



**VALUE OF CLINICAL PHARMACISTS AND THEIR ROLES IN HOSPITALS IN CHINA
FROM THE PERSPECTIVE OF PHYSICIANS AND PHARMACISTS**

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ABSTRACT

The study to determine the perception of physicians and pharmacists in hospitals was conducted in ten tertiary hospitals (inpatient units and hospital pharmacies) in eight urban cities in China. A self administered questionnaire was distributed to 500 physicians and 150 pharmacists between Oct 2014 and Feb 2015. Instrument contained questions to determine demographics, perception towards professional value and roles of clinical pharmacists in general and advanced clinical services. Response rates were 69.2% for physicians and 72% for pharmacists. Majority of physicians and pharmacists (more than 90%) accepted that clinical pharmacist is an irreplaceable member of health care system, who can help improve efficacy of therapies and reduce drug related problems. Compared to physicians, pharmacists were more agreed that clinical pharmacists have an ability to provide individualized patient care. Some physicians were uncomfortable with clinical pharmacists' suggesting alternatives and prescribing for minor illness, and this is in line with pharmacists' perception. Pharmacists (46.30%) showed more negative response towards performing physical examination role than physicians (42.49%). Both respondent groups strongly supported the function of clinical pharmacists in advanced clinical services/programs except patient self-management service.

KEY WORDS: Clinical pharmacist · Roles · Perception · Physicians · Hospital · Questionnaire.

INTRODUCTION

There is a growing pressure on health care system due to factors such as ageing societies, unhealthy life style, complex medication market and reduction of health system resources. Drug-related morbidity and mortality is another major issue, which cannot be resolved by one health care profession in isolation. In order to develop an appropriate drug therapy plan, coordination and collaboration is important between different professionals as doctors, nurses and pharmacists, usually within an interdisciplinary team. Traditional roles of pharmacist are considered as interpretation of prescription orders, compounding, labeling and dispensing of drugs and medical devices, the provision of cognitive services related to use of medications and medical devices^[1], and they were not supposed to participate in direct patient care.^[2,3] In 1990, Hepler and Strand introduced a revolutionary term in the field of pharmacy called pharmaceutical care, as the responsible

provision of drug therapy for the purpose of achieving definite outcomes that improve the patients' quality of life by preventing and resolving drug-related problems. In past few years, a better interaction between physicians and pharmacists has led to safer, more effective and less costly drug therapies. But often role of pharmacists is not recognized by the physicians or other health care workers.^[4-5] Some studies have proven that direct patient care is still exclusively in the hands of physicians.^[6] In past few years China's Ministry of Public Health has worked hard to establish the role of pharmacists especially in hospitals. It recommended in 2002 that "the clinical pharmacist should take part in the diagnosis and treatment of diseases, provide pharmaceutical care, and improve the quality of medical care", and so clinical pharmacy departments were established in hospitals.^[7] Recently, Chinese Ministry of Health (MOH) has initiated an ambitious health care reform that is to provide equitable and affordable health care to the

masses till 2020.^[8] One of the goals is to develop and implement clinical pharmacy services. In 2011 the Ministry of Health issued a policy that all secondary and tertiary hospitals should have three and five full-time clinical pharmacists respectively.^[9] And should hire clinical pharmacists specialized in infectious diseases to control the antibiotic resistance problem.^[10] Yet in most urban hospitals, clinical pharmacists do not participate in direct patient care, and they are only involved in performing auxiliary tasks, such as providing adverse drug reaction (ADR) monitoring, therapeutic drug monitoring, and drug information counseling.^[11]

Many researchers in China have observed the impact of pharmaceutical care provided by clinical pharmacists, and it is expected that clinical pharmacy services can make strong contribution in China's health care system.^[12] To enhance the effectiveness of clinical pharmacy services, it is very important to determine their value among other health care members such as doctors and nurses. Many studies have already evaluated the perception of doctors regarding clinical pharmacists' roles.^[13-17] A recent study in China has also showed encouraging behavior of physicians towards clinical pharmacy services except clinical pharmacists' prescribing role.^[18] Some studies have also evaluated the perception of physicians, nurses and pharmacists towards the roles of pharmacists.^[19-21] It is important to assess pharmacists' attitude and views about various advanced pharmacy services as sometimes pharmacists also seemed confuse regarding their roles and profession.^[22] There are only few studies that were designed to compare perceptions of both pharmacists' and practitioners.^[23 - 25] Compared to the existing research, the added value of our research is that the questionnaire included the vast majority of clinical pharmacy activities, and it is the first study in China which encompassed the views of both physicians and pharmacists not only regarding clinical pharmacists' roles but also about their professional capabilities.

