

Knowledge about the availability of the pharmacist in the Nuclear Medicine Department: A questionnaire-based study among health-care professionals

Abstract

Objective: The objective of this study was to analyze the knowledge about the availability of the pharmacist in the nuclear medicine department among health-care professionals through a prospective cohort study.

Methods: A total of 741 health-care professionals participated in the study by answering 10 simple questions about the role of the pharmacist in the nuclear medicine department and the availability of pharmacist in the nuclear medicine department. An online questionnaire system was used to conduct the study, and participants were invited to participate through personal communications and by promoting the study through social websites including Facebook, LinkedIn and Google (including Gmail and Google+). The study was conducted between April 2013 and March 2014 using the <http://www.freeonlinesurveys.com/> Web server. Finally, the data provided by 621 participants was analyzed. Group frequency analysis was performed using Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc. USA).

Results: The participants were from Malaysia, India, Pakistan, Sri Lanka, Bangladesh, UAE and Nepal. In total, 312 (50.2%) female health-care professionals and 309 (49.8%) male health-care professionals participated in the study. Of the 621 participants, 390 were working in hospitals, and 231 were not working in hospitals. Of the participants who were working in hospitals, 57.6% were pharmacists. The proportion of study participants who were aware of nuclear pharmacists was 55.39%. Awareness about the role of the pharmacist in nuclear medicine was poor.

Conclusion: The role of the pharmacist in a nuclear medicine unit needs to be highlighted and promoted among health-care professionals and hence that the nuclear medicine team can provide better pharmaceutical care.

Key words:

Nuclear medicine, nuclear pharmacist, radiopharmaceuticals

Introduction

The discovery of X-rays in 1895 by Wilhelm Conrad Roentgen is one of the important milestones in the history of physics and medicine, and the concept of the radioactive maker was introduced in 1913 by Georg de Hevesy.^[1] Radiopharmaceuticals are unique medicinal formulations containing radioisotopes that are used for diagnostic and therapeutic purposes.^[2] Radiopharmaceuticals are most commonly dispensed by the nuclear physicist and radiopharmacist or pharmacist in the nuclear pharmacy unit

in Asian countries. In general radioisotopes or isotope-tagged diagnostic agents are dispensed by nuclear physicists in Asia. In developed countries, the role of the pharmacist in the radiology unit is significant in terms of formulation and quality control and describing the appropriate use of radiopharmaceuticals. Wolf and Tubis identified three areas where radiopharmacists are needed, including in-house preparation and quality control of radiopharmaceuticals, formulation of radiopharmaceuticals

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that are not commercially available and fulfilling regulatory requirements in the Nuclear Medicine Unit/Radiology Department.^[3] Radiopharmacists produce 2000–10,000 doses every year, and quality control and formulation of these doses according to the regulatory guidelines without the contributions of pharmacists is impossible.^[4] The need for nuclear pharmacists is increasing every day in developed countries, and their main function is to operate nuclear pharmacy domains according to the American Pharmaceutical Association's Nuclear Pharmacy Practice Guidelines and to provide better pharmaceutical care to patients.^[5]

In Southeast Asia, the pharmacy curriculum focuses mainly on industrial aspects. Every day, the need for pharmacists in public health care is increasing greatly. Pharmacy is a product- and patient-oriented profession, and pharmacists must fulfill the WHO concept of 'seven-star pharmacists' to provide better service to the public and to their profession.^[6,7] Nuclear pharmacists are members of nuclear medicine teams, specializing in the procurement, compounding, quality control, dispensing, distribution and development of radiopharmaceuticals.^[8] In addition, nuclear pharmacists provide information related to drugs and give advice about health safety issues and patient care.^[9]

