

PROFESSIONAL ISSUES

PROFESSIONAL SURVEY IN SWITZERLAND: MEDICAL PHYSICISTS IN RADIODIAGNOSTICS

Eleni-Theano Samara¹, Robert Schöpflin², Stefano Presilla³

¹ Radiation oncology service, Valais Hospital, Sion, Switzerland

² Radiation protection, Radiation oncology service, St. Gallen Cantonal Hospital, St. Gallen, Switzerland

³ Medical physics service, Ente Ospedaliero Cantonale, Bellinzona, Switzerland

Abstract— In Switzerland, medical physicists (MP) started officially working in the field of radiology and nuclear medicine in 2012. In the end of 2015, a survey was conducted to examine the situation of the MP working in the field and the future of the profession. MP were shown to be highly motivated to work in this field. The work of MP in radiodiagnosics should evolve towards radiation management. In Switzerland, we need to define our mission and responsibilities as MP in radiology and nuclear medicine in order to develop our profession.

Keywords— Survey, Radiology, Nuclear medicine, Switzerland

VI. INTRODUCTION

Medical physicists (MP) in radiodiagnosics (radiology and nuclear medicine) started officially working in Swiss hospitals in 2012, final date imposed by the Swiss law (Radiological protection ordinance, art.74, p.7) [1]

The general framework about the duties and responsibilities of MP was published in 2011 as recommendations without, however, reaching a full agreement of different societies [2]. In the same document, the minimum hiring times were also defined (Table 1). MP in Switzerland are hired as consultants and their principal tasks are the following:

- Measurements of patient, staff and public safety related dosimetric quantities during quality controls (QC)
- Improving patient protection by optimization of practices, procedures and acquisition protocols
- Improving protection of the medical staff by giving advice on machine operation and personal protective equipment, including protective garments, fixed and mobile shielding

- Establishing an effective education system in radioprotection for healthcare professionals.

QC to the machines are carried out by the manufacturers. MP perform measurements that are exclusively related to radiation dose in order to optimize it, without, though, repeating the controls that are already made by the manufacturers. Radiation protection remains under the responsibility of the radiation protection experts.

Table 1 Minimum hiring times for MP in Switzerland

Equipment	Minimum hiring time per year (day)
<u>Radiology</u>	
CT	3
Fluoroscopy units (dedicated for interventional procedures)	3.4
Other fluoroscopy units	1
<u>Nuclear medicine</u>	
Gamma-camera	2.5
SPECT/CT	5.5
PET	2.75
PET/CT	5.75

Several schemas for the occupation of the MP were adopted by the different hospitals and clinics: i) MP work exclusively for radiodiagnosics, ii) MP that work principally in radiation therapy cover the requirements in radiodiagnosics for their hospital, and iii) enterprises provide external services of MP. These enterprises can be independent MP, big hospitals that provide services to other smaller ones or any other institute.

VII. SURVEY

A survey was conducted in the end of 2015 to examine the current situation of the MP working in radiodiagnostics and gather the opinions about the future of the profession. All MP working in radiodiagnostics in the country were asked to participate to the survey. The survey was conducted using the Google forms and the statistical analysis was made by means of the MedCalc software, v. 14.12.0.

Twenty-two physicists took part in the survey. The majority of the MP that took part in the survey work in public hospitals (73%), 23% work in private hospitals and only one participant reported to be self-employed. Half of the institutes reported that they provide external services of MP to thirds.

The activity rate between the different modalities is presented in Figure 1 (Some MP seem to work more than 100%, either did their respond concern more than one MP or simply a mistake was introduced. The original data are presented here with no corrections.). Radiology tasks concern almost all MP with a rate between 10% and 80%. MP with no responsibilities in diagnostic radiology, work either exclusively in radiation therapy or nuclear medicine. Nuclear medicine, on the other hand, has very low rates of occupation, between 10% and 30%. As expected, radiation therapy MP work primarily in this domain, for instance participants 4, 5, 9, 10, 11, 21 and cover the needs of their institution for radiodiagnostics and typically do not provide external services. Only one person (participant 20) reported an occupational rate balanced between all modalities.

