Saudi Pharmaceutical Journal (2012) **20**, 203–210

King Saud University

Saudi Pharmaceutical Journal

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ORIGINAL ARTICLE

Hospital pharmacy practice in Saudi Arabia: Prescribing and transcribing in the Riyadh region

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Received 18 October 2011; accepted 2 November 2011
Available online 10 November 2011

KEYWORDS

Pharmacy services;
Formulary management;
Clinical practice;
Pharmacist consultation;
Drug information;
Medication use

Abstract *Purpose:* The purpose of this survey is to outline pharmacy services in hospitals on a regional level in the Kingdom of Saudi Arabia.
Methods: A modified-American Society of Health-System Pharmacists (ASHP) survey questionnaire as pertinent to Saudi Arabia was used to conduct a national survey. After discussing with the pharmacy directors of 48 hospitals in the Riyadh region over the phone on the survey's purpose, the questionnaires were personally delivered and collected upon completion. The hospital lists were drawn from the Ministry of Health hospital database.
Results: Twenty-nine hospitals participated in the survey giving a response rate of 60.4%. Approximately 60% of the hospitals which participated in the survey required prior approval for the use of non-formulary medications. About 83.3% of hospitals reviewed compliance with clinical practice guidelines and 72.7% hospitals reported that pharmacists are also actively involved in these activities. Pharmacists in more than 95% of hospitals provided consultations on drug information. A

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Peer review under responsibility of King Saud University.
doi:10.1016/j.jsps.2011.11.001

ELSEVIER **Production and hosting by Elsevier**

staff pharmacist routinely answering questions was the most frequently cited (74.1%) method by which objective drug information was provided to prescribers. Electronic drug information resources were available in 77.7% of hospitals, although internet use is not widely available to hospital pharmacists, with only 58.6% of hospitals providing pharmacist access to the internet. About, 34.5% of hospitals had computerized prescriber order entry (CPOE) systems with clinical decision-support systems (CDSSs) and 51.9% of the hospitals had electronic medical record (EMR) system. *Conclusion:* Hospital pharmacists are increasingly using electronic technologies to improve prescribing and transcribing of medications in Saudi Arabia.

1. Introduction

Hospital pharmacy services must provide pharmaceutical care efficiently and effectively to assure that patients receive the highest quality of care possible. Medication errors (ME) are very common (0.03–16.9%) in hospitals throughout the medication use process including prescribing and transcribing. The negative consequences of ME include but are not limited to increased length of hospital stay, increased costs, unwarranted discomfort, and increased morbidity and mortality. The Institute of Medicine (IOM) report in 2000 estimated that 44,000 to 98,000 patients die each year in the United States (US) because of a medical error and a large proportion (7000 deaths) of these are due to an ME (IOM, 2000). Medication errors harm at least 1.5 million people annually and add US$3.5 billion a year in extra hospital costs alone (IOMNA, 2006). The fundamental responsibility of a hospital pharmacy is to ensure that the medication use process including prescribing, transcribing, dispensing, administration, and monitoring are accurate and error free. Various ways to organize and deliver these services, and many new practices and technologies have been shown to improve their effectiveness and safety (Lai et al., 2007; Mahoney et al., 2007). These are usually delivered in the context of a general pharmacy structure and organization of the pharmacy, and are supported by training and education. Differences in practices could yield different patient outcomes. Several international pharmacy organizations have undertaken surveys to assess current practices in their country or region. These surveys assessed practices at different times and guided strategic initiatives.

In 2005, as part of the initial planning for the International Pharmaceutical Federation (FIP) Global Conference on the Future of Hospital Pharmacy, a survey was commissioned to better understand the current state of hospital pharmacy practice around the globe (Doloresco and Vermeulen, 2009). During this survey, the nature, scope, and breadth of hospital pharmacy practices were evaluated. The survey results indicated that the practice of hospital pharmacy differs from country to country and many nations face similar challenges, regardless of their population, location, or wealth. In addition, the European Association of Hospital Pharmacists (EAHP) surveyed its members on the status of the specialization in hospital pharmacy in their country at the beginning of 2010 (EAHP survey, 2010). Preliminary results show that specialized hospital pharmacy care is provided in 12 European Union (EU) member states serving 72% of the total population of the EU. Likewise, every two years, the hospital pharmacy in the Canada survey collects information about hospital pharmacy practices in their country. The report of this survey summarizes many important aspects related to clinical pharmacy, drug distribution, human resources, medication safety and technology. The results of their most recent survey suggest that the pharmacist's role as a clinical practitioner in Canada is clearly established in most hospital settings (Hospital Pharmacy in Canada, 2009/2010) and centralized unit dose systems were reported to be in use by 70% of all respondents. Vacancies for pharmacists still exist but the latest survey data suggest that the pharmacist manpower situation has improved considerably since the last report.