METHOD

Research design and population: A cross sectional survey was conducted in ten hospitals located in eight different cities in China; one hospital in each Beijing, Shanghai, Changzhou, Xuzhou, Wuhu, Changchun, Xinjiang and three hospitals in Nanjing. Initially a letter was sent to administration of 15 hospitals, where ten replied and permitted us to conduct the survey. All these hospitals belong to the category of tertiary hospital A, which are comprehensive or general hospitals at the city, provincial, or national level, and they are required to have at least five full time clinical pharmacists working there. In case of physicians, we aimed to complete randomly ten questionnaires in five in patient units/wards of each hospital, with a goal of five hundred respondents in total. For pharmacists, a finite set of fifteen pharmacists was set from each hospital, with a target of one hundred and fifty pharmacists in total. As until now the number of clinical pharmacists in most of the

hospitals in China is less, and hospital pharmacists are also performing some clinical roles, we found it appropriate to question them about clinical pharmacy services. So, we collected data from both registered hospital pharmacists working in hospital pharmacies and clinical pharmacists working in inpatient units.

Questionnaire: A self administered questionnaire was designed to determine the perception of physicians and pharmacists regarding the professional competence and roles of clinical pharmacists in hospitals. We reviewed previous studies to get useful information about the questionnaire design.^[19, 23] Questionnaire was mainly composed of three parts: (1) Demographics; include gender, age, qualification, current ward, and job status. (2) Value of clinical pharmacists; this part include seven questions regarding professional competence of clinical pharmacists and to indicate the level of agreement, 4-points Likert scale, where 1= strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree, was used in order to avoid confusion with the neutral responses. (3) Perception about the clinical roles; it include 18 items where the degree of comfort with general roles of clinical pharmacists in hospitals was assessed using a 4-points Likert scale, where 1= very uncomfortable, 2 = uncomfortable, 3 = comfortable, 4 = very comfortable, was used. First 10 items were to assess perception about different clinical pharmacy services provided in hospital wards, and last 8 questions were about the role of clinical pharmacist in advanced clinical programs or centers in hospitals.

Pilot study: Questionnaire was first developed in English, and then translated to Chinese, and sent to the hospitals for the consent and suggestions. A pilot study was also conducted on ten doctors and five pharmacists in a hospital in Nanjing, who were later on asked about the legibility, worth and comprehensiveness of the questions. Both the suggestions from the hospitals and respondents were used for the validation of the questionnaire. To ensure equivalent content of the translated items, back-translation was carried out by an English native speaker with long experience in pharmacy education in Chinese academia. Content and clarity of the final draft was again assessed and reviewed by the faculty members in clinical pharmacy department in our university.

Data Collection: Data was collected by the research team from Oct 2014 to Feb 2015. Permission was obtained from the administration of the surveyed hospitals. Aim and purpose of the study was explained to all the participants, and a verbal consent was obtained before they were given questionnaire.

Data analysis: Descriptive statistical test was employed to analyze demographic characteristics and perception scales using Statistical Package for Social Sciences version 17.0 for Windows (SPSS Inc., Chicago, Illinois). Simple frequencies and percentages were calculated for

demographic variables; age, qualification, current ward and job status. To simplify the results, response regarding professional capabilities and perception about clinical roles were dichotomized. Ratings of one or two (strongly disagree/very uncomfortable or disagree/uncomfortable) were considered as disagree/not comfortable whereas ratings of three or four (agree/comfortable or strongly agree/very comfortable) were considered agree/comfortable. The chi-test was used to test significance of association between independent variable (current job position) and dependent variables (value of clinical pharmacists and perception regarding the clinical roles). Statistical significance was accepted at p value of < 0.05 .

RESULTS

Demographic Data: A total of 346 Performa were returned by physicians (response rate: 69.2 %) and 108 (72%) by the pharmacists. Participants' demographics are shown in the Table 1. For physicians, 53.17% of the respondents were male, and most (42.49%) of them were young with an age ranging between 20-30 years. 82 of the physicians were ward in charge, 92 attending doctors and 172 residents. 58.67% of physicians had a masters degree. In case of pharmacists, most of the participants were female 65 (60.18%). 19 of pharmacists were senior or in charge pharmacists, 73 pharmacists and 16 trainee pharmacists. Most of the pharmacists (60.18%) had an undergraduate qualification.

