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REVIEW ARTICLE

Community pharmacy practice in China: past, present and future

Yu Fang · Shimin Yang · Siting Zhou · Minghuan Jiang · Jun Liu

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Abstract Background In 2009, China launched a new healthcare system, with reform of the primary healthcare system as its foundation and focus, to enable residents to access primary healthcare for simple health problems instead of seeking help at hospitals. Community pharmacies and pharmacists were to have increased responsibility in primary healthcare by delivering pharmaceutical care services in China in addition to their traditional roles of dispensing prescriptions and selling medicines. Aim of the Review To describe the current status of Chinese community pharmacy education and practice, and discuss future directions. Method A literature search was conducted using MEDLINE and International Pharmaceutical Abstracts. Additional articles were identified through the cross-referencing of articles and books. Additional data were found from relevant websites. Results From the 313 publications identified, 98 were included. China currently has 388,000 retail pharmacies, corresponding to one pharmacy per 3,532 population. All pharmacies provide prescription and over-the-counter products, as well as prescription dispensing and patient counselling. However, the lack of reimbursement mechanisms reduces the willingness of pharmacists to offer high-quality dispensing and

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counselling services. There is a shortage of qualified pharmacists to meet increasing patient needs. This, coupled with a shortage of pharmacist training, has resulted in pharmaceutical care being a low priority for delivery in routine pharmacy practice. To meet the increasing demand for pharmacists, 25 universities have been allowed to offer BS, MS and PhD degrees (3-7 years in length) in clinical pharmacy since 2008. The adoption of Good Pharmacy Practice as a recommended standard for community pharmacy practice provides pharmacists with a framework to aid them in service delivery. Conclusion A number of undertakings still require development, including the enactment of the Chinese Pharmacist Law, development of a standard for pharmaceutical care activities, development of the pharmacy workforce, increasing public awareness of pharmacists, and proper reimbursement for care provision. Although pharmaceutical care services are underdeveloped in China, they will become an integral part of the professional work of all pharmacists in the future, particularly in community pharmacy settings.

Keywords China · Clinical pharmacy · Community pharmacy · Health care · Pharmaceutical care · Pharmacy practice

Introduction

Community pharmacies are becoming increasingly recognized in many parts of the world as a source of professional medical advice [1-5]. This is also occurring in China where community pharmacies have emerged as a source of primary healthcare [6]. Although the medical care system and the health of Chinese citizens have improved since the economic and political reforms in the late 1970s [7], the

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disparity between urban and rural areas and between different regions has increased, and healthcare expenditure has grown [8]. Facing these challenges, in 2009 China further unveiled a healthcare reform plan, with the primary healthcare system as its foundation and focus [9], to enable residents to access primary healthcare for simple health problems instead of seeking help at hospitals. Community pharmacies, with their convenient location and easy accessibility, were identified as having a critical role in ensuring more people in China had access to health services. As a result, the healthcare reform plan highlighted the responsibilities of community pharmacies and pharmacists in providing primary healthcare [10].

By the end of 2010, the total population of mainland China was over 1.3 billion, while people aged 60 years and above accounted for 13.3 % of the population [11]. The aging Chinese population and an increase in chronic medical conditions have escalated demand for pharmacy services [12]. Two streams of medical practice exist in China, traditional Chinese medicine (TCM) and Western medicine, which have been practiced alongside each other at every level of the healthcare system since the late 1800s [13, 14]. TCM has its own department at the Ministry of Health (MoH) and at provincial and county Bureaus of Health. It has its own medical schools, hospitals, and research institutes. Overall, it is estimated that 40 % of healthcare in China is based on TCM, with a higher proportion in rural areas. The collaboration between the two systems is well illustrated by the fact that, in Western medicine hospitals, around 40 % of the medicines prescribed are traditional. Similarly, in the traditional hospitals, 40 % of all prescribed drugs are Western medicine [15]. Central government continues to have a policy for expansion of TCM. An increase in the number of traditional Chinese pharmacists is one of the priorities for manpower development; their number continues to increase and is now nearly 100,000 [16]. Hospital and community pharmacies are responsible for the dispensing of medicines that are used in both streams [17]. In China, Western and Chinese over-the-counter (OTC) medications are equally popular [18].

