

Original Article

AN EXPLORATORY STUDY TO ASCERTAIN THE NEED OF RADIOPHARMACIST IN SRI LANKA

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ABSTRACT

Objective: Implementation of radiopharmacy is one of the advancements in field of pharmacy. The aim of this study is to evaluate the need of radiopharmacists in Sri Lanka, by exploring the awareness of patients about radiopharmaceuticals and as well as perception of healthcare professionals and future healthcare practitioners towards radiopharmaceuticals.

Methods: A total of 34 patients were interviewed who were receiving radiopharmaceuticals for their treatment. Moreover, an interview-administered questionnaire was used to explore the perception of healthcare professionals and undergraduate students.

Results: A total of 9 males and 25 female patients were included in the study. Slightly less than half (46%) of patients were educated up to O-Level. A large majority (82%) of patients had knowledge on their disease conditions. Similarly, large number (88.24%) of patients reported awareness about the safety measures which are needed to be followed. Within the interview setting, patients expressed their inclination towards more information about their drug use. In terms of exploring the perception, around three-fourth (75%) of respondents agreed to have a radiopharmacist for proper handling processes, educating the patients and for assisting doctors and nurses. Around 90% of respondents urged on the importance of radiopharmacist in Sri Lanka and strongly emphasized on patient's education about their radiopharmaceuticals.

Conclusion: Gaps were identified regarding patient awareness about the use of their radiopharmaceuticals. Interestingly all the respondents showed willingness towards the concept of a radiopharmacist in Sri Lanka.

Keywords: Radiopharmacist, Sri Lanka, Radiopharmaceuticals.

INTRODUCTION

The resurgence of nuclear medicine by way of molecular targets is a specific deciding factor of the disease and has invoked superior demand for basic sciences and health sciences experts. With the inception of new nuclear entities, there is a need of interdisciplinary teamwork which encompasses not only molecular and cellular biologists but also synthetic and radiopharmaceutical chemists. The maintenance of safe and effective contemporary nuclear-based research in different clinical facilities requires radiopharmacists [1]. The field of pharmacy is evolving continuously and with the recent shift in the trend of pharmacists' responsibilities from a dispenser to a caregiver it is necessary that pharmacy professionals keep themselves knitted and aligned in their professional advancements. Implementation of radiopharmacy is one of the advancements in pharmacy profession [2].

Across the globe, non-communicable diseases (NCD) are the leading causes of mortality along with continuous upsurge in these diseases [3]. There were more than 7.6 million deaths from cancer in 2008 and out of which 70% were from middle and low-income countries [3]. It is reported by the Ministry of Health, Sri Lanka that 43.6% of deaths in Sri Lanka were due to cancer in 2012 comparing to the previous statistics of 27.9% in 1985; therefore shows a worrisome rise [4] but the emergence of new diagnostic and treatment modalities in nuclear medicine raises the need of a radiopharmacist [5]. In developed countries, the practice of radiopharmacy is already established. On the contrary in developing countries the implementation and development of radiopharmacy varies up to certain extents. The development of nuclear pharmacy as a specialty area is followed by the recognition of the development of nuclear medicine as one specialty by the American Medical Association [6]. Nuclear pharmacy seeks to improve and promote health through the safe and effective use of radioactive drugs not only for diagnosis but also as a therapeutic modality [7]. According to the statistics of the National Cancer Institute (NCI) of Sri Lanka, during 2006-2008 a total of 1,11377 patients were admitted at NCI for treatment and investigations [8].

Literature review

An article by Callahan in 1996 [9] emphasized the role of the commercial nuclear pharmacy. In terms of future practice of nuclear medicine Callahan [9] reported that this will continue to increase due to mounting pressures within health care institutions thereby reducing the manpower, increase cost-effectiveness and to seek outside vendors for many services. Callahan [9] highlighted that nuclear medicine practitioners will pin their hopes to commercial nuclear pharmacies to meet a larger portion of their radiopharmaceutical needs and also for value added services, such as education and research and development [9].