Table 1: Demographic Data

| Variables | Physicians n (%) | Pharmacists n (%) |
|---------------------------|----------------------------------|-----------------------------------------------|
| Gender | | |
| Male | 184 (53.17%) | 43 (39.81%) |
| Female | 162 (46.82%) | 65 (60.18%) |
| Age (years) | | |
| 20-30 | 147 (42.49%) | 60 (55.56%) |
| 30-40 | 129 (37.29%) | 37 (34.26%) |
| 40-50 | 45 (13.00%) | 4 (3.70%) |
| 50-60 | 25 (7.22%) | 7 (6.48%) |
| Education level | | |
| Bachelors | 89 (25.72%) | 65 (60.18%) |
| Masters | 203 (58.67%) | 37 (34.26%) |
| PhD | 54 (15.61%) | 6 (5.56%) |
| Job Position | | |
| Senior | In charge Doctors 82 (23.69%) | Pharmacy Heads 19 (17.59%) |
| Middle Level | Attending Doctors 92 (26.58%) | Pharmacists 73 (67.59%) |
| Junior | Resident Doctors 172 (49.71%) | Trainee Pharmacists 16 (14.81%) |
| Current Ward | | |
| Internal Medicine | 94 (27.17%) | Hospital pharmacists 82 (75.93%) |
| General surgery | 73 (21.10%) | |
| Oncology | 54 (15.61%) | |
| Obstetrics and Gynecology | 43 (12.43%) | Clinical pharmacists 26 (24.07%) |
| Psychiatry | 37 (10.69%) | |
| Emergency | 45 (13.00%) | |

Value of clinical pharmacist: It was observed that physicians mostly expect clinical pharmacist to be an expert in drug related area as 80.92% agreed to this statement. Although we expected all the pharmacists to agree in this regard, yet 11.11% showed disagreement. Their job status also showed significant influence, as compared to head or trainees, the pharmacists strongly agreed. As shown in Table 2, for all other questions pharmacists showed significantly positive response such as they were 100% agreed with the clinical pharmacists' ability to work as health care team member and minimize

therapy related problems. Physicians also strongly agreed (more than 90%) that clinical pharmacists can help improve the quality and cost effectiveness of the treatment and minimize the adverse drug reactions, medication errors or drug interactions. Compared to other items physicians showed somewhat reserved response towards clinical pharmacist's capability to provide individualized patient care (86.41%). Value was statistically significant for physicians when asked about value of CPs as health care member.

Table 2: Value of Clinical Pharmacists

| Items | Respondents | Agree(n) (%) | Do not Agree (n) (%) | P- Value (Job Status) |
|---------------------------------------------------------------------|-------------|-----------------|-------------------------|--------------------------|
| CP is a drug expert | Physicians | 280 (80.92%) | 66(19.08%) | 0.052 |
| | Pharmacists | 96 (88.89%) | 12 (11.11%) | 0.003 |
| CP is an irreplaceable health care member | Physicians | 320 (92.49%) | 26 (7.51%) | 0.171 |
| | Pharmacists | 103 (95.37%) | 5 (4.63%) | 0.912 |
| CP can effectively collaborate with other health care professionals | Physicians | 326 (94.22%) | 20 (5.78%) | 0.005 |
| | Pharmacists | 108 (100%) | 0 | 0.708 |
| CP can provide individualized patient care | Physicians | 299 (86.42%) | 47 (13.58%) | 0.211 |
| | Pharmacists | 105 (97.22%) | 3 (2.78%) | 0.766 |
| CP involvement in patient therapy can reduce drug related problems | Physicians | 324 (93.64%) | 22 (6.36%) | 0.097 |
| | Pharmacists | 108 (100%) | 0 | 0.588 |
| CP can improve the quality and cost effectiveness therapy | Physicians | 315 (91.04%) | 31 (8.96%) | 0.069 |
| | Pharmacists | 106 (98.15%) | 2 (1.85%) | 0.869 |
| Collaboration with CP is not wastage of time | Physicians | 334 (96.53%) | 12 (3.47%) | 0.259 |
| | Pharmacists | 106 (98.15%) | 2 (1.85%) | 0.522 |

*CP: Clinical pharmacists

Perception about the roles of clinical pharmacists: As shown in Table 3, highest agreement of the physicians on the roles were found for ADR monitoring (91.91%), inpatients education (92.20%), giving latest drug related information to the health professionals (91.04%)

followed by participating in ward rounds (88.15%) and taking medication history (87.57%). All of these items have been agreed even to a significantly higher degree by pharmacists.