In developed and developing countries, the role of pharmacists is expanding beyond providing clinical expertise regarding the use of medications to coordinating patient-controlled medical homes.^[10,11] Chisholm-Burns *et al.*, studied the effects of involving pharmacists in direct patient care, and they suggest that pharmacists can provide favorable patient care by incorporating pharmacists as members of health-care teams providing direct patient care.^[12] The pharmacist is one of the three most significant health-care professionals in the USA, and he or she can play a role in providing better patient-centred pharmaceutical care.^[13]

Radiopharmaceuticals are mostly used for diagnostic and treatment purposes. There is an inherent risk faced by the subject of the use of wrong radiopharmaceuticals. There are no quantitative data on the rate of mistakes, awareness about the use of radiopharmaceuticals and availability of nuclear pharmacists in nuclear medicine units. Hence, the present study was planned to analyze knowledge about the availability of pharmacists in nuclear medicine units among health-care professionals, through a prospective cohort study.

Methods

The study was approved by the Institute Ethics Committee of AIMST University (AU Human and Animal Ethics Committee 3/FOP/2014) and registered with National Medical Research Register (NMRR-13-1596-16802). The study was conducted among health-care professionals in Asia. An online questionnaire system was used for the study, and participants were invited through personal communications and by promotion of the study through social websites including Facebook, LinkedIn and Google (including Gmail and Google+). The study was conducted between April 2013 and March 2014 using the <http://www.freeonline surveys.com>.

com/Web server. Informed consent information was placed on top of the survey page. Anyone who was not interested in the survey could simply quit the web page. The study was conducted according to the declaration of Helsinki.

A total of 741 health-care professionals participated in the study. They answered nine simple questions about the role of the pharmacist in the nuclear medicine department and the availability of pharmacists in nuclear medicine departments [Table 1]. The responses of those participants from Asia who were associated with the pharmaceutical and health-care system (pharmacists, physicians, paramedical professionals and members of the administrative staffs of hospitals) were included in the study. The responses of participants from outside Asia and those not related to pharmaceutical education, hospital administration and pharmaceutical care were excluded from the study. The responses of 120 participants were excluded from those selected for analysis because they did not meet the inclusion criteria. The first question of the survey was about the demographic details of the participant: Gender, age, educational qualification, and profession. Questions 2–6 were related to the availability of the pharmacist in the nuclear medicine unit, and the last three questions were related to knowledge about the role of the pharmacist in the nuclear medicine unit.

Statistical analysis

The values were expressed as actual numbers and the corresponding percentages. Group frequency analysis was carried out using Statistical Package for the Social Sciences (SPSS) version 16 (SPSS Inc. USA).

Results

The contributions of social media in promoting the study are shown in Figure 1.

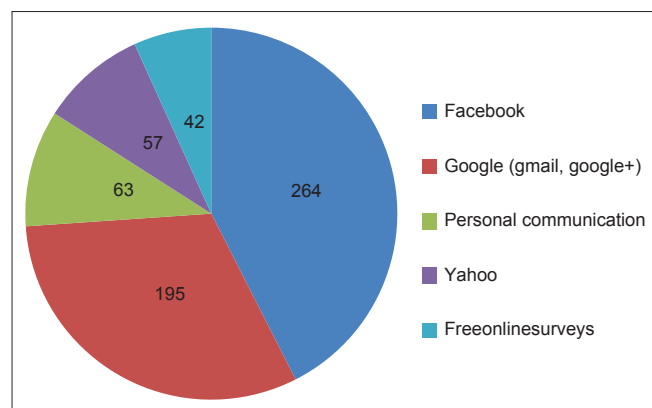
The participants were from Malaysia, India, Pakistan, Sri Lanka, Bangladesh, UAE and Nepal. The number of female health-care professionals who participated was 312 (50.2%), and the number of male professionals was 309 (49.8%). The mean age of the study participants was 34 ± 0.33 years (mean \pm standard error of the mean). Of the 621 participants who were selected, 390 worked in hospitals, and 231 did not work in hospitals. Of the participants who worked in hospitals, 57.6% were pharmacists and 11.1%, 12.4%, 7.9%, 6.9% and 4.0% were physicians, members of the administrative or paramedical staff of the hospital, laboratory technicians and others (social workers, hospital data entry operators, etc.), respectively. The demographic details and geographical distribution of the participants are summarized in Table 2. The majority of the people working in hospitals were from Malaysia, and the next largest group was from India [Table 3].