Very interestingly, almost all MP have tasks related to radiation protection. This may be officially written in their job description or simply required by their everyday work. Moreover, to the question “Are you involved in the radiation protection policy of your hospital?”, 81% of the MP answered positively with one participant specifying that this task is “not official”.

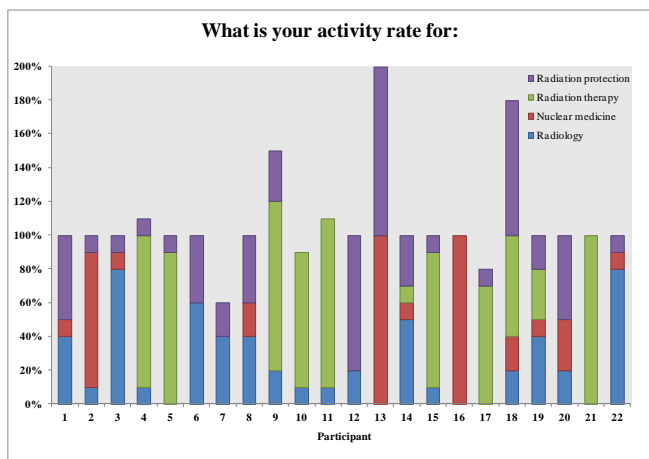
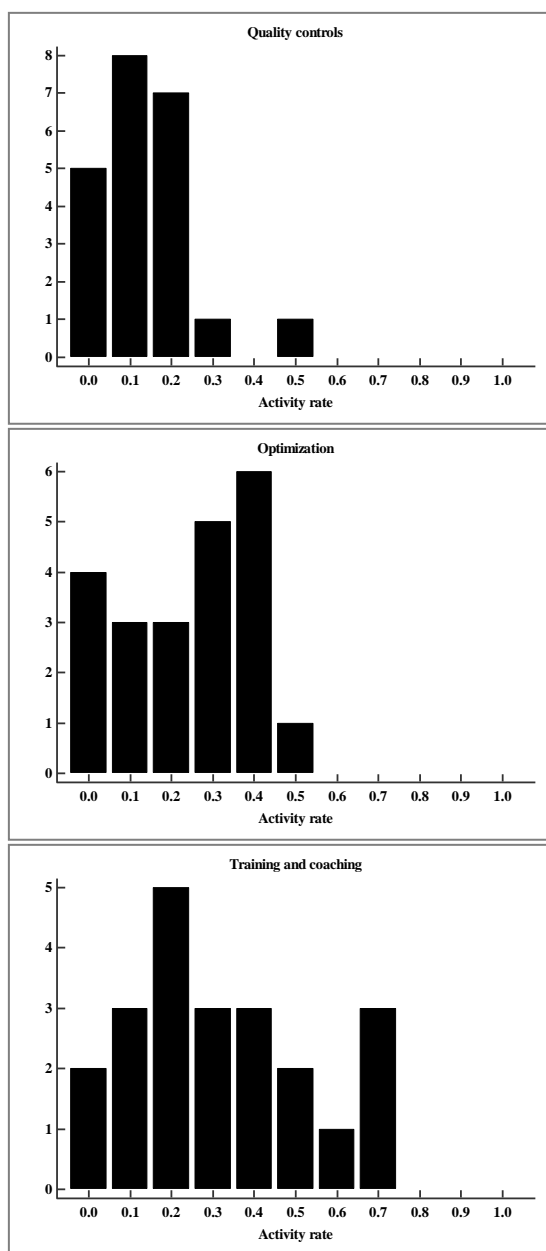


Fig. 1 The activity rate of MP in radiation protection, radiation therapy, nuclear medicine and radiology

According to the “Guidelines and recommendations for application of the radioprotection ordinance Article 74”, published in 2011, the tasks of the MP include i) quality controls of radiological equipment, ii) optimization of protocols and techniques used for patient and personnel safety and iii) training of the personnel in medical physics matters. The results of this survey showed that MP are concentrated to the training and coaching of the personnel (Figure 2). Optimization comes second, while quality controls are rarely performed by MP. Other tasks related to radiology and nuclear medicine may include IT activities or research in the field, but they only occupy a small amount of time.