Table 3: Attitude Towards General Roles

| Roles | Respondent Group | Comfortable n(%) | Not Comfortable n(%) | P-value(Job status) |
|----------------------------------------|------------------|------------------|----------------------|---------------------|
| Suggesting Alternatives | Physicians | 269 (77.75%) | 77 (22.25%) | 0.312 |
| | Pharmacists | 98 (90.74%) | 10 (9.26%) | 0.285 |
| Taking Medication History | Physicians | 303 (87.57%) | 43 (12.43%) | 0.693 |
| | Pharmacists | 105 (97.22%) | 3 (2.78%) | 0.477 |
| Performing Physical Examination | Physicians | 199 (57.51%) | 147 (42.49%) | 0.602 |
| | Pharmacists | 58 (53.70%) | 50 (46.30%) | 0.882 |
| In-Patient education | Physicians | 319 (92.20%) | 27 (7.80%) | 0.905 |
| | Pharmacists | 105 (97.22%) | 3 (2.78%) | 0.644 |
| *ADR evaluation and monitoring | Physicians | 318 (91.91%) | 28 (8.09%) | 0.701 |
| | Pharmacists | 107 (99.07%) | 1 (0.93%) | 0.785 |
| Participating in ward rounds | Physicians | 305 (88.15%) | 41 (11.85%) | 0.186 |
| | Pharmacists | 106 (98.15%) | 2 (1.85%) | 0.614 |
| Accessing therapy outcomes | Physicians | 284 (82.08%) | 62 (17.92%) | 0.094 |
| | Pharmacists | 104 (96.30%) | 4 (3.70%) | 0.591 |
| Providing **DI to health professionals | Physicians | 315 (91.04%) | 31 (8.96%) | 0.054 |
| | Pharmacists | 106 (98.15%) | 2 (1.85%) | 0.614 |
| Out patients Education | Physicians | 273 (78.90%) | 73 (21.10%) | 0.115 |
| | Pharmacists | 105 (97.22%) | 3 (2.78%) | 0.477 |
| Minor Prescribing | Physicians | 252(72.83%) | 94 (27.17%) | 0.273 |
| | Pharmacists | 93 (86.11%) | 15 (13.89%) | 0.285 |

*ADR: Adverse Drug Reactions, ** DI: Drug Information

On extended roles of clinical pharmacists such as suggesting alternatives to the practitioners or prescribing for minor conditions under physicians' supervision, physicians rather disagreed up to 22.25% and 27.17% respectively. Concerning a bit advanced and new clinical pharmacy service, performing physical examination, results showed that pharmacists (53.70%) themselves acknowledged it to lesser extent than physicians

(57.51%). Contrary to the general roles, about 90% physicians supported clinical pharmacists' functions in different hospital based clinical programs or centers, except for their role in patient self medication management program only 74.28% agreed. Pharmacists themselves strongly supported these roles. Detailed results are presented in Table 4. They showed highest level of agreement for the role in therapeutic drug

monitoring and antibiotic therapy management programs (99.07%). Like physicians, pharmacists also showed less positive response towards pharmacists' role in patient

self management service as 10.18% disagreed. Values are statically insignificant for all the questions asked in this section.

Table 4: Attitude Towards Role In Advanced Clinical Programs

| Roles | Respondent Group | Comfortable n(%) | Not Comfortable n(%) | P-value(Job status) |
|---------------------------------------|------------------|------------------|----------------------|---------------------|
| Antibiotic therapy management program | Physicians | 327 (94.51%) | 19 (5.49%) | 0.755 |
| | Pharmacists | 107 (99.07%) | 1 (0.93%) | 0.791 |
| Warfarin therapy management program | Physicians | 333 (96.24%) | 13 (3.76%) | 0.292 |
| | Pharmacists | 105 (97.22%) | 3 (2.78%) | 0.477 |
| Total parenteral nutrition (TPN) | Physicians | 324 (93.64%) | 22 (6.56%) | 0.651 |
| | Pharmacists | 102 (94.44%) | 6 (5.56%) | 0.575 |
| Patient self-management service | Physicians | 257 (74.28%) | 89 (25.72%) | 0.372 |
| | Pharmacists | 97 (89.81%) | 11(10.18%) | 0.633 |
| Steroidal therapy management program | Physicians | 327 (94.51%) | 19 (5.49%) | 0.371 |
| | Pharmacists | 104 (96.30%) | 4 (3.70%) | 0.369 |
| New drugs research center | Physicians | 307 (88.73%) | 39 (11.27%) | 0.148 |
| | Pharmacists | 103 (95.37%) | 5 (4.63%) | 0.336 |
| Drug information center (DIC) | Physicians | 316 (91.33%) | 30 (8.67%) | 0.651 |
| | Pharmacists | 102 (94.44%) | 6 (5.56%) | 0.505 |
| Therapeutic drug monitoring (TDM) | Physicians | 327 (94.51%) | 19 (5.49%) | 0.008 |
| | Pharmacists | 107 (99.07%) | 1 (0.93%) | 0.785 |