The country with the largest tradition of tracking and trending hospital pharmacy services is the United States. There were over 20 surveys in more than 40 years. Currently, the American Society of Health-System Pharmacists (ASHP) national surveys of pharmacy in hospital settings focuses on the role pharmacists play in managing and improving the medication use process (Pedersen et al., 2011). These surveys are organized according to six steps in the medication-use system: prescribing, transcribing, dispensing, administration, monitoring, and patient education. Each year, the survey focuses on two steps in the medication-use system. When combined, the most recent four surveys represent a composite picture of the current role that pharmacists play in managing and improving the medication-use system. The results of these surveys indicate that pharmacists contribute to improving prescribing and transcribing. Patient safety is now a priority for medication management (Pedersen et al., 2011) and pharmacists are also responding to changes in the healthcare system to find appropriate ways to improve medication use at prescribing and transcribing steps of the medication use system (Pedersen et al., 2008). The adoption of new technology is rapidly changing the philosophy of medication distribution and pharmacists are continuing to improve medication use at the dispensing and administration steps of the medication use process (Pedersen et al., 2009); pharmacists were significantly involved in monitoring medication therapy and were less involved in medication education activities (Pedersen et al., 2010).

Saudi Arabia is the largest state in the Middle East and, due to its oil wealth; the country is a major force in the Arab world (Walston et al., 2008). The country had a population of about 27.1 million in 2010 (Central Department of Statistics, 2010). The healthcare system in Saudi Arabia is developing rapidly in response to changing healthcare needs in the population arising from the adoption of increasing affluent lifestyles. Published studies assessing hospital pharmacy practice in Saudi Arabia are not available. While specific hospitals in Saudi Arabia are known to practice at international standards, the overall current practices are uncertain. Consequently in 2010, a project was designed in collaboration between King Saud University College of Pharmacy faculty, the Saudi Pharmaceutical Society (SPS) and the American Society of Health-System

Pharmacist (ASHP) to survey the current state of hospital pharmacy practice. The general purpose of this survey is to outline pharmacy services in hospitals on a regional level and to obtain information on a wide range of important areas, especially the safety and quality of the medication use process. Findings from this survey can be used by pharmacy practitioners looking for local data on key elements that can affect the safety and quality of the medication use process. This information can be utilized as a base for benchmarks internally within Saudi Arabia and externally to international survey outcomes, as well as track progress over time and help to identify opportunities for strategic initiatives and policies at a national level to improve practice.

This survey is still ongoing in different regions of Saudi Arabia. It is the first survey of its kind in the country. However, the time scale is longer than stipulated because our survey reviews all steps in the medication use system unlike the ASHP surveys, which focus yearly on two steps (Pedersen et al., 2008). In addition, there is a scarcity of data in different regions of the country, and this has motivated us to publish the outcomes of the survey in a stepwise manner. Hence, this will be the first report in the series and will focus on 2 steps of medication use process (prescribing and transcribing) in Riyadh hospitals.

2. Methods

Modified survey questionnaires were prepared as pertinent to Saudi Arabia in consultation with ASHP survey members by using their ASHP survey questions. The major domains of questions were general characteristics and medication use process (prescribing, transcribing, dispensing, administration, monitoring and patient education). Surveys were conducted by using methods similar to those of the ASHP survey (Pedersen et al., 2008, 2009, 2010, 2011). The survey details were discussed with pharmacy directors prior to finalization and the surveys were collected upon completion. Three attempted follow-ups were made within 3 months to declare non-responders. To increase the response rate, respondents were promised to receive a copy of the 2010 Saudi National Formulary (SNF) as an incentive. All hospitals in Riyadh city were included in the survey. Each booklet of the survey questionnaire was assigned a serial number. Data were entered into Predictive Analytics Software (PASW) Advanced Statistics version 18 (formerly called SPSS Advanced Statistics, SPSS Inc., Chicago, Illinois) licensed for King Saud University. The data are summarized using descriptive statistics.