A scientific review was published describing the importance of radiopharmacy in hospital practice [10]. It was shown that the role of the radiopharmacist is essential. It was concluded in the scientific review that radiopharmacist is important to guarantee the quality of the radiopharmaceuticals which are prepared in radiopharmacy. Guilloteau and colleagues cited that having a radiopharmacy is useful to develop new diagnostic methods by preparing new products for research [10]. In 1996 Rhodes and associates conducted a survey among the radiopharmacists to determine the percentage of time they spent in clinical activities [11]. The survey reported increased needs of clinical activities [11]. It was reported that radiopharmacists spent about 17.2% of their time in clinical activities; provided they practice in an institutional setting [11]. Another recently published research by Beach and associates [12] evaluated safe and quality use of nuclear medicine. A collaborative team can blend resources from both the specialties (nuclear medicine and pharmacy) to accomplish compliance and make expansions in safety [12].

Another study reported that many organizations which exercise nuclear medicine management take choices on radiopharmaceuticals without any oversight from pharmacy [13]. It was reported that the pharmacy director may need to address a number of specific issues with radiopharmaceuticals [13]. The study also highlighted that pharmacist should contribute in procurement, storage and handling, review of medication order as doing for all

other medicines [13]. The author suggested that the management of radiopharmaceuticals can be accomplished with a collaborative approach with the pharmacist for optimization in quality and safety [13]. In a doctoral dissertation on the quality assurance of radiopharmacy in selected Gauteng Academic Hospitals in South Africa, Qatayan in 2010 [14] reported that the chief radiographer is responsible for the radiopharmacy unit and in one of the hospitals the responsibility is shared with the medical physicist [14]. The study concluded that one deficit which both hospitals shared is in terms of documentation and record keeping. It was also highlighted in the study that neither hospital has a radiopharmacist in charge of the radiopharmacy unit [14]. Dondi and associates in 2011 accentuated trends in nuclear medicine in the developing world [15]. It was emphasized that the global expansion of nuclear medicine practice is needed in the management of chronic diseases and training in nuclear medicine should be developed in Asian countries [15]. Dondi and associates also highlighted that in most of the developing region there is a lack of precise training programs for nuclear medicine professional which not only includes physicians and physicists but also radiopharmacists and technologists [15]. To be precise, it is pertinent to note that in all the above cited research and review studies not even a single one highlighted the need of the pharmacist in the eyes of patients and practitioners and future practitioners alike. In the backdrop of this the current research is aimed to explore the need of radiopharmacist.

MATERIALS AND METHODS

Study design

This study comprised of two components which include interviewing the patients who were receiving radiopharmaceuticals followed by a self-administered questionnaire to healthcare practitioners and future healthcare practitioners. In the first part of the study patients who were receiving radiopharmaceuticals for their treatment last three months were interviewed in order to assess their awareness about radiopharmaceuticals. The study was conducted in National Cancer Institute (NCI), Maharagama. A sample of 35 patients was recruited in the study as they were only receiving treatment during the duration of study. The inclusion criteria comprise of those who were receiving radiopharmaceuticals or either received radiopharmaceuticals for their treatment and generally visits for follow up to the hospital. Those patients who were not willing to participate and unable to communicate were excluded from the study.

The second part was a questionnaire-based study conducted among healthcare professionals and undergraduate students to explore their perception towards the need of radiopharmacist. A convenience sample of 25 physicians, 25 hospital pharmacists, and

25 nurses in the hospital was recruited who were present at the time of execution of study. A convenient sample of undergraduate students of pharmacy and radiography departments, University of Peradeniya was also recruited to evaluate the perception of future healthcare practitioners.

Data collection instrument

The questionnaires were formulated on the basis of previously published literature and were subjected to face validity and content validity. It was then sent to five academics experts in the field. Their comments and suggestions were incorporated to the survey instruments. The questionnaires included questions on demographics, knowledge about radiopharmaceuticals related to the drug, dosage, precautions, and side effects. The questionnaire was then subjected to pilot study to 10 patients receiving radiopharmaceuticals, 5 doctors, and 10 students of pharmacy and allied health sciences students.