DISCUSSION

It is an accepted fact that new models of primary care need to include pharmacists in patient care roles in order to more fully meet the needs of patients.^[26] Various studies have showed that physicians and other health care members have accepted the usefulness of pharmacist in various specialties.^[21, 27, 28, 29] In our study, doctors showed an overall very positive attitude towards clinical pharmacy profession, similar to some other studies.^[18, 30 - 33] Although not all the physicians perceive clinical pharmacist as an expert in drug related area or do not appreciate pharmacist led individualized patient therapy yet they strongly believe that pharmacist is an irreplaceable member of health care team and can improve quality of patient therapy by preventing drug related problems. According to a study in Sudan, 87.9% physicians expect pharmacists to be knowledgeable drug therapy experts, while in our study 80.92% respondent agreed.^[13] Some studies also showed that practitioners questioned the pharmacists' competency to provide direct patient care services.^[33] Unlike another study where 18% of the hospital-based physicians thought that the collaboration had been time-consuming to certain or to a high extent, physicians in China do not assume that the time spent in collaborating with clinical pharmacists is a wastage.^[34] Pharmacists were not 100% agreed with the statement that clinical pharmacists are drug experts. The number of clinical pharmacists available in hospitals in China is not sufficient, and sometimes they lack confidence and problem solving skills.^[18] By taking direct responsibility for individual patients' medication-related needs, pharmacists can make a unique contribution to the outcome of medication therapy.^[35] Compared to existing studies in China, our survey has showed overwhelming response of physicians towards

various services provided by clinical pharmacists. Another study in Tennessee, USA also showed that ninety-one percents of physicians and pharmacists were receptive to the extended roles of the pharmacist in hospitals.^[25] When asked about common tasks performed by clinical pharmacists in wards such as ward rounds, ADR monitoring, in patient education about drug use, providing information to other health care workers and taking medication history, physicians strongly supported these roles. As clinical pharmacists in Chinese hospitals are mostly involved only in ADR monitoring, therapeutic drug monitoring and patient counseling, so may be both physicians and pharmacists were well aware of these roles.^[11]

Different studies have also observed that physicians are more comfortable with the drug related services provided by the pharmacist including adverse drug reaction monitoring^[30], drug abuse prevention and management^[31], patient counseling and drug education.^[36] Good communication between healthcare professionals ensures a comprehensive and effective patient care.^[37] Dependence of practitioners on pharmacists for drug information has sorted out conflict regarding their professional liabilities.^[38] A study focusing community pharmacists' roles proved that both prescribers and pharmacists acknowledge pharmacist as a "value source of information".^[23]

Physical examination by pharmacist can both improve patient care and expand their scope of practice^[39], but in China this concept is still nowhere and more than half of the pharmacists were also reluctant. It may be because they do not get adequate training to perform such interactive roles as curriculum, and training for

Bachelor's in clinical pharmacy in China lacks standards and guidelines for students' training.^[40] In another study, 67.7% of the physicians did not agree with pharmacists screening for chronic conditions, e.g. high blood pressure.^[41] Respondents strongly accepted clinical pharmacists' role in ward rounds, unlike a research showing that 33.3% of questioned physicians' do not expect the pharmacist to be available for consultation during rounds.^[15]

Although our results showed that physicians seemed somewhat reserved with clinical pharmacist giving them information about drug alternatives or prescribing under supervision. Similar trend was seen in pharmacists' response. Physicians don't support the idea of prescribing or prescription modification by pharmacists.^[32, 36, 42, 43, 44] A survey carried out in 2013 involving 6272 clinicians across China showed that many of them use ineffective interventions in their clinical practice.^[45] This situation particularly emphasize that the strategy for developing clinical pharmacy services in China should focus the role of clinical pharmacists within the decision support system. Mostly physicians are concerned about liability or pharmacists' ability to make appropriate adaptations.^[46] Both physicians and pharmacists were more supportive with respect to counseling in patients rather than providing information to out-patients for drug adherence. In another study, 32.5% of physicians and 5.3 % of pharmacists judged pharmacists' current influence on patients' adherence to chronic medication to be minimal or not existing.^[23]