According to the healthcare reform blueprint (2009), China was to invest USD 124 billion on healthcare from 2009 to 2011. The reforms focused on five key issues: facilitating broad coverage of basic medical insurance, setting up a national system for essential medicines covered by the medical insurance system, expanding the network of local-level clinics, improving the basic public health system, and initiating a pilot reform of public hospital operations [19]. Since the announcement of these reforms, a series of regulations and guidelines have been released, including: a guideline on the construction of county hospitals, health centers, community health service centers, and village clinics [20]; a guideline on the price of essential medicines [21]; a guideline on the reform of public hospitals in 16 pilot cities [22]; and a guideline about China's drug distribution industry (for 2011–2015) [23]. These guidelines particularly emphasized pharmacists' responsibilities in providing low-cost medicines and promoting appropriate use of medications in both hospital and community pharmacy settings.

Significant changes have occurred within the pharmacy profession in the past few decades [24]. Pharmaceutical care, as a practice philosophy, was first introduced in China during the mid-1990s. Under this philosophy, patient-centered services are provided by pharmacists for the purpose of improving rational use of medications and ultimately enhancing the quality of life of patients [25]. Therefore, understanding the expanded role of community pharmacies and pharmacists in today's rapidly changing healthcare system (a role that transcends the traditional dispensing of prescriptions and selling of medicines) is important for the promotion of primary healthcare in China. However, only limited information is available on the current state of community pharmacies in China.

Aim of the review

The aim of this review is to describe the current status of Chinese community pharmacies and community pharmacist education and practice, and to discuss future directions for community pharmacy service development in China that may lead to an enhanced primary care role in the context of the recent healthcare reforms.

Method

Studies were identified through searches in MEDLINE and International Pharmaceutical Abstracts using a combination of search terms, namely: 'China, Chinese, community pharmacy, retail pharmacy, pharmacist, clinical pharmacy, pharmaceutical care, primary healthcare, and/or pharmaceutical education'. Articles were limited to those in English or Chinese, published between January 1993 and March 2012 (a 20-year period), and pertaining to China. The initial search was conducted from June to August 2011, and a check for new literature was performed in March 2012. Additional articles were identified through the cross-referencing of articles and books. We also consulted the websites of the Chinese MoH, the State Food and Drug Administration (SFDA), the World Health Organization (WHO), and various search engines (Google Scholar, Baidu, Sogou) for other relevant information that was published in either English or Chinese. Search terms included were 'community pharmacy/retail pharmacy', combined with 'China, Chinese, pharmacist, clinical pharmacy, pharmaceutical care, primary healthcare, and/or healthcare reform'.

Results

Our initial screen resulted in 245 peer-reviewed publications from MEDLINE and International Pharmaceutical Abstracts and 68 publications from the other databases, including those published by government departments, such as the MoH and SFDA, and the WHO. We included only research publications that investigated a broad view of community pharmacy activities and their future development. Selected for final review were 34 papers on community pharmacy services, 25 on primary healthcare in the community, 22 on clinical pharmacy and pharmaceutical care, and 17 dealing with pharmaceutical education (see Fig. 1).

Community pharmacies in China

To establish and operate a pharmacy in China, the number of permanent residents, terrain, transportation, and practical needs of the locality should be taken into consideration. According to the Provisions for Supervision of Drug Distribution adopted by the SFDA in 2006, ownership of a pharmacy is not restricted to pharmacists [26] provided that a pharmaceutical professional is present when medications and pharmaceutical care services are provided [27]. The Drug Administration Law of the People's Republic of China, revised in 2001, stipulates that community pharmacies should have legally qualified pharmaceutical professionals, including pharmacists and pharmacy technicians. However, this law is not strictly enforced; most pharmacies sell medications without the presence of a pharmaceutical professional [28]. As a result, rules concerning the operation and ownership of community pharmacies were tightened in early 2012 [29]. According to the 12th Five-Year Plan on Drug Safety released by the State Council in early 2012 [29], newly opened community pharmacies must be staffed by licensed pharmacists during business hours to ensure the quality of medications and services, and that all community pharmacies will be owned by licensed pharmacists only by 2015.

