention and Treatment Engineering Committee	2015	Diabetes World: Clinical	Diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No	
Chinese Diabetes Medical Nutrition Treatment Guide (2013) ^[76]	Chinese Medical Association Diabetes Branch	2015	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Treatm ent	No	Yes	No	No	Yes	Both	
China Clinical Application Guide for Blood Glucose Monitoring (2015 Edition) ^[77]	Chinese Medical Association Diabetes Branch	2015	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Monito r	No	No	No	Yes	No	No	
Principle of Oral Hypoglycemic Drugs for Type 2 Diabetes Complicated with Chronic Kidney Disease Chinese Expert Consensus (Updated 2015) ^[78]	Chinese Medical Association Association of Endocrinology and Metabolism	2015	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with chronic kidney disease	Updated	Western Medicine	Treatm ent	No	No	No	Yes	Yes	No	

Portable blood glucose meter clinical operation and quality management norms Chinese expert consensus ^[79]	Chinese Medical Association Laboratory Medicine Branch	2016	Chinese Medical Journal	Blood glucose monitoring patient	Original	Western Medicine	Management	No	No	No	Yes	No	No
Metformin Clinical Application Expert Consensus (2016 Edition) ^[80]	Individual	2016	Chinese Diabetes Journal	Diabetes	Updated	Western Medicine	Application	No	No	No	Yes	Yes	Both
Quick advice guide based on clinical application of incretin-treated drugs ^[81]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	Both
Sodium-glucose co-transporter 2 (SGLT2) inhibitor clinically reasonable Application China expert advice ^[82]	Individual	2016	Chinese Diabetes Journal	Diabetes	Original	Western Medicine	Application	No	No	No	Yes	No	No
Expert consensus on clinical use of diabetic microcirculatory disorders (draft for comments) ^[83]	China Microcirculation Society Diabetes and Microcirculation Committee	2016	Drug evaluation	Diabetic microcirculatory disorder	Original	Chinese and Western Medicine	Application	No	No	No	No	No	Both
Perioperative blood glucose management expert consensus (fast version) ^[84]	Chinese Medical Association Anesthesia Branch	2016	Journal of clinical anesthesiology	Perioperative patient	Original	Western Medicine	Management	No	No	No	No	No	No
Pre-mixed insulin clinical application expert consensus (2016 edition) ^[85]	Chinese Medical Association Endocrinology Branch	2016	Drug evaluation	Diabetes	Updated	Western Medicine	Treatment	No	No	No	No	Yes	No
Chinese insulin therapy guide for type 1 diabetes ^[86]	Chinese Medical Association Diabetes Branch	2016	Chinese Diabetes Journal	Type 1 diabetes	Original	Western Medicine	Treatment	No	No	No	No	No	Both
Expert consensus on integrated management of type 2 diabetes and obesity in China ^[87]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Type 2 diabetes with obese patients	Original	Western Medicine	Management	No	No	No	No	No	No
Expert consensus on postprandial hyperglycemia management in Chinese patients with type 2 diabetes ^[88]	Individual	2016	Chinese Diabetes Journal	Type 2 diabetes	Original	Western Medicine	Management	No	No	No	No	No	No
Guidelines for grading prevention of atherosclerotic cardiovascular and cerebrovascular diseases in Chinese adults with type 2 diabetes ^[89]	Chinese Medical Association Endocrinology Branch	2016	Chinese Journal of Endocrinology and Metabolism	Chinese adult type 2 diabetes patients	Original	Western Medicine	Management, prevention, treatment	No	No	No	No	No	Quality of evidence

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Guidelines for the diagnosis and treatment of diabetes after organ transplantation in China (2016 edition) ^[90]	Chinese Medical Association Organ Transplantation Branch Chinese Medical Association Organ Transplantation Branch	2016	Organ transplantation	Diabetic patients after organ transplantati on	Original	Western Medicine	nt Diagno sis and treatme nt、 prevent ion、 manag ement 、 screeni ng	Yes	No	Yes	No	No	Quality of evidence
Pre-diabetes Chinese medicine evidence-based clinical practice guide ^[91]	Individual	2017	Chinese Medicine Journal	Prediabetes	Original	Chinese and Western Medicine	Diagno sis and treatme nt、 prevent ion	Yes	Yes	No	Yes	No	Both
Chinese Diabetes Prevention and Control Experts Consensus ^[92]	Expert Group on China Diabetes Prevention and Control Experts Consensus	2017	Chinese Journal of Preventive Medicine	Diabetes and high-risk groups	Original	Western Medicine	Preven tion and manag ement	No	No	No	No	No	No
Chinese Diabetes Foot Treatment Guide ^[93]	China Healthcare International Exchange Promotion Association Diabetes Foot Disease Branch	2017	Chinese Medical Journal	Diabetic foot disease patients	Original	Western Medicine	Diagno sis and treatme nt	Yes	No	No	No	No	No
Expert consensus on blood glucose management in hospitalized patients in China ^[94]	Chinese Physician Association Endocrine and Metabolism Physician Branch, China Hospitalized Patients Blood Glucose Management Expert Group	2017	Chinese Journal of Endocrinology and Metabolism	Adult patients with diabetes or hyperglyce mia hospitalized in non-endocrine department	Original	Western Medicine	Manag ement	No	No	No	No	No	No
Expert consensus on the clinical application of sulfonylureas (2016 edition) ^[95]	Group	2017	Drug evaluation	Type 2 diabetes	Updated	Western Medicine	Treatm ent	No	No	No	No	Yes	Quality of evidence
Chinese expert guidance for clinical application of basic insulin in type 2 diabetes	Group	2017	Chinese Journal of	Type 2 diabetes	Original	Western Medicine	Manag ement	No	No	No	No	No	No

