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A Qualitative Evaluation on Learning Experiences and Perceptions on MSc in Medical Physics among Radiography and Radiotherapy Graduates



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ABSTRACT

Background- The number of radiography and radiotherapy degree holders, who follow Master of Science in medical physics program has been increased dramatically during past few years in Sri Lanka. **Objective-** The aim of this study was to evaluate learning experiences and perceptions on MSc in medical physics among radiography and radiotherapy graduates. **Methodology-** In-depth face to face interview were performed with nine Radiography/Radiotherapy graduates, who were following MSc in medical physics program at universities in Sri Lanka at the end of first year between March to April 2015. Data was analyzed using thematic analysis. **Results-** This study explored data under two aspects; the perceptions on MSc in medical physics and the learning experiences of the students who following the particular MSc program. Three themes emerged under the perceptions on MSc in medical physics including career opportunities in the field, relevancy of the course and selection of the MSc course in medical physics. Five themes were emerged under the aspect of learning experiences: difficulty in learning advanced physics and mathematical content, less content of clinical aspects, limited amount of new knowledge, less time to spend with family members, interruption due to heavy workload and effect on monthly income. **Conclusion-** The overall results show, that the tendency of following the MSc in medical physics in radiography and radiotherapy degree holders mainly occur due to unavailability of relevant postgraduate programs in Sri Lanka and their learning experiences reveal the students follow the MSc program with many personal problems.

INTRODUCTION

Medical physics is a combination of concepts, theories and methods of physics with the medicine, mainly in the healthcare specialties such as medical applications of radiation, diagnostic imaging, and clinical measurement [1]. Medical physicists are the personals who apply physics with medicine and most of them are found in the fields of diagnostic and intervention radiology, nuclear medicine, and radiation oncology [2].

Nowadays the medical physicist has become a crucial component of cancer treatment. Recent surveys indicated that approximately ten million new cancer cases have been detected per year worldwide. Therefore currently there is a great demand for the medical physicists all over the world for the treatment of cancer patients who receive radiotherapy [3]. During past few decades, the radiological techniques related to diagnosis and therapy also have been undergone an enormous technical improvement. Accordingly, requirement of well-educated, competent medical physicists also became increased [4].

As a result, during past decade the quality of medical physics education was dramatically improved worldwide. The universities started undergraduate courses which produce professionals to work as hospital medical physicist and the research conducted by them also focused on improving the practice of this profession [5]. Many countries started postgraduate medical physics courses such as master degrees in medical physics to provide skilled medical physics to their population [6].

During the period of 1994-2003, more than 15 MSc programs in medical physics /engineering were established in Eastern Europe [7]. In India, there are about 20 centers offering such programs. There are more than six universities that offer postgraduate medical physics for the Korean medical physics education programs [8].

The establishment of medical physics profession in Sri Lanka was occurred about 50 years ago with the installment of the Co-60 teletherapy unit in the National Cancer Institute (NCI) at Maharagama [6]. Currently, there are several government and private hospitals which provide radiotherapy treatment for the Sri Lankan population. The nuclear medicine departments are equipped with Single-photon emission computed tomography (SPECT) cameras, where physicists are mainly employed as radiation protection officers. As a result, the demand for suitably educated and trained specialists in medical physics was increased and

the universities in Sri Lanka also started education and training courses related to medical physics [1].

The first MSc in medical physics was started in 1996 at the University of Peradeniya with collaboration of the NCI and the Atomic Energy Authority (AEA) of Sri Lanka. A second MSc in medical physics was started at the University of Colombo in 2013. Basic principles and introduction of medical physics also have been included in the curricula of radiography/radiotherapy degree programs [1].

At the beginning, only physics graduates were allowed to follow MSc in medical physics in Sri Lanka. But later the radiography and radiotherapy graduates were also allowed to follow these degrees. Therefore during past few years, a significant number of radiography and radiotherapy graduates were followed the MSc in medical physics. The current study was designed to reveal the perceptions on MSc in medical physics in radiography and radiotherapy graduates and their learning experiences.

METHODOLOGY

Study design

Qualitative study, interpretative phenomenological analysis.

Study population

The radiography and radiotherapy graduates who have completed the first academic year of the MSc programs in medical physics.

Sample size

Purposeful non-probability sampling method was done. The number of participants was decided on the theoretical saturation.