In the current research, patients were interviewed who undergo radioiodine treatment in NCI from May 2013-July 2013. The data were collected only from 34 patients; as in NCI only 5 doses of radioiodine are used per week (1 dose- 100mCi). Some patients received double doses (200mCi). Therefore, 3-5 patients were interviewed per week. Generally patient was sampled from the radiology unit at NCI.

Ethics

Since this study involves human subjects, ethical approval was sought for the execution of this study. This was obtained from the Ethics Committee, Faculty of Allied Health Sciences University of Peradeniya. A written informed consent was also sought from all the recruited participants. The participants were assured of their confidentiality. The permission to collect data was taken from the Deputy Director, National Cancer Institute (NCI) of Sri Lanka. Verbal consent was also sought from healthcare professionals and undergraduate students.

Data analysis

Data was entered and analyzed using statistical software (SPSS), version 18. Descriptive and inferential statistics were applied. Chi square was used to compute the association between the independent and dependent variables.

RESULTS

A total of 34 patients (males; 26.47%; females 73.53%) were recruited. Most of the patients were Sinhalese (64.71%) followed by Muslims (23.53%) and Tamils (11.76%). For detailed demographics please refer to table 1.

Table 1: Demographic characteristics of patients

Characteristics	Frequency	Percentage (%)
Age range		
18-30	05	14.70
31-43	07	20.60
44-56	12	35.29
57-69	10	29.41
Gender		
Male	09	26.47
Female	25	73.53
Ethnicity		
Sinhala	22	64.71
Muslim	08	23.53
Tamil	04	11.76
Education Level		
Primary	15	44.10
Up to O level	16	47.06
Up to A level	01	2.94
University level	02	5.90
Diagnosis known to patient		
Yes	28	82.35
No	06	17.65

Awareness of patients regarding radiopharmaceuticals

In terms of awareness of patients regarding their radiopharmaceuticals slightly more than one-fourth of the patients (n=30; 88.24%) knew about the safety measures need to be considered after taking their medicines. More than three-fourth of the patients (n=32; 94.12%) reported that they never discussed with the healthcare professional about their medicines. For detailed results please refer to table 2.

Awareness of healthcare professionals about radiopharmacist

In terms of exploration of the awareness of healthcare professionals about radiopharmaceuticals and as well as their opinions on the need of radiopharmacist, there were 25 pharmacists, 25 nurses and

24 doctors being recruited in the current research. Demographic characteristics of healthcare professionals are shown in table 3.

Awareness about radiopharmaceuticals among healthcare professionals

More than half of the respondents (n=55; 74.3%) agreed that radiopharmaceuticals are widely used for the diagnosis and therapy and they are one of the reasons for radiation contamination if not handled properly. Nearly all the respondents agreed to follow safe disposal.

Table 4 represents outcomes of items in awareness about radiopharmaceuticals with respect to independent variables. None of the items shows statistical significant value with respect to independent variables.

Table 2: Awareness of patients regarding their radiopharmaceuticals

Item	Yes	No	Age	Gender	Ethnicity	Disease
Do you know the precautions to be taken before administering the drug?	13 (38.23%)	21 (61.77%)	0.302	0.221	0.654	0.123
Do you know the way of excretion of the drug from your body?	13 (38.23%)	21 (61.77%)	0.312	0.432	0.322	0.123
Do you know about the safety measures to be considered after taking the drug?	30 (88.24%)	4 (11.76%)	0.501	0.987	0.432	0.987
Do you know what the side-effects are after taking the drug?	12 (35.29%)	22 (64.71%)	0.442	0.567	0.123	0.123
Did you get any advice regarding the drug which you are receiving, from the health professionals?	28 (82.35%)	6 (17.64%)	0.321	0.231	0.123	0.432
Have you ever discussed with the health professionals about your drugs?	2 (5.88%)	32 (94.12%)	0.945	0.123	0.765	0.121
Are you aware of the necessity of a radiopharmacist to provide information about effective drug use?	23 (67.65%)	11 (32.35%)	0.654	0.231	0.435	0.111
Are you aware of the utility of a radiopharmacist for your drug-related issues?	22 (64.71%)	12 (35.29%)	0.321	0.123	0.667	0.121