In general, 55.39% of the participants are aware of nuclear pharmacists. Awareness about the role of the pharmacist in nuclear medicine was poor. Only 29.63% of the participants are aware of the use of radiopharmaceuticals in the health-care system. This highlights the need to conduct awareness programs aimed at educating all health-care professionals

Table 1: Questionnaire completed online by each of the participants enrolled in the study

Question number	Question	Answer
1	Personal details Name (optional) Gender* Professional qualification* Job profile/nature of the job* Country*	
2	Are you aware about nuclear pharmacists?*	Yes/no/I don't know
3	Are you working in a hospital?	Yes/no
4	Does your hospital have radiology/radiodiagnosis department? If yes, please mention the size of the hospital. If no, please poll option "NA"	< 500/501-1000/1001-2000/> 2000/NA
5	Does your institute/university/hospital have a nuclear pharmacy resource center?*	Yes/no
6	Do you have nuclear pharmacists in your hospital?	Yes/no/NA
7	How can pharmacists provide better radiopharmaceutical care?*	Formulation and quality control/ patient safety/drug information/others
8	Are you adequately aware about the use of radiopharmaceuticals in the health-care system?*	Yes/no
9	If you have any comments about nuclear pharmacists, please enter them in the given text box	

*Compulsory field to be filled

**Figure 1: Sources of online promotion**

on the role of pharmacists in nuclear medicine. Apart from formulation and quality control, pharmacists have a role in patient safety, education and providing drug information. The proportion of participants who were aware that pharmacists can play a better role in the formulation was 91.30%. Many of the participants were not aware of the concept of "pharmacist towards patient". Only 54 of the 621 participants are aware of the role of the pharmacist in patient safety, counseling and providing information related to drugs [Table 4].

Discussion

Pharmacists play a number of essential roles in the health-care system. Half of the participants in our study are aware of nuclear pharmacists, but only 29.63% of the participants are aware of the use of radiopharmaceuticals in the health-care system. Pharmacists are widely perceived as formulation chemists, but they have an essential role in the health-care system. Most of the participants were not aware of this role. This situation needs to be changed by promoting or creating awareness about the role of pharmacists in industries, communities and hospitals.

Participants from Southeast Asian countries identified pharmacists as dispensing chemists or formulation chemists. Most of the participants were from the health-care sector, and they were not aware of the role of pharmacists in clinical setups. The pharmacy curriculum has also been designed to meet industrial requirements. Khan reports that the Southeast Asian countries need major changes in the pharmacy curriculum to fulfill current clinical needs.^[14]

In 2012, Beach *et al.* underscored the importance of integrating nuclear medicine and pharmacy teams. The pharmacist or pharmacy team member must acquire knowledge about nuclear medicine procedures and the special requirements of radioactive materials. Similarly, nuclear physicists need to learn about pharmacy operations and management. Beach *et al.* also indicated that collaborative efforts between pharmacy and nuclear medicine teams help achieve compliance and improve quality control systems and safe use of radiopharmaceuticals.^[15]

Shaw and Ice (2000) also drew conclusions about the role of the pharmacist in nuclear medicine. They state that the services of the pharmacist in nuclear medicine unit help patients and nuclear medicine personnel and ensure the quality of services in the health-care system.^[16]

Conclusions

The need for the pharmacist's hand in the health-care system is growing daily around the world, and the use of radioactive substances in diagnosis and treatment is also increasing every day. The pharmacist's role in managing radioactive substances is very important in various aspects of formulation, quality control, patient safety and counseling. The role of the pharmacist in nuclear medicine unit needs to be highlighted and promoted among healthcare professionals. Since a pharmacist has complete knowledge about formulation, quality control of