Data collection

Individual in depth interviews were conducted with radiography and radiotherapy graduates who has completed the first academic year of the MSc program in medical physics in 2015. The participants were interviewed by two interviewers who had prior experience in social and qualitative research works. The participants were interviewed at a separate, quiet place in the

university premises and data were collected through voice recording. First, they were clearly informed about the purpose of the study and written informed consent was obtained.

Data Analysis

The content of the interviews was analyzed using thematic analysis described by Miles and Huberman *et al.* [8]. First, a transcription was prepared for each interview and became familiar with the data. Then the data was coded and organized to identify the themes. Then they were reviewed and defined. After naming each identified themes a report was prepared.

Ethical considerations

Approval for the study was granted by universities and written informed consent was obtained from individual participants prior to the interview. The recordings, the notes on individual interviews and transcripts were anonymous and tagged with an identity code which was only known by the researchers. They were stored in a personal cupboard which was not accessed by any other.

RESULTS AND DISCUSSION

Nine MSc students were interviewed, four were radiographers and three were radiotherapists while two of them were clinical application specialists in radiology. They were in the age range of 28-33 years (mean age 30). Seven participants were male while two were female and out of nine, five of them were unmarried. The most common race affiliation cited by participants was Sinhala (n=8), followed by Tamil (n=1). Five participants indicated that the distance between their workplace and university was less than 150 km, while others noted that it was greater than 150 km. Monthly income of these participants varies between 50,000 LKR to 100,000 LKR.

This study explored data under two aspects; the perceptions on MSc in medical physics and the learning experiences of the students who following the particular MSc program. Three themes emerged under the perceptions on MSc in medical physics including career opportunities in the field, relevancy of the course and selection of the MSc course in medical physics.

Under the theme of career opportunities in the field, the participants pointed out, that there is no proper position as medical physicists in Sri Lankan hospitals. Therefore there is no clear

pathway for medical physicist in Sri Lanka. Hence none of them is interested in being a medical physicist after completion of the MSc course.

Under the relevance of the course, most of them indicated that the field of medical physicist is different from the career of a radiographer or radiotherapist. Therefore MSc in medical physics is not relevant to radiographic and radiotherapy graduates. Although MSc in medical physics is not relevant to their future career pathway, they tend to follow it.

The theme of selection of MSc course in medical physics explained, the reasons for selection of MSc course in medical physics by them. Three subthemes emerged under the theme of selection of MSc course in medical physics by radiography and radiotherapy graduates; for professional development, as a prerequisite for higher education and unavailability of relevant postgraduate courses in Sri Lanka.

One radiographer showed that he is following this MSc course to upgrade his knowledge for his professional development while a clinical application specialist in radiology stated that knowledge of medical physics will help him to understand the operation of equipment during foreign training.

[Radiographer (RG) 04]: "I am doing this MSc to upgrade my knowledge, but there is no well-defined career path in Sri Lanka related with this MSc."

(Clinical application specialist in radiology 01): "I think this MSc will help me to improve the career path in future. I will go for foreign training frequently as a clinical application specialist in radiology. So I can learn about functions of equipment and their parts clearly, but I don't expect to work as medical physicist in future."

Another participant showed that he is following this course to acquire the postgraduate qualification which is a prerequisite to follow a Ph.D. Another participant indicated that the main reason to follow this MSc course is to acquire postgraduate qualifications that required for their continuous professional development and for improved remuneration. They showed the major reason to select this MSc course is none of higher educational institutions in Sri Lanka conduct postgraduate degrees related to radiography or radiotherapy.

(RG 04): “I don’t want to be a medical physicist, they have a separate background. I am different from them because I am a professional who is working with patients directly. I chose this MSc for my personnel development and not to become a medical physicist.”

(RG 03): ‘I have planned to follow a Ph.D. related to one of my radiography imaging modality. I have gained adequate supportive knowledge from my working experience and from this MSc, but I have no idea to work as a medical physicist in Sri Lanka’.

Participants were influenced by some intrinsic and extrinsic factors when deciding the best institute from which they will be able to achieve MSc degree, according to their carrier perspective and expectation. Key intrinsic factors included family issues, occupational workload, lack of time, distance between their workplace and the university, and financial cost. Key extrinsic factors included course contents, quality of the lecturer panel, easy access, availability of traveling methods, university rank and class schedule.

[Radiotherapist (RT) 01]: “This university is much close to my working place. Since I have no university preferences, I selected this university to follow my MSc.”