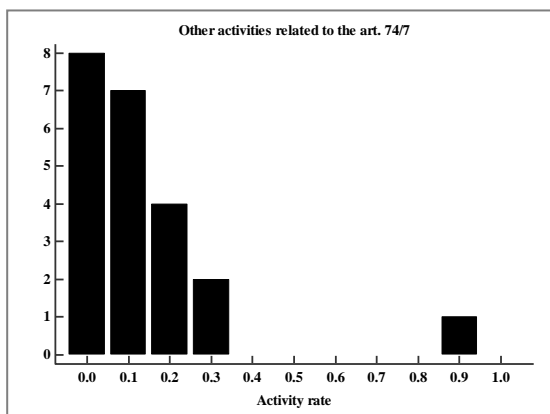


Fig. 2 The activity rate of the tasks of MP working in radiology and nuclear medicine

The majority of the MP working in radiodiagnosics believes that the work of the MP should be oriented towards the management of the radiation instead of quality controls of the radiological machines, as depicted in the Figure 3. This comes to no surprise as already the current activities in radiodiagnosics include only few quality controls. Moreover, the colleagues mentioned that a MP should:

- consider radiation dose optimization taking into account other clinical factors, such as contrast agent
- analyze the clinical practice for avoidable risks
- be consulted from the purchase of the radiological equipment to its end-of-life
- be active in the field of medical informatics as it becomes an every-day tool for our work.

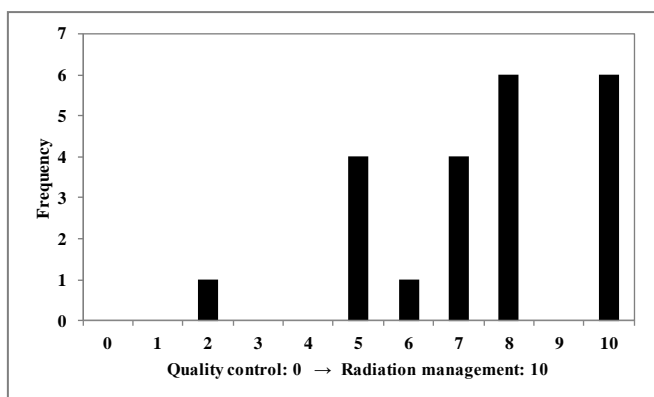


Figure 3: Answers to the question “Should the work of the MP-74/7 be more quality-control oriented or radiation management-oriented?”

A positive and motivating point for the profession of MP in radiodiagnosics, which remains an open field at least in Switzerland, is that the MP feel that their responsibilities and tasks have evolved and continue to evolve according to Figure 4.

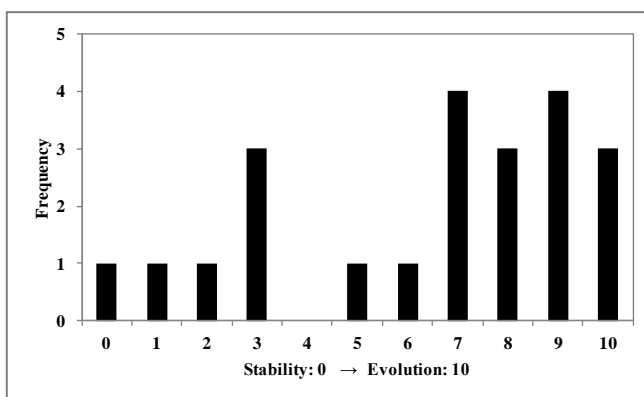


Figure 4: Answers to the question “Do you feel that your responsibilities and tasks have been evolving with time or do you feel that they have been stable since the day you started in radiology and/or nuclear medicine?”