Table 2: Demographical details of study participants

	Bangladesh	India	Malaysia	Nepal	Pakistan	Sri Lanka	UAE	Total (%)
Gender								
Male	8	188	92	0	10	9	2	309 (49.8)
Female	8	74	214	1	6	7	2	312 (50.2)
Total (%)	16 (2.6)	262 (42.2)	306 (49.3)	1 (0.2)	16 (2.6)	16 (2.6)	4 (0.6)	621 (100)
Educational qualification								
Pharmacy	9	153	186	0	7	1	2	358 (57.6)
Medicine	6	31	26	1	2	1	2	69 (11.1)
Health-care profession	0	38	21	0	5	13	0	77 (12.4)
Hospital administration	1	19	28	0	1	0	0	49 (7.9)
Laboratory technician	0	17	26	0	0	0	0	43 (6.9)
Others	0	4	19	0	1	1	0	25 (4.0)
Total (%)	16 (2.6)	262 (42.2)	306 (49.3)	1 (0.2)	16 (2.6)	16 (2.6)	4 (0.6)	621 (100)
Profession								
Working in hospital	9	130	225	1	12	10	3	390 (62.8)
Not working in hospital	7	132	81	0	4	6	1	231 (37.2)

Table 3: Analysis of occupational details of participants

Size of hospital	Bangladesh	India	Malaysia	Nepal	Pakistan	Sri Lanka	UAE
Professionals working in hospitals							
< 500	8	73	185	1	7	9	2
501-1000	1	31	31	0	4	0	1
1001-2000	0	11	5	0	1	0	0
> 2000	0	15	4	0	0	1	0
Sub-total	9	130	275	1	12	10	3
Professionals not working in hospitals							
NA	7	132	81	0	4	6	1
Total	16	262	306	1	16	16	4

Table 4: Mean score of knowledge and awareness of Asian participants regarding nuclear pharmacists

Question number	Question	Response	Distribution of results						Total (%)	
			Bangladesh	India	Malaysia	Nepal	Pakistan	Sri Lanka		UAE
2	Are you aware about nuclear pharmacists?	Yes	7	118	207	1	6	2	3	344 (55.39)
		No	9	111	80	0	9	13	1	223 (35.91)
		NA	0	33	19	0	1	1	0	54 (8.70)
3	Are you working in a hospital?	Yes	9	130	225	1	12	10	3	390 (62.80)
		No	7	132	81	0	4	6	1	231 (37.20)
4	Does your hospital have a radiology/ radiodiagnosis department?	Yes	7	109	178	0	10	6	2	312 (50.24)
		No	9	153	128	1	6	10	2	309 (49.76)
5	Does your institute/university/hospital have a nuclear pharmacy resource centre?	Yes	1	57	40	0	5	1	1	105 (16.91)
		No	15	205	266	1	11	15	3	516 (83.09)
6	Are there nuclear pharmacists in your hospital?	Yes	0	0	30	0	0	0	0	30 (4.83)
		No	1	17	0	0	0	0	0	18 (2.90)
		NA	15	245	276	1	16	16	4	573 (92.27)
8	Are you adequately aware about the use of radiopharmaceuticals in the health-care system?	Yes	7	72	97	0	4	1	3	184 (29.63)
		No	9	190	209	1	12	15	1	437 (70.37)
7	How can pharmacists provide better radiopharmaceutical care?	Formulation and quality assurance	15	241	276	0	16	15	4	567 (91.30)
		Patient safety	0	8	14	0	0	1	0	23 (3.70)
		Drug information	1	13	16	1	0	0	0	31 (4.99)

pharmaceutical substances, patient education and patient counseling, pharmacist can provide better pharmaceutical

care to patients along with other nuclear medicine team members.

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