In assessing the role of a pharmacist in prescribing and transcribing, the present study sought to describe the process of formulary system management, the availability and implementation of clinical practice guidelines, medication use evaluation activities, the extent of pharmacist consultations, the provision of drug information to prescribers, the evaluation of medication orders, the use of computerized prescriber order entry (CPOE) and electronic medical records (EMRs) systems, medication reconciliation of medication orders, and action taken to ensure accurate transcription of medication order.

3. Results

Overall, 48 hospital pharmacies approached, 29 responded to the survey, yielding a response rate of 60.4%. The characteristics of respondents' hospitals are presented in Table 1.

3.1. Formulary system management

Pharmacy directors indicated the extent of various formulary system management techniques used in their hospitals (Table 2). About 93% of directors responded to this question. Approximately 60% of hospitals required prior approval for the use of non-formulary medications and about 52% regularly evaluated prescriber adherence to medication-use policies. Moreover, 48% of hospitals used a therapeutic interchange policy, took steps to minimize duplication of therapeutically similar products, and regularly reviewed new therapeutic agents and therapeutic classes for addition to the formulary. More than 40% of hospitals used pharmacists' interventions to help monitor prescriber compliance with established medication use policies and regularly reviewed non-formulary medications.

3.2. Clinical practice guidelines

Over 65.4% of hospitals reported using clinical practice guidelines that include medications (Table 3). Furthermore, 63% of hospitals had pharmacists actively involved in the development and implementation of all evidence-based clinical practice guidelines that included medications.

3.3. Improved prescribing through medication-use activities

The majority of hospitals (56%) had a medication-use evaluation (MUE) program to monitor prescribing. Pharmacy directors also reported the extent to which hospitals undertook a variety of MUE activities to improve prescribing and the extent of pharmacists' involvement in these activities (Table 4).

Table 1 Size, ownership and accreditation of respondents' hospital.

Characteristics	Hospitals (n = 29)	
	n	(%)
Staffed beds		
> 50	2	(6.9)
50–99	4	(13.8)
100–199	7	(24.1)
200–299	3	(10.3)
300–399	3	(10.3)
400–599	4	(13.8)
⩾ 600	4	(13.8)
Missing-no response	2	(6.9)
Occupied beds		
> 50	4	(13.8)
50–99	4	(13.8)
100–199	6	(20.7)
200–299	3	(10.3)
300–399	1	(3.4)
400–599	3	(10.3)
⩾ 600	3	(10.3)
Missing-No Response	5	(17.3)
Ownership		
Government hospital	14	(48.3)
Private hospital	15	(51.7)
Accreditation		
Accredited	16	(55.1)

Table 2 Number (%) of hospitals using formulary system management techniques.

Characteristic	Hospitals ($n = 27$)	
	n	(%)
Minimal duplication of multisource products	13	(48.1)
Pharmacist interventions designed to help monitor prescriber compliance with established medication-use policies (MUP)	11	(40.7)
Education of prescribers regarding medication costs	7	(25.9)
Minimal duplication of therapeutically equivalent products	10	(37.0)
Therapeutic interchange policy	13	(48.1)
Substitution of therapeutically similar drug	7	(25.9)
Regular review of new therapeutic agents	13	(48.1)
Regular review of therapeutic classes	13	(48.1)
Regular review of non-formulary drugs	11	(40.7)
Regular evaluation of physician adherence to medication-use policies	14	(51.9)
Prior approval required for non-formulary product	16	(59.3)

Table 3 Percentage of hospitals with clinical practice guidelines (CPGs) that include medications and pharmacist involvement in their use.