*p<0.05

Table 3: Demographic characteristics of healthcare professional

Characteristics	Frequency	Percentage (%)
Type of Professional		
Nurse	25	33.78
Pharmacist	25	33.78
Doctor	24	32.43
Years in Practice		
Less than 10 years	43	58.10
> 10 years	31	41.90

Table 4: Awareness about radiopharmaceuticals among healthcare professionals

Item	Strongly disagree n (%)	Disagree n (%)	Neither disagree nor agree n (%)	Agree n (%)	Strongly agree n (%)	Professional p value	Experience p value
Radiopharmaceuticals are widely used for diagnosis and therapy	2 (2.8)	14 (18.9)	3 (4.1)	49 (66.2)	6 (8.1)	0.321	0.213
Radiopharmaceuticals are one of the reasons for radiation contamination	1 (1.4)	4 (5.4)	4 (5.4)	39 (52.7)	26 (35.1)	0.212	0.311
Contamination may occur due to improper handling procedures	0	0	5 (6.8)	43 (58.1)	26 (35.1)	0.111	0.312
By following proper safety techniques, radiation contamination can be reduced up to some extent	0	0	2 (2.7)	38 (51.4)	34 (45.9)	0.121	0.321
Proper disposal of radiopharmaceuticals is necessary to reduce the contamination	0	0	0	39 (52.7)	35 (47.3)	0.132	0.453

* p <0.05

Opinion about the need of a radiopharmacist

Interestingly, for every statement addressed in this domain, the respondents agreed. More than 75% of the respondents (n=65) agreed to have a radiopharmacist in hospital nuclear pharmacy for proper handling processes, educating the patients and for assisting

doctors and nurses in a multidisciplinary team. Around 90% of respondents agreed on the necessity to have a radiopharmacist in Sri Lanka. From the studied sample, it was observed that most of the health professionals are willing to welcome a radiopharmacist in a multidisciplinary team of nuclear pharmacy. Table 5 represents outcomes of items in the opinion about the need of a

radiopharmacist with respect to independent variables. No statistically significant results were obtained.

Opinion of healthcare professionals about patient safety

Among the studied sample, respondents strongly emphasized that patient education is needed about the side effects, safety precautions and elimination of the radiopharmaceuticals. table 6 represents the outcomes of items on opinion about patient safety with respect to independent variables. No statistically significant association is noted.

Awareness and opinion of undergraduate students

Table 7 represents the distribution of the students and their year of study. Final year students were recruited intentionally in the study as the concept of radiopharmacy is generally taught in the final year. For the radiography students they are taught about radiopharmaceuticals in their third year.

Awareness about radiopharmaceuticals among future healthcare practitioners

More than 75%of respondents agreed that radiopharmaceuticals are widely used for diagnosis and therapy. All the respondents

agreed that radiopharmaceuticals are one of the reasons for radiation contamination. About 15% of respondents neither agreed nor disagreed that contamination may occur due to improper handling procedures and by following proper safety handling techniques can reduce the radiation contamination. Every respondents agreed that proper disposal of radiopharmaceuticals is necessary.

Opinion of future healthcare practitioner about the need of a radiopharmacist

More than three-fourth of respondents reported is that it is necessary to have a radiopharmacist in Sri Lanka. Likewise, majority of the respondents opined to have study programs, which will be included in Sri Lanka for pharmacy graduates. For detailed results please refer table 8.

Opinion of future healthcare practitioners about patient safety

Almost all the respondents agreed that patient safety is very important in radiopharmaceutical usage and all of them agreed that patients should be educated about safety measures, side effects and way of excretion of the radiopharmaceutical.