The analysis revealed five themes which were emerged under the aspect of learning experiences of radiographic and radiotherapy graduates who are following the MSc program in medical physics. They are; difficulty in learning advanced physics and mathematical content, less content of clinical aspects, limited amount of new knowledge, less time to spend with family members, interruption due to heavy workload and effect on monthly income.

All of the participants complained about the difficulty to understand the mathematical and advanced physics components of the course. They indicated that the MSc curriculum does not include the basic mathematics and physics, therefore they did not understand the advanced mathematical and physics components. Most of them suggested to include separate modules in basic mathematics and physics in the curricula of MSc.

One participant, who is a radiographer work at a private hospital, mentioned that he expected to learn more clinical aspects such as handling patients effectively; changing the scanning protocol according to the patients and pathology condition; practical aspects of radiation protection measurements; and effective communication with patients. However, he stated that the MSc in medical physics did not meet his requirements, and suggested that the curriculum

of the MSc program needs to incorporate more practical sessions where the students can achieve hands-on experience with real patients.

(RG 04): “In this MSc, I have learned more theory than practical aspects. There was least exposure at hospital setup as I have expected. Most theory we have learned was related to mathematics and very less biology related subject matter; therefore it was very hard to understand the contents of the subjects.”

Two participants who are working as radiotherapists at hospitals conveyed that the curriculum of the MSc program contained subject content similar to their undergraduate degree. Therefore they gained only a limited amount of new knowledge in those subject areas from this MSc program.

(RT 02): “After some period elapsed I realized, this MSc will not improve my career path. The curriculum of the MSc is very similar to our undergraduate curriculum in radiotherapy. There are some variation but almost same.”

All married participants complained that they did not have enough time to spend with their family members due to the time spend to follow the course work and sometimes the lack of time to spend with family members and it created conflicts with their family members.

(RG 01): “You know I got married and have a child. When I come to the MSc classes in weekend and some time in weekdays I have faced lots of family issues.”

All the participants (n=6) who are working at government hospitals mentioned that they have a huge workload in their respective radiology departments and most of them (n=5) also have night duty. Therefore they don't have enough time to study.

(RG 02): “As I have a huge workload at radiology department in the hospital, I don't have enough time to study.”

Four participants indicated that regular attendance to the MSc classes affects their regular duty at the hospital as well as their income. As some MSc classes are conducted on Fridays, participants had to take leave from their workplace and ask someone else to work instead. When they have MSc classes on weekends they are unable to work on overtime and it badly affected their monthly income.

(RG 03): “...if I attend the classes regularly it may seriously affect my monthly income. Therefore it was somewhat difficult to participate classes regularly.”

Most of them got information about the MSc through their seniors. Even though the participants had a doubt on the relevance of the MSc course, all of them are very keen to direct their juniors who have completed the radiography/radiotherapy degree to pursue the MSc in medical physics. They hope the juniors will also get the advantage of the MSc course to improve their knowledge and hence enhance the quality of their careers.

(All participants): “I will direct my juniors to follow the MSc program in medical physics, but I don’t have any preferences on recommending universities which conduct these MSc courses in Sri Lanka.”

The aim of this study was to explore the experiences and perceptions on MSc program in medical physics among radiography and radiotherapy graduates, who are following it. The results of the present study revealed that the participants have almost exclusively keen about the learning experiences they gain through the MSc course. The results of this study show, that there is a common query in the minds of the students who follows it. ‘Is it worth?, Is it relevant?’. There is an uncertainty about the value of the MSc program for radiography and radiotherapy graduates compared to the significant financial investment they did and the time they spend on it.

Table 1. Personal Details of the participants

Characteristics	Male	Female
Age		
25 - 30	2	1
30 - 35	5	1
Civil status		
Married	2	1
Single	5	1
Workplace		
Government	5	1
Private	2	-
Both	1	-
Employment		
Radiographer	4	0
Radiotherapist	2	1
Application specialist	1	1
Graduation year		
2011	5	2
2012	2	0
Distance from workplace to university		
<150 km	4	1
>150 km	3	1

CONCLUSION

The overall results of this study suggest, that the radiography and radiotherapy graduates tend to follow MSc in medical physics due to unavailability of MSc programs related to their fields and also because they are very interested in upgrading their knowledge through a MSc program as a postgraduate degree. Their learning experiences revealed that most of them follow the MSc course with many personal difficulties. These graduates frequently compare the relative value of the educational experiences gain through the MSc course with the expenditure they did as course fee. This shows the requirement for the appropriate postgraduate degrees related to the field of radiography and radiotherapy in Sri Lanka.

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