After the latest round of healthcare reforms in 2009, community pharmacies have come to play a significantly more important role in China than previously. In 2009, the number of community pharmacies reached nearly 388,000, a 6.1 % increase from the previous year. This increase was primarily a result of the establishment of pharmacy chains, which accounted for 35 % of pharmacies in 2009, while the number of independent pharmacies decreased [30]. Each community pharmacy in China caters for an average of 3,532 people. In contrast, the number of licensed



Fig. 1 Flow chart of literature search

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pharmacists was only 185,692 in 2010, equivalent to approximately 7,380 people per licensed pharmacist, which is much higher than in the United States, Canada, and other developed countries [31–33]. There is a lack of pharmacists in China; this shortage is worse in rural areas, which suffers from chronic understaffing in both the hospital and community pharmacy sectors. In 2010, 388,000 pharmacists (both licensed pharmacists and pharmaceutical specialists) were working in a variety of settings. This number translates to approximately 0.29 pharmacists per 1,000 people, lower than that of India and Brazil [24]. A community pharmacist must register in a Provincial Pharmacists' Association to work. Two professional societies represent all Chinese pharmacists in community pharmacies: the Chinese Pharmaceutical Association (CPA) run by the Ministry of Civil Affairs, and the China Licensed Pharmacist Association run by the SFDA.

Community pharmacies are a profitable business in China. From 1978 until 2009, the average annual medication sales growth in China was 20 %, reaching USD 21.8 billion in 2009 [30]. Nevertheless, hospitals remain the main outlets for medication distribution in China, with more than 19,000 hospital pharmacies accounting for 74 % of total medication sales in 2009 [25]. However, this situation is changing because the government is encouraging the establishment of community pharmacies that are not associated with hospitals. Unlike many developed countries, no official data on community pharmacist salaries are available because of the lack of a national survey of Chinese pharmacists. In Xi'an, the capital city of Shaanxi Province, the average salary of community pharmacists is around USD 3.3/h, which is much lower than USD 11.4/h for hospital pharmacists [34].

Both prescription and nonprescription medicines can be sold in community pharmacies, with the exception of narcotic drugs, some psychotropic substances, abortion drugs, anabolic steroids, peptide hormones, chemical products used in the production of narcotics, radiopharmaceuticals, and vaccines, which can only be prescribed and dispensed in designated medical institutions. Current regulations state that prescription medications cannot be sold without a medical prescription [35]; however, because of the shortage of pharmacists and the profit-driven behaviour of some retailers, the illegal sale of prescription medications (e.g., antibiotics) remains very common, especially in the rural regions of China [36].

Pharmacy education

Statistics from late 2010 showed that 603 higher education pharmaceutical institutions existed in China (including universities and colleges), with 21 pharmacy-related specialties offering more than 700 programmes [37]. Fortyseven of these institutions were selected to obtain profile statistics on their undergraduates; 162 programmes had 15,743 state-planned undergraduate students enrolled [37]. Currently, 94 universities and colleges offer TCM programmes in China, training students in knowledge and experimental skills, including the documents and literature of TCM, pharmaceutical analysis, Chinese medicine, acupuncture, tuina and massage, Chinese pharmacology, and pharmacognosy [38].

Traditionally, pharmacy education has focused on drug products, and has emphasized chemistry, pharmaceutics and the control and regulation of drug product delivery systems [39]. The majority of pharmacy programmes in China (generally 4 years in length) are basically product-oriented rather than patient-oriented [13]. The dramatically changing healthcare delivery system, and the increasingly prominent role of community pharmacies in primary healthcare, is shifting focus to a broader role for pharmacists [40]. This fundamental paradigm shift is reinforcing that pharmacists can help improve the health-related quality of life of patients, rather than simply providing products. This highlights the importance of shifting the emphasis of pharmacy education from the product to the patient [41].

The education that pharmacy students currently receive in China encompasses the following three major areas: (1) general education (1 year), including English, mathematics, physics, chemistry, and biological sciences; (2) didactic pharmaceutical education (2.5 years or more), composed of basic pharmaceutical sciences such as pharmacology, pharmaceutics, pharmaceutical analysis, pharmaceutical chemistry, pharmacy administration; and (3) experiential education (<6 months), which refers to the experience gained by working in a pharmaceutical practice setting, usually a drug-manufacturing enterprise. After graduating, most pharmacy graduates work in hospitals or industry. Of approximately 300,000 pharmacy graduates from 1949 to 1998, 52 % worked in hospital pharmacies, 21 % worked in the pharmaceutical industry, and 9 % worked for wholesale distributors or in community pharmacies in their first year after graduation [42].