Table 5: Opinion about the need of a radio pharmacist

Item	Strongly disagree n (%)	Disagree n (%)	Neither disagree nor agree n (%)	Agree n (%)	Strongly agree n (%)	Professional p value	Experience p value
For the compounding or processing of radiopharmaceuticals, it is necessary to have a responsible person	0	0	0	19 (25.7)	55 (74.3)	0.212	0.344
A properly trained personnel is essential for handling radiopharmaceutical in hospital radiopharmacy	0	0	0	17 (23.0)	57 (77.0)	0.312	0.212
Doctors need more assistant in patient monitoring in radiopharmaceutical usage as number of patients are increasing (cancer patients)	0	0	14 (18.9)	53 (71.6)	7 (9.5)	0.123	0.111
Nurses need more assistant in patient monitoring	1(1.4)	5(6.8)	20 (27.0)	36 (48.6)	12 (16.2)	0.111	0.121
It is necessary to have a radiopharmacist for proper handling and educating patients	2(2.8)	1(1.3)	6 (8.1)	32 (43.2)	33 (44.6)	0.123	0.456
Radiopharmacist is considered to be helpful for other healthcare professionals involved in radiopharmacy	0	2(2.8)	11 (14.9)	33 (44.6)	28 (37.8)	0.612	0.451
In Sri Lanka it is necessary to have a radiopharmacist	0	0	7 (9.5)	34 (45.9)	33 (44.6)	0.123	0.121

*p<0.05

Table 6: Opinion of healthcare professionals about patient safety

Item	Strongly disagree n(%)	Disagree n (%)	Neither disagree nor agree n(%)	Agree n (%)	Strongly agree n(%)	Professional p value	Experience p value
It is necessary to educate the patients about radiopharmaceuticals	0	0	1 (1.4)	30 (40.5)	43 (58.1)	0.111	0.543
It is necessary to make patients aware about safety precautions	0	0	0	26 (35.1)	48 (64.9)	0.123	0.321
Patients should be educated about side effects	0	0	0	32 (43.2)	42 (56.8)	0.123	0.111
It is necessary to make aware the patients about elimination of the drug	0	0	1 (1.4)	30 (40.5)	43 (58.1)	0.123	0.333
Patient monitoring is necessary for excretion to avoid contamination	5 (6.8)	4 (5.4)	13 (17.6)	36 (48.6)	16 (21.6)	0.111	0.124

p<0.05

Table 7: Demographic characteristics of future practitioners

Characteristics	Frequency	Percentage (%)
Department		
Pharmacy	15	50
Radiography	15	50
Year of Study		
Third Year (1)	10	33.34
Fourth Year (2)	20	66.66

Table 8: Opinion of future healthcare practitioner about the need of a radiopharmacist

Item	Strongly disagree n (%)	Disagree n (%)	Neither disagree nor agree n (%)	Agree n (%)	Strongly agree n (%)	Professional p value	Experience p value
For the compounding or processing of radiopharmaceuticals, it is necessary to have a responsible person	0	0	0	1(3.3)	29 (96.7)	0.190	0.129
A properly trained personnel is essential for handling radiopharmaceutical in hospital radiopharmacy	0	0	0	4 (13.3)	26 (86.7)	0.786	0.184
Doctors need more assistant in patient monitoring in radiopharmaceutical usage as number of patients are increasing (cancer patients)	0	1(3.3)	3(10.0)	8 (26.7)	18 (60.0)	0.196	0.112
Nurses need more assistant in patient monitoring	0	2(6.7)	6(20.0)	8 (26.7)	14 (46.7)	0.345	0.981
It is necessary to have a radiopharmacist for proper handling and educating patients		2(6.7)	5(16.7)	4 (13.3)	19 (63.3)	0.512	0.412
Radiopharmacist is considered to be helpful for other healthcare professionals involved in radiopharmacy	0	1(3.3)	4(13.3)	6 (20.1)	19 (63.3)	0.129	0.542
The study programmes should be included in Sri Lanka for the Pharmacy graduates	0	0	5(16.7)	10 (33.3)	15 (50.0)	0.367	0.289
In Sri Lanka it is necessary to have a radiopharmacist	2(6.7)	6(20.1)	1(3.3)	3 (10.0)	18 (60.0)	0.987	0.198

p<0.05

DISCUSSION

The current research was conducted to explore the need of a radiopharmacist in Sri Lanka. This research attempted to take the views of healthcare professionals such as doctors, pharmacists and nurses and as well as radiography and pharmacy students about the need of a radiopharmacist and their opinion on the need of patient awareness about their radiopharmaceuticals. The research also attempted to explore those patients who received radio pharmaceuticals for their treatment and therefore their awareness about their radiopharmaceuticals was also assessed.