in adults ^[96]								Diabetes										
Portable blood glucose meter clinical operation and quality management norms Chinese expert consensus ^[97]	Chinese Association of Medical Laboratory Medicine Branch	2016	Chinese Medical Journal	Blood glucose monitoring patient	Original	Western Medicine	Management	No	No	No	Yes	No	No					
Diabetes Metabolism Research and Reviews ^[98]	Group	2016	DIABETES/METABOLISM RESEARCH AND REVIEWS	Type 2 diabetes	Original	Western Medicine	Nursing	No	No	No	No	No	No					

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MOOSE Checklist

Criteria		Brief description of how the criteria were handled in the meta-analysis
Reporting of background should include		
2	Problem definition	To the best of our knowledge, there has been no systematic evaluation of guidelines on diabetes mellitus in China.
2	Hypothesis statement	Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement.
2	Description of study outcomes	Scores in each domain of AGREE II.
2	Type of exposure or intervention used	Diabetes mellitus
2	Type of study designs used	We searched the databases and guideline websites for CPGs for diabetes mellitus published between January 2007 and April 2017 in China. Two reviewers independently screened the literature according to the inclusion and exclusion criteria and extracted data. We used the AGREE II tool to evaluate the quality of the included guidelines.
2	Study population	We placed no restriction.
Reporting of search strategy should include		
1	Qualifications of searchers	The credentials of the two investigators Lian Liu and Lixin Ke are indicated in the author list.
3	Search strategy, including time period included in the synthesis and keywords	CBM (Chinese Biomedical Literature database, http://www.sinomed.ac.cn/), WanFang Data (Chinese Medicine Premier, http://www.wanfangdata.com.cn/), VIP (Chinese Journals Full-text Database, http://data.whlib.ac.cn/), and CNKI (China National Knowledge Infrastructure, http://www.cnki.net/). We used the same search strategy in all databases and restricted the search to guidelines published in China from January 2007 through April 2017. See Table 1 in the article
3	Databases and registries searched	CBM, WanFang Data, VIP, CNKI, Pubmed
3	Search software used, name and version, including special features	We did not employ a search software. EndNote was used to merge retrieved citations and eliminate duplications
3	Use of hand searching	We hand-searched bibliographies of retrieved papers for additional references,
5	List of citations located and	Details of the literature search process are outlined in the

	those excluded, including justifications	flow chart. The citation list is available upon request
3	Method of addressing articles published in languages other than English	We placed no restrictions on language; local scientists fluent in the original language of the article were contacted for translation
3	Method of handling abstracts and unpublished studies	We had contacted a few authors for unpublished studies on the association.
4	Description of any contact with authors	We contacted authors who published the guideline in the international journals for the full manuscript.
Reporting of methods should include		
3	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	Detailed inclusion and exclusion criteria were described in the methods section.
3	Rationale for the selection and coding of data	Data extracted from each of the studies were relevant to the population characteristics, study design. We first conducted one preliminary trial of data extraction. The extraction strategy was then discussed and agreed upon all researchers, and formal data collection was performed.
8	Assessment of confounding	Subgroups were preset for subgroup analysis. We conducted a subgroup analysis based on different classification criteria and compared scores of each domain subgroup analyses. Table 3 shows the domain scores and P values for different subgroups of the guidelines.
-	Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results	-
-	Assessment of heterogeneity	-
4	Description of statistical methods in sufficient detail to be replicated	Description of methods are detailed in the methods.
√	Provision of appropriate tables and graphics	We included 1 box detailing the terms used for database search, 1 flow chart, 1 summary table, 1 table of scores of AGREE II, 1 table of different subgroups of the guidelines, 1 figure shows number of clinical practice guidelines, 1 figure of comparison between domestic guidelines and international guidelines.
Reporting of results should include		
√	Graph summarizing individual study estimates and overall estimate	Supplementary 1
√	Table giving descriptive information for each study	Supplementary 1

	included	
-	Results of sensitivity testing	-
√	Indication of statistical uncertainty of findings	95% confidence intervals were presented with all summary estimates
Reporting of discussion should include		
-	Quantitative assessment of bias	-
√	Justification for exclusion	Old or variant versions of guidelines where a new version was available, and guidelines not originally developed in China (such as Chinese versions of foreign CPGs, and adapted versions of CPGs from other countries), were excluded.
√	Assessment of quality of included studies	We used the AGREE II tool to evaluate the quality of the included guidelines.
Reporting of conclusions should include		
√	Consideration of alternative explanations for observed results	The assessment of the content validity is not a part of this review as the instrument used in the review only assesses the reporting of the different items and not the clinical content.
√	Generalization of the conclusions	A large number of Chinese diabetes CPGs have been produced. Their quality is relatively good compared with CPGs of all topics published in China and worldwide, there is still room for improvement.
√	Guidelines for future research	Chinese guideline developers should pay more attention on the transparency of methodology, and use the AGREE II instrument to develop and report guidelines.
√	Disclosure of funding source	No separate funding was necessary for the article.