In order to improve the status of pharmacy services, many of the tertiary A hospitals are diligently establishing clinical pharmacy based programs or centers in hospitals in China. Yet it would be in vain if physicians and nurses are unwilling to support these roles. Here we accessed the acceptability of these services among pharmacists and physicians. Overall response was significantly positive except for patient self-management service, as both physicians and pharmacists showed some level of disagreement. A similar survey where all the stake holders in a hospital setting were involved, both physicians and pharmacists were less aware of relatively new services such as patient self-medication program or clinical drug research.^[47] In a focus group study conducted in Hong Kong about pharmacist-led patient self-management, all pharmacists believed that they had extended roles in addition to drug management, but the other professionals thought that pharmacists were drug experts only and could only play an assisting role.^[48] Sometimes physicians' fear of losing independence and professional autonomy is one of the barriers.^[49] Yet it cannot be ignored that acceptance of a clinical pharmacist by other members of the health care team depends mainly on their individual attitude, perception and personal experience.^[50] Positive attitude of physicians and pharmacists towards various clinical pharmacy services shows their willingness to collaborate

with each other in providing patient care. Previously, some studies showed that physicians are hesitant towards prescribing or interactive roles of clinical pharmacists, but we found that pharmacists themselves are also somewhat reluctant. This highlights that pharmacists need to improve their knowledge and skills, so that they can confidently participate in patient therapy management.

CONCLUSION

This study showed that physicians and pharmacists have a good understanding towards clinical roles of pharmacists in China. Yet there are some spaces to fill such as development and recognition of pharmacists' ability in minor prescribing, physical examination or suggesting alternatives.

REFERENCES

1. Remington JP, Gennaro AR. Scope and history of pharmacy. Science and practice of pharmacy. 20th ed. Lippincott Williams & Wilkins; 2002. p. 34-45.
2. Jones EJ, Mackinnon NJ, Tsuyuki RT. Pharmaceutical care in community pharmacies: practice and research in Canada. *Ann Pharmacother* 2005; 39:1527–1533.
3. Volume CI, Farris KB, Kassam R, Cox CE, Cave A. Pharmaceutical care research and education project: patient outcomes. *J Am Pharm Assoc (Wash)* 2001; 41:411–420.
4. Smith M, Bates DW, Bodenheimer T, Cleary PD. Why pharmacists belong in the medical home. *Health Affairs* 2010; 29:906–913.
5. Tang JTC, Sporrang KS. Uppsala University. The role of pharmacists in Asia and Africa- A Comparative study to the UK and Sweden. Thesis submitted to Uppsala University in 2008. http://www.farmfak.uu.se/farm/samfarmweb/Diplo maWork/HT08_JanetT_apotekarens_roll_i_fyra_lan der.pdf. (Accessed 15.1.15).
6. Zaidan M, Singh R, Wazaify M, and Tahaineh L: Physicians' perceptions, expectations, and experiences with pharmacists at Hamad Medical Corporation in Qatar. *Journal of Multidisciplinary Healthcare (JMDH)* 2011; 4:85–90.
7. Jiang JH, Liu Y, Wang YJ, Liu X, Yang MS, Zeng Y, *et al.* Clinical pharmacy education in China. *Am J Pharm Educ.* 2011; 75:57c.
8. Yip WC, Hsiao WC, Chen W, Hu S, Ma J, Maynard A. Early appraisal of China's huge and complex health-care reforms. *Lancet* 2012; 379:833–842.
9. Ministry of Health, P.R. China. China Health Statistics Yearbook 2012. Beijing: China Union Medical College Publishing, 2012. Can be accessed at http://t.search.yahoo.com/_ylt=A0LEVxGWDh9V10oAyh5XNyoA;_ylu=X3oDMTEzNW9rZ3BzBGNvbG8DYmYxBHBvcwMxBHZ0aWQDVkIQNTY1XzEEc2VjA3Ny/RV=2/RE=1428127510/RO=10/RU=http%3a%2f%2fwww.wpro.who.int%2fhealth_ser