Characteristic	Number of hospital respondents	Hospitals using CPGs	
		n	(%)
CPGs include medications	26	17	(65.4)
Pharmacists involved in CPGdevelopment and implementation	27	17	(63.0)

About 83.3% of hospitals reviewed compliance with clinical practice guidelines and 72.7% hospitals reported that pharmacists are also actively involved in these activities. Furthermore, 70.8% of hospitals tracked and monitored trends for pharmacists' interventions. Moreover, 68% of hospitals tracked and monitored the trends for adverse drug events and 64% routinely reviewed culture and sensitivity reports. Pharmacy directors were asked to indicate which type of consultations were provided by pharmacists in their hospital, how many consultations occurred each month, and if most (80% or more) of the pharmacists' recommendations were accepted by prescribers. Pharmacists at more than 95% of hospitals provided consultations on drug information (Table 5). Pharmacists also provided dosage adjustments consultations in approximately 79% of the hospitals and provided consultations on antibiotics in 69.6% of hospitals. The survey data indicated that the recommendations offered by pharmacists were mainly adopted by prescribers for this type of consultation. Consultations on pain management, pharmacokinetics and nutritional support were provided less frequently. Pharmacy directors were also asked on how their hospital provides objective drug information to prescribers (Table 6). A staff pharmacist routinely answering questions, was the most frequently cited method by which objective drug information was provided to prescribers (74.1%), followed by continuing education programs (48.1%) and availability of electronic drug information on the product (33.3%). Approximately 30% of hospitals provided information through newsletters/

Table 4 Number (%) of hospitals and pharmacist with medication-use evaluation activities to improve prescribing ($n = 29$).

Activity	Number of hospital respondents	Hospitals engaged in activity		Number of hospital respondents	Pharmacist actively involved in activity	
		n	(%)		*n*	(%)
Tracking and trending adverse drug events	25	17	(68.0)	22	14	(63.6)
Retrospective drug-use evaluations	22	12	(54.5)	19	8	(42.1)
Identifies problem-prone or high-risk therapies using pre-established criteria	23	12	(52.2)	21	9	(42.9)
Compliance with hospital clinical practice guidelines	24	20	(83.3)	22	16	(72.7)
Routine review of culture and sensitivity reports	25	16	(64.0)	22	9	(40.9)
Tracking and trending pharmacist interventions	24	17	(70.8)	21	13	(61.9)
Tracking and trending treatment failures	24	13	(54.2)	20	8	(40.0)

Percentages based on number of hospital respondents.

Table 5 Number (%) of hospitals with pharmacist consultations.

Type of consultation	Number of hospital respondents	Consultation provided by hospitals		Number of hospital respondents	⩾ 80% Adoption rate of pharmacist recommendation	
		n	(%)		*n*	(%)
Drug information	24	23	(95.8)	18	14	(77.8)
Dosage adjustments	24	19	(79.2)	16	10	(62.5)
Pharmacokinetics	22	6	(27.3)	17	1	(5.9)
Antibiotics	23	16	(69.6)	16	7	(43.8)
Nutrition support	22	8	(36.4)	18	3	(16.7)
Patient education	23	13	(56.5)	15	6	(40.0)
Pain management	21	4	(19.0)	16	1	(6.3)
Anticoagulation	22	12	(54.5)	16	5	(31.3)
Compliance and medical history	20	9	(45.0)	16	6	(37.5)

Percentages based on number of hospital respondents.

Table 6 Number (%) of hospitals using various methods for providing prescribers with objective drug information in the prescribing and transcribing steps of the medication use process ($n = 27$).

Characteristic	Hospitals ($n = 27$)	
	n	(%)
Staff pharmacists routinely answer questions	20	(74.1)
Newsletters/bulletins	8	(29.6)
Continuing education programs	13	(48.1)
Disseminating results of medication-use evaluation	5	(18.5)
Electronic drug information product	9	(33.3)
Formal drug information center or service	8	(29.6)
Pharmacist attending rounds	7	(25.9)

bulletins and formal drug information center or service. Less frequently utilized mechanisms to provide objective drug information to prescribers included pharmacists attending rounds (25.9%) and disseminating the results of MUE activities (18.5%). Electronic drug information resources were available in 77.7% of hospitals, 44.4% had electronic availability only in the pharmacy department and 33.3% only on the hospital networks, and 22.2% hospitals had no electronic source of drug information (Table 7). The internet is not widely available to hospital pharmacists, with only 58.6% of hospitals providing pharmacist access to the internet.

3.4. Pharmacy and health informatics

About 34.5% of hospitals had a CPOE system that incorporates CDSSs (Table 8). The survey responses showed that 51.9% of hospitals had an EMR system (Table 8).