The continuous growth of the pharmacy profession inevitably requires both expansion and modernization, justifying the need for a new pharmacy program and curriculum that is able to produce a more skilled workforce, which is required for the new and emerging roles. Clinical pharmacy education in China was developed only recently; the West China School of Pharmacy at Sichuan University offered the first 5-year clinical pharmacy BS degree from 1989 to 1999 [43]. Since 2000, the Ministry of Education has allowed only pharmaceutical sciences as a first-level discipline for BS degrees [44]. Students wishing to study clinical pharmacy, but only as a second level of study under pharmaceutical sciences. From 2008, some universities, such as China Pharmaceutical University, have been allowed to once again offer BS, MS and PhD degrees in clinical pharmacy (3-7 years in length) [45]. As of 2010, only 11 universities were allowed to offer a first-level, 5-year BS degree in clinical pharmacy [37]. Another 14 universities have offered clinical pharmacy MS and PhD programmes (3–7 years in length) [43]. However, unlike the curricula of pharmacy and other medical courses, a standardized curriculum for clinical pharmacy has not yet been established [45]. To establish a uniform and highly qualified model to train clinical pharmacists, the MoH is considering a proposal for an entry-level professional degree of Doctor in Clinical Pharmacy, similar to the Doctor of Pharmacy (PharmD) degree in the United States. Thus, the introduction of the PharmD program in 2004, pioneered in China by Sichuan University, Chengdu, is a welcome development [45].

In the 5-year BS in Clinical Pharmacy program at China Pharmaceutical University, students spend the first 2 years studying basic sciences, i.e., biology and chemistry. From the first semester of the third year, students study core subjects, i.e., diagnostic basics, biostatistics, internal medicine, surgery, gynecology, pediatrics, clinical pharmacology, and clinical therapeutics. In the last year of undergraduate study, and under the supervision of both a physician and a clinical pharmacist, students become involved in hospital pharmacy practice activities, including patient care rounds, medication order reviews, therapeutic drug monitoring, and supplying drug information to patients and other healthcare practitioners in the hospital. Upon graduation, students must have completed their core courses, as well as laboratory courses, pharmacy practicals, and thesis writing [46]. The curricula for the postgraduate MS in Clinical Pharmacy varies widely across schools that offer this degree, while students pursuing a Clinical Pharmacy PhD must spend a significant portion of their program engaged in laboratory research [43].

China has two types of pharmacist qualification systems. The first is a professional qualification system, under which only pharmaceutical professionals who pass the national pharmacist licensing exam can obtain a Licensed Pharmacist Certificate, register with a provincial regulatory authority, and work in institutions where medicines are manufactured, distributed or used. The minimum qualification to apply for the licensed pharmacist qualification examination is attainment of a secondary technical school diploma and a major in pharmacy or related disciplines (e.g., medicine, chemistry, biology or nursing). The current minimum qualification for registration as a pharmacist is too low, and future adjustment is anticipated [47]. Meanwhile, working experience is also needed; this depends on the academic qualification. Currently, people with secondary, tertiary, Bachelors or Masters degrees can apply for the examination after 7, 5, 3 and 1 year's experience. respectively. No work experience is required for candidates with Doctorate degrees [48]. The SFDA and the Ministry of Human Resources and Social Security are the governing bodies charged with overseeing the licensing examinations, as well as the registration and mandatory continuing education of licensed pharmacists. The second pharmacist qualification system is a specialized system, under which a pharmaceutical specialist is assigned a specific title, such as chief pharmacist, associate chief pharmacist, pharmacist in-charge, pharmacist or assistant pharmacist, according to their educational background, work experience, and professional skills. This type of pharmacist works mainly in medical institutions and is overseen by the MoH. At present, passing the licensure examination is not mandatory for pharmacists in medical institutions. As a result, the vast majority of pharmacists in medical institutions have specialized qualifications instead of licensed pharmacist qualifications. For example, 345,000 pharmacists worked in Chinese medical institutions at the end of 2010; of these, only 48,000 were licensed [49]. There are also more than 4 million pharmacy technicians working in China's community pharmacies [30]. The role of the pharmacy technician requires a high school diploma or equivalent and also some training and certification at the college level, which takes between 3 and 6 months to complete. Under the direct supervision of a pharmacist, pharmacy technicians help dispense prescription medications and perform other administrative duties in the community pharmacies.