- vices%2fservice_delivery_profile_china.pdf/RK=0/RS=VtPPdTXtvogaRSMr40G2pP5zgT8-
10. Ministry of Health of the People's Republic of China. 2011c. Policy on the Clinical Use of Antimicrobials. <http://www.moh.gov.cn/mohyzs/s3584/201205/54645.shtml> (in Chinese). Accessed on 15 January 2015.
 11. Hu M, Jiang XH, Wu YP, Yan Q, Li XX. Survey on hospital pharmaceutical care in China and the status quo of clinical pharmacy practice (part 2): survey on status quo of clinical pharmacy practice. *China Pharmacy* 2009; 20:1030-1032. (in Chinese)
 12. Penm J, Li Y, Zhai S, Hu Y, Chaar B, Moles R. The impact of clinical pharmacy services in China on the quality use of medicines: a systematic review in context of China's current healthcare reform. *Health Policy and Planning* 2014; 29:849-72.
 13. Awad AM, Matowe L, Capps P. Medical doctors' perceptions and expectations of the role of hospital pharmacists in Sudan. *Pharm World Sci* 2007; 29:557-564.
 14. Ibrahim OM, Ibrahim R. Perception of physicians to the role of clinical pharmacists in United Arab Emirates (UAE). *Pharmacology & Pharmacy* 2014; 5: 895-902.
 15. Tahaineh L, Wazaify M, Albsoul-Younes A, Khader Y, Zaidan M. Perception experiences, and expectations of physicians in hospital settings in Jordan regarding the role of the pharmacist. *Research in Social and Administrative Pharmacy*. 2009; 5: 63-70.
 16. Matowe L, Abahussain EA, Al-Saffar N, Bihzad SM, Al-Foraih A, Al-Kandery AA. Physicians' perceptions and expectations of pharmacists' professional duties in government hospitals in Kuwait. *Medical Principles and Practice* 2006; 15:185-189.
 17. Sabry NA, Farid SF. The role of clinical pharmacists as perceived by Egyptian physicians. *Int J Pharm Pract* 2014; 22:354-9.
 18. Li X, Huo HQ, Kong WJ, Li F, Wang JW. Physicians' perceptions and attitudes toward clinical pharmacy services in urban general hospitals in China. *Int J Clin Pharm* 2014; 36:443-450
 19. Cufar A, Mrhar A, Locatelli I. Attitudes of physicians, nurses and pharmacists concerning the development of clinical pharmacy activities in a university hospital. *Acta Pharmaceutica*. 2014; 64:447-46.
 20. Köse G, Subaşı U, Gatipoglu S, Lenk H, Gonul E. The importance of "patient-nurse-physician-pharmacist" collaboration on drug administrations. *Marmara Pharmaceutical Journal* 2012; 16:115-119.
 21. Giwa A, Giwa HBF, Yakubu SI, Ajiboye WT, Abubakar D, Abe SA. Perception of other health care professionals on pharmacists' roles in optimizing pharmaceutical care for HIV/AIDS patients in University of Maiduguri teaching hospital, north-eastern Nigeria. *Journal of Pharmacology and Tropical Therapeutics* 2011; 1:12-16.
 22. Olsson EL, Tuyet TN, Nguyen HA, Lundbor CS. Health professionals' and consumers' views on the role of the pharmacy personnel and the pharmacy service in Hanoi, Vietnam – a qualitative study. *Journal of Clinical Pharmacy and Therapeutics* 2002; 27:273-280.
 23. Wu'stmann A, Haase-Strey C, Kubiak T, Ritter CA. Cooperation between community pharmacists and general practitioners in eastern Germany: attitudes and needs. *Int J Clin Pharm* 2013; 35:584-592.
 24. Rubio-Valera M, Jové AM, Hughes CM, Guillen-Solà M, Rovira M, Fernández A. Factors affecting collaboration between general practitioners and community pharmacists: a qualitative study. *BMC Health Services Research* 2012; 12:188.
 25. Cruthirds DL, Hughes PJ, Weaver S. Value of pharmacy services to the healthcare system: an interdisciplinary assessment. *Int J Pharm Pract* 2013; 21:38-45.
 26. White CM. Pharmacists need recognition as providers to enhance patient care. *Ann Pharmacother* 2014; 48:268-73.
 27. Lalonde L, Hudon E, Goudreau J, Bélanger D, Villeneuve J, Perreault S, Blais L, Lamarre D. Physician-pharmacist collaborative care in dyslipidemia management: The perception of clinicians and patients. *Res Social Adm Pharm* 2011; 7:233-45.
 28. Tarn DM, Paterniti DA, Wenger NS, Williams BR, Chewing BA. Older patient, physician and pharmacist perspectives about community pharmacists' roles. *Int J Pharm Pract* 2012; 20:285-93.
 29. Wheeler A, Crump K, Lee M, Li L, Patel A, Yang R, Zhao J, Jensen M. Collaborative prescribing: a qualitative exploration of a role for pharmacists in mental health. *Res Social Adm Pharm* 2012; 8:179-92.
 30. Ghosh S, Ali S, Chhabra L, Prasad C, Gupta A. Investigation of attitudes and perception of medical practitioners on adverse drug reaction reporting-a pilot study. *The Pharma Research* 2010; 3: 1-9.
 31. Awalom MT, Kidane ME, Abraha BW. Physicians' views on the professional roles of pharmacists in patient care in Eritrea. *Int J Clin Pharm* 2013; 35:841-6.
 32. Wilbur K, Beniles A, Hammuda A. Physician perceptions of pharmacist roles in a primary care setting in Qatar. *Globalization and Health* 2012; 8:12.
 33. Sulick JA, Pathak DS. The perceived influence on clinical pharmacy services on physician prescribing behaviour: a matched-pair comparison of pharmacists and physicians. *Pharmacotherapy* 1996; 16:33-41.
 34. Gillespie U, Mörlin C, Hammarlund-Udenaes M, Hedström M. Perceived value of ward-based