3.5. Medication reconciliation

When pharmacy directors were asked: 'Does your hospital perform medication reconciliation upon admission, transfer between floors and discharge of patients?' Approximately, 48% of hospital pharmacy directors reported that their hospital performed medication reconciliation (Table 8).

Table 7 Number (%) of hospitals that provide electronic drug information and internet access ($n = 27/29$).

Electronic source availability	Hospitals	
	n	(%)
Pharmacy department only ($n = 27$)	12	(44.4)
Hospital network only ($n = 27$)	9	(33.3)
None ($n = 27$)	6	(22.2)
Internet access for pharmacists ($n = 29$)	17	(58.6)

3.6. Transcribing

Electronic receipt through CPOE was the most common way for hospital pharmacy department to receive medication orders and was used by 41.4% of hospitals. A copy of the original handwritten order and the original order itself was a common practice and used by 34.5% of hospitals (Table 9). Fax was used by 17.2% of hospitals, followed by digital image capture (10.3%).

4. Actions to ensure accurate transcription of medication orders

A majority of hospitals took one or more of five actions to ensure accurate transcription of medication orders: (i) use of standardized prescriber order forms, (ii) requiring all oral orders to be read back (including spelling the drug name, dose, dosage form, and name of the patient), (iii) using special transcribing procedures for high-risk drugs, (iv) clarification of illegible orders before transcription or entry into MARs, (v) requiring prescribers to countersign all oral orders (Table 10). Action taken less frequently included having an electronic MAR, reconciliation of MARs and pharmacy patient profiles at least daily, having a second nurse double check written changes to the MAR, having an integrated CPOE with the pharmacy computer system, requiring prescribers to print or type all medication orders when CPOE is not available, and pharmacy sending a printed label to be placed on the MAR.

5. Discussion

The present survey ''National pharmacy practice in hospital settings'' focuses on practices and technologies for managing and improving the medication-use system. To our knowledge,

Table 8 Number (%) of hospitals using technology in the prescribing step of the medication use process (n = 27/29).

Characteristic	Hospitals	
	n	(%)
EMR (n = 27)	14	(51.9)
CPOE systems with CDDS (n = 29)	10	(34.5)
Medication reconciliation (n = 27)	13	(48.1)

EMR: electronic medical record, CPOE: computerized prescriber order entry, CDDS: clinical decision-support system.

Table 9 Number (%) of hospitals with primary method by which their pharmacy receives medication orders (n = 29).

Characteristic	Hospitals (n = 29)	
	n	(%)
Copy of original handwritten order	10	(34.5)
Original handwritten order (copy stays in chart)	10	(34.5)
Electronically through CPOE	12	(41.4)
Fax	5	(17.2)
Digital image capture (e.g., Pyxis® Connect)	3	(10.3)
Other	1	(3.4)

Table 10 Number (%) of hospitals undertaking actions to ensure accurate transcription of medication orders (n = 27).

Characteristic	Hospitals (n = 27)	
	n	(%)
Standard physician order forms are used	24	(88.9)
Verbal orders must be countersigned	9	(33.3)
All verbal orders must be read back, including spelling the drug name, dose, dosage form, and name of patient	14	(51.9)
If CPOE not available, physicians must print/ type all medication orders	4	(14.8)
Any illegible order is clarified before transcription/entry onto MARs	11	(40.7)
MARs and pharmacy patient profiles are reconciled at least daily	6	(22.2)
Have electronic MAR	7	(25.9)
Pharmacy sends label to be placed on MAR	3	(11.1)
Second nurse double checks written changes to MAR	6	(22.2)
Special transcribing procedures are used for high-risk drugs	13	(48.1)
Have CPOE with interface to pharmacy computer system	4	(14.8)

CPOE = computerized prescriber order entry, MAR = medication administration record.

it is the first of its kind in the Middle East. The study was conducted in consultation with the ASHP survey group. Even though our survey was only performed in Riyadh, capital of Saudi Arabia in the central region, total response rate was 60% and compares favorably with response rates of 42% and 29% for similar studies conducted by the ASHP survey group in the US in 2007 and 2010 respectively (Pedersen et al., 2008, 2011).