Development of clinical pharmacy and pharmaceutical care

Prior to 1990, the roles of pharmacists in community pharmacies mainly involved the supply and dispensing of medications, bulk compounding, administrative functions, and staff supervision and management. Since then, numerous developments have taken place in the various aspects of pharmaceutical education, legislation and practice that encompass industry, hospitals and communities [50]. The introduction and acceptance of clinical pharmacy and pharmaceutical care into the practice of pharmacy in China during the 1990s led to the involvement of some community pharmacists in related professional activities, such as drug information services and patient medication counselling [51].

The field of clinical pharmacy has grown rapidly since the introduction of the Temporary Regulations of Pharmacy Administration for Medical Institutions in 2002. At this time, the government required all hospitals to develop clinical pharmacy programmes to promote appropriate drug use and take responsibility for helping to establish patient care services in community pharmacy settings [52]. In January 2006, the MoH established 1-year clinical pharmacy training programmes with both didactic and experiential components for practicing pharmacists [45]. However, no standard working model for clinical pharmacists has been developed in China to date. This is because the establishment of the clinical pharmacist system has only recently been accomplished, and the pilot training of clinical pharmacists has just been completed [53].

The implementation of pharmaceutical care in Chinese hospital pharmacies continues to expand. However, pharmaceutical care provision as part of routine community pharmacy practice has not been a priority for a sector that is facing many challenges, including a shortage of pharmacists, a lack of professional skills, a lack of reimbursement systems for healthcare services, and poor public awareness of pharmacists [54]. The challenge in providing pharmaceutical care has led pharmacists to change their practices in community settings. Pharmacists from Shanghai Changhai Hospital were the first to extend pharmaceutical care from hospital patients to community residents, resulting in increased medication education across all levels and an expanded scope for pharmaceutical care [55]. The role of the community pharmacist in primary care has undergone significant changes, with a greater emphasis on providing patient-centered care and documenting healthcare services, which include counselling patients, profiling medications, and performing any function other than dispensing medicines [56].

Community pharmacy services

Community pharmacists in China typically compound and dispense medications by following the prescriptions issued by clinical physicians, dentists or other authorized medical practitioners, such as public health physicians and radiologists. In this role, pharmacists act as skilled intermediaries between physicians and patients, thus ensuring the safe and effective use of medications. The Fourth Chinese National Health Care Survey revealed a high prevalence of selfmedication in China that increased from 36 % in 2003 to 70 % in 2008 [57]. In China, the most common reason for self-medication was that people thought they knew enough to take care of themselves. In particular, self-perceived illness status, economic circumstances, and education had a positive association with the probability of self-medication [58]. These data reinforce the responsibility of community pharmacies and pharmacists to protect patients from drugrelated problems when self-medicating.

Chinese pharmacists have indicated a willingness to implement pharmaceutical care, but are restricted by limited knowledge and skills in this field, as well as by underdeveloped pharmacy education. In China, patients do not pay dispensing fees for the medications dispensed to them, and current insurance programmes do not pay pharmacists for healthcare services [36]. Under such circumstances, some

In 2003, based on the "Guidelines for Good Pharmacy Practice (GPP)" and "GPP in developing countries" drafted by the International Pharmaceutical Federation [59], the China Nonprescription Medicines Association (CNMA) adopted the first edition of GPP in China as a recommended standard for pharmacy practice in community pharmacies [60]. A revised version of this document was approved by the CNMA in 2007 [61]. The GPP aims to achieve the promotion of health, the supply of medicines and medical devices, patient self-care, and improved prescription and medicine use, through the actions of pharmacists in community pharmacy settings. This document details the role of pharmacists in community pharmacy services and describes pharmaceutical care as a set of activities that must be developed by pharmacists. To date, 86 retail pharmacies have achieved GPP certification. The CNMA is planning to consult with the government to institutionalize the GPP system in the near future [60].