- pharmacists from the perspective of physicians and nurses. *Int J Clin Pharm* 2012; 34: 127-35.
35. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990; 47:533-43.
 36. Bailie GR, Romeo B. New York State primary care physicians' attitudes to community pharmacists' clinical services. *Arch Intern Med.* 1996; 156: 1437-41.
 37. Fewster-Thuente L, Velsor-Friedrich B. Interdisciplinary collaboration for healthcare professionals. *Nursing Administration Quarterly.* 2008; 32:40-48.
 38. Cowen DL. Changing relationship between pharmacists and physicians. *Am J Hosp Pharm* 1992; 49: 2715-21.
 39. Adamcik BA, Stimmel GL. Use of physical assessment skills by clinical pharmacists in monitoring drug therapy response: attitudes and frequency. *Am J Pharm Educ* 1989; 53: 127-33.
 40. Madiha, Yang CQ, Sands CD, Ge WH. Evaluating B.S. Clinical Pharmacy Curriculum of China Pharmaceutical University (China) by comparing with PharmD Curriculum of Samford University (USA). *International Journal of Pharmacy Teaching and Practices (IJPTP)* 2014; 5: 944-948.
 41. Hussen DA, Alemu HM, Mohammednur MM, Raya MG, Hailu GS. Pharmacy practice in view of health professionals in Jimma University specialized hospital. *International Journal of Pharmaceutical Sciences and Research* 2012; 3: 576-582.
 42. Adepu R, Nagavi B G. General practitioners' perceptions about the extended roles of the community pharmacists in the state of Karnataka: A study. *Indian J Pharm Sci* 2006; 68: 36-40.
 43. Bourget S, Allenet B, Bedouch P, Bosson LJ, Calop J. Physicians' expectations towards pharmacy services on ward. *J Pharm Belg* 2007; 62: 130-4.
 44. Henrich N, Joshi P, Grindrod K, Lynd L, Carlo. Family physicians' perceptions of pharmacy adaptation services in British Columbia. *Can Pharm J* 2011; 144: 172-178.
 45. Luo XM, Tang JL, Hu YH, Li LM, Wang YL, Wang WZ, *et al.* How often are ineffective interventions still used in clinical practice? A cross-sectional survey of 6,272 clinicians in China. *PLoS One* 2013; 8: e52159.
 46. Teinila T, Kaunisvesi K, Airaksinen M. Primary care physicians' perceptions of medication errors and error prevention in cooperation with community pharmacists. *Research in Social and Administrative Pharmacy (RSAP)* 2011; 7: 162-179.
 47. Lacaria K, Balen RM, Frighetto L, Lau TTY, Naumann TL, Jewesson PJ. Perceptions of the professional pharmacy services in a major canadian hospital: A comparison of stakeholder groups. *Healthcare Quarterly* 2004; 7: 8-19.
 48. Wong FY, Chan FW, You JH, Wong EL, Yeoh EK. Patient self-management and pharmacist-led patient self-management in Hong Kong: A focus group study from different healthcare professionals' perspectives. *BMC Health Services Research* 2011; 11: 121.
 49. Zillich AJ, McDonough RP, Carter BL, Doucette WR. Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother* 2004; 38: 764-770.
 50. Punekar Y, Lin SW, Thomas J 3rd. Progress of pharmacist collaborative practice: status of state laws and regulations and perceived impact of collaborative practice. *Journal of the American Pharmacists Association* 2003; 43: 503-510.