Non-formulary medications (NFMs) use is associated with higher risk of medication errors, additional costs, and possibly safety concerns. In 2009, Pummer and coworkers demonstrated that 28% of all orders entered as non-formulary medications had a prescribing error (Pummer et al., 2009). Our survey showed that 59.3% of hospitals adhered to their non-formulary medication use policy and 52% adhered to their medication use policies. Both ASHP surveys conducted in 2007 and 2010 showed that only 30% of US hospitals regularly used such policies (Pedersen et al., 2008, 2011). Institutional policies can support compliance with formulary systems and deal with such issues.

With growing medication costs, it is imperative to control drugs cost without compromising the quality medical care. In the US, within one year from 2008 to 2009, total prescription drug expenditure increased by 5.2% with total spending rising from $284.8 billion in 2008 to $299.5 billion in 2009 (Doloresco et al., 2011). In a provincial drug benefit program in British Columbia, Canada, applying a therapeutic substitution policy for proton pump inhibitors was shown to save at least 2.9 million Canadian dollars as a result of the policy change within nine months of 2006 (Schneeweiss et al., 2006). Our survey suggests that only 48% of hospitals in Riyadh regularly review the use of new therapeutic agents, therapeutic interchange policy, or take steps to minimize duplication of similar therapeutic products. ASHP surveys conducted in 2007 and 2010 showed 80% of US hospitals used such policy and procedure regularly to minimize duplication of multisource product (Pedersen et al., 2008, 2011). Applying such methods may provide enormous cost savings to hospitals and improve the quality of medical care.

Clinical practice guidelines (CPGs) have been shown to improve processes of care, clinical outcomes and quality medical care (Grimshaw and Russell, 1993; Iliadis et al., 1999). Two-thirds (67%) of our survey responders claimed that CPGs that included medications were used in their hospitals. These figures are similar to those previously reported in an Australian study and by the ASHP, which showed that approximately 65% of responders claimed that CPGs were used in their clinical area of hospitals (Scott et al., 2003; Pedersen et al., 2011).

MUE is a performance improvement method that focuses on evaluating and improving the medication-use processes with the goal of optimizing patient outcomes (Nadzam, 1991). ASHP surveys conducted in 2001 and 2008 indicated that 77.9% and 72% of the hospitals had MUE programs designed to improve prescribing whereas our survey data showed a much lower use (56%) of this method in Riyadh hospitals (Pedersen et al., 2001, 2009).

The definitive goal of pharmacists providing medication consultation services is to improve patients' overall health outcomes. The positive impact of pharmacist consultation on outcomes for specific diseases, such as hypertension, heart failure and anticoagulation therapy has been demonstrated (Beney et al., 2010). For this survey, pharmacist consultation is defined as consisting of at least a review of patient medical records or clinical laboratory determined serum drug concentrations and an oral or written follow up with the prescriber. The current survey data suggests that almost all hospital pharmacists (96%) provide some kind of drug consultation including dosage adjustment. However, this figure is much greater than that for the ASHP national survey (Pedersen et al., 2001, 2008, 2011). This study also highlights the frequently used methods for providing objective drug information to the prescriber as routinely answering questions (74%), continuing education programs (48%) and electronic drug information resources (33%). This is in concurrence with Pedersen et al. (2001, 2008, 2011) ASHP national survey results.

CPOE and EMR provided the framework for improvements in patient safety and in the timeliness of care (Mekhjian et al., 2002). An EMR system is a useful technology for managing information and improving prescribing. A well-designed CPOE system has the potential to reduce medication-related errors due to the elimination of handwritten orders, improvement in communication between health care providers, and standardization of patient care (Lai et al., 2007). Our survey highlights that half of the hospitals in Riyadh had EMR system and medication orders were received through CPOE more commonly.

6. Conclusion

Hospital pharmacists in Saudi Arabia are increasingly utilizing technological and non-technological performance improvement initiatives to advance the practice of pharmacy in hospital settings with regard to prescribing and transcribing of medications.

Acknowledgement

The authors would like to thank the Saudi Pharmaceutical Society (SPS) and the American Society of Health-System Pharmacist (ASHP) for their support. They also would like to thank Ted Morton Pharm.D., BCPS(AQ-ID), Associate Professor of Clinical Pharmacy, King Saud University College of Pharmacy, Riyadh, Saudi Arabia for his review of survey questionnaire as pertinent to Saudi Arabia.

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