It is well-known that radiopharmacy is one of the vital pharmacy practice component all over the world. Unfortunately it is seldom that a radiopharmacist is found working in a radiopharmacy. The study is attempted to ensure the safe and effective use of radiopharmaceuticals in Sri Lanka.

Patient education is reflected to be vital in terms of radiopharmaceutical use because of their radioactive nature. Inadequate handling of radiopharmaceuticals may harm not only the patient but also other people like caregivers or either those who are living with them and even the environment. In Sri Lanka, radioiodine is the major radiopharmaceutical which is used for the treatment of patients with thyroid cancer mainly in the NCI, Maharagama. There are precautions and safety measures to be monitored before and after the treatment with radioiodine. Therefore, the patients must be well educated before the treatment. The possibility of radiation contamination from the patients' excretions and radiation emitted by the body cannot be sidelined. By assessing the knowledge about their drug usage, we attempted to identify the need of a radiopharmacist for proper patient counseling. It is a general practice that in NCI there are physicists who are counseling to patients about the radioiodine treatment. In the current research patients reported themselves to be inconvenient to discuss their drug -related issues with the physicians. They feel that if someone who is more closed to them is there and hence it would be more convenient for them to discuss their problems. An important point which is noted in the current research is that some patients reported difficulties in understanding the language; probably because of multiple ethnicities in Sri Lanka. Communication challenges cannot be ignored in those healthcare settings where patients and physicians are unable to communicate for exchange of information because of language barriers [16]. Similarly, the pharmacist-patient relationship is imperative to construct an effective communication to increase better patient outcomes. Communication with patient about their medication and disease condition provides significant benefits to patient. Generally there is gap in pharmacist-patient relationship in Asian societies and hence effective patient

education is not often achieved. Thus, the pharmacist's role in patient education remains unfulfilled. In Sri Lanka, pharmacists' role is limited only as a hospital pharmacist in the hospital setting; though the nuclear pharmacy facility is established in many health care institutions. Regarding radiopharmaceutical preparation and usage the need of the radiopharmacist is already highlighted by the healthcare professionals and students alike for the proper handling of radiopharmaceuticals, procurement, patient counseling, patient monitoring, etc. To be precise it is interesting to note in the current research that the surveyed respondents accepted the concept of a radiopharmacist in Sri Lanka. Undergraduate students emphasized that a study program should also be included for pharmacy undergraduate course.

CONCLUSION

Gaps are identified regarding patient awareness about their radiopharmaceutical usage who received radiopharmaceuticals for therapy i. e. radioiodine and these gaps can be successfully fulfilled by a radiopharmacist by its inclusion in the nuclear healthcare team. Regarding opinions on the need of a radiopharmacist it is concluded that all the respondents were willing to accept the concept of a radiopharmacist in Sri Lanka.

RECOMMENDATION

It is recommended that future studies will explore the interventions by radiopharmacists in improving patient's quality of life. Likewise, there is a requisite to establish in future studies that how the induction of radiopharmacist can initiate better patient care and improve the quality use of radiopharmaceuticals. This may pave the way for policy developments to implement better radiopharmacy services in Sri Lanka. It is worthwhile to conduct these types of studies at a national level. To be precise, the finding of this study is considered a baseline data to proceed further at the national level.

LIMITATIONS

This research has a couple of limitations. This study is conducted in only one university. Likewise forgetfulness on the part of patients and survey bias cannot be sidelined.

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CONFLICTS OF INTERESTS

Declared None

Authors contributions

Fathima Riyasha conceived the research idea. Sakeena Hameem and Shazia Qasim Jamshed helped in the designing of questionnaires. All the three authors contributed in the writing of the manuscript.

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