Discussion

After the initial developments outlined above, a number of activities must now be initiated to further develop community pharmacy services in China.

Enactment of the Chinese pharmacist law

Following the introduction of the provisional regulations of the Licensed Pharmacist Qualification System in 1994, and their revision in 1999 by the Ministry of Personnel and State Drug Administration, the number of licensed pharmacists in China has increased sharply from 98,310 in 2003 to 185,692 in 2010. With licensed pharmacists playing an increasingly important role in patient care, the legal and professional obligations of licensed pharmacists should be stipulated in law. However, no pharmacist laws are currently in place in China, thereby hindering the development of pharmacist skills for providing clinical pharmacy and pharmaceutical care services. Additionally, pharmacists in China are of many different types, including licensed pharmacists in industry, hospitals and community pharmacies, and pharmacists in medical institutions. Their responsibilities, as defined in the SFDA regulations [62], do not include the duty to maintain and properly care for patients. Thus, the Chinese Pharmacist Law, which clearly specifies the provision of patient care services as one of the principal duties of Author's personal copy

pharmacists, must be enacted to promote appropriate advice on the use of medications by all citizens. A draft of the "Chinese Pharmacist Law" has already been prepared by the MoH and the SFDA, and will be implemented in the near future.

Development of a standard for pharmaceutical care activities

The adoption of standards for conducting pharmaceutical care activities is an important step towards improving patient care throughout the nation. Pharmaceutical organizations, government, universities, and other healthcare stakeholders should work together in developing a nationally mandated standard to ensure quality pharmaceutical care practices in both hospital and community settings. Training programmes delivered by health departments are also needed to ensure that the standard is correctly implemented by all pharmacists.

Development of the pharmacy workforce

Pharmacists are expected to become more involved in pharmaceutical care in the near future [63], hence pharmacist development must be an academic and practical priority to ensure an adequate supply of high-quality pharmacists. In February 2011, the MoH issued the Longterm Medical and Health Personnel Development Plan (2011–2020) [64], which projects that the number of Chinese pharmacists will reach 550,000 by 2015 and 850,000 by 2020. The training of more pharmacy technicians to perform the traditional duties of pharmacists is also critical for pharmacy education; this will release more time for pharmacists to play a caring, advisory role in patient care.

Increasing public awareness of pharmacists

In line with the SFDA program to increase public awareness of healthcare issues, the CPA carried out a "Pharmacist on Your Side" campaign [65]. This campaign continues efforts to increase public awareness about the vital role of pharmacists within any primary healthcare team, beyond simply dispensing medications. Through increased awareness of the potential contribution of pharmacists to the Chinese healthcare system, more opportunities for educating pharmacists will be made available to satisfy the vast needs of the country.

Pharmacy services reimbursement

The lack of third-party reimbursement for dispensing and advanced patient services provided by pharmacists is a barrier that must be addressed. To foster greater awareness of the value of pharmacist services and to ensure the longterm success of pharmaceutical care, policy-makers need to focus more attention on obtaining compensation for community pharmacy services. Ultimately, pharmacists will be able to enhance their revenues by increasing the array of patient care services, exploring innovative markets for pharmaceutical care services, and continuing to improve their reimbursement rates from third-party payers (including private insurance companies, government programmes such as the New Cooperative Medical Scheme in rural areas, and basic medical security for urban residents). Introducing patient contributions toward advanced pharmaceutical care services is another potential policy option.

Conclusions

In the past several decades, significant progress has been made in the development of community pharmacy settings in China. Despite this achievement, we face new challenges in an evolving healthcare system. A number of developments must be stimulated to continue progress, including the enactment of the Chinese Pharmacist Law, development of a standard for patient pharmaceutical care services, development of the pharmacy workforce, increased public awareness about the value of pharmacists, encouraging professional organization involvement in advancing the pharmacy profession, and proper remuneration for care provision. In the future, Chinese pharmacists are expected to become an integral part of the healthcare system, and in doing so, will serve the healthcare needs of the population, especially in community pharmacy settings.

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Conflicts of interest None of the authors have any real or potential conflicts of interest concerning this work.

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