The same positive perspective is also depicted in Figure 5 that gives the answers about the motivation of the MP to continue working in the field (A) and motivate younger MP to consider careers in radiology and nuclear medicine (B). It is interesting to remark here that all four MP that noted very low scores in both questions work principally in radiation therapy (participants 5, 11, 15, and 21).

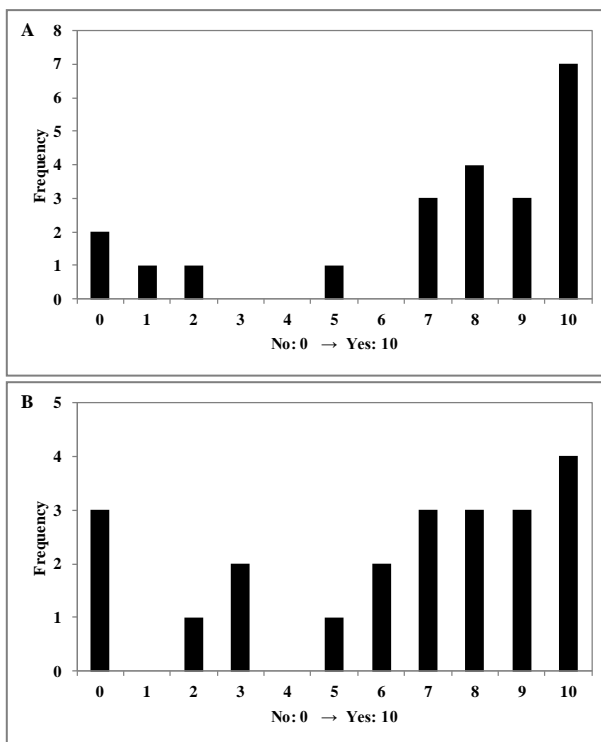


Figure 5: Motivation of the MP to continue working in the field (A) and motivate younger MP to consider careers in radiology and nuclear medicine (B)

This frustration may be related to the equivocal responsibilities of the MP in radiology and nuclear medicine

according to the Swiss legislation or in the institute where they work (Figure 6). The approval towards the definition of the responsibilities of the MP in the institutes, where they work, is higher than the one in the Swiss legislation (mean values for institute definition was 5.7, while the mean value for the Swiss legislation definition was 4.3, p-value=0.006 for paired T-test).

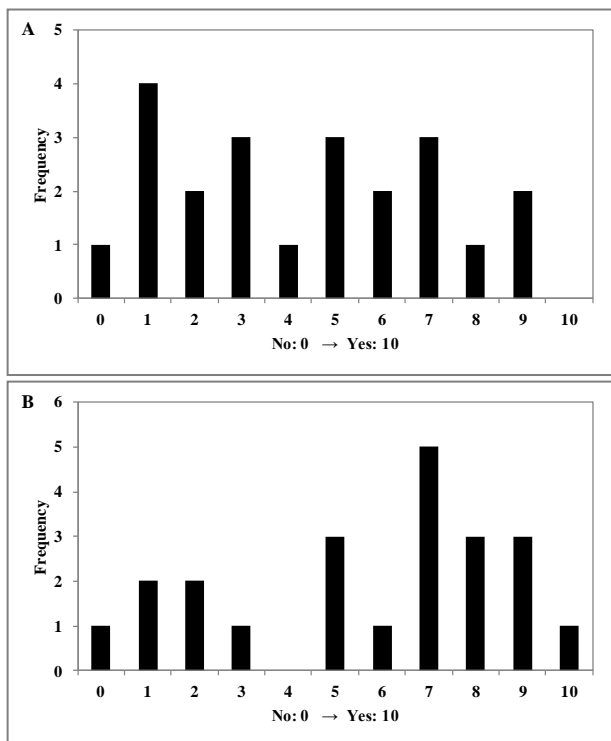


Figure 6: Answers to the question “Are you satisfied with the definition of your responsibilities in radiology and/or nuclear medicine according to the Swiss legislation (A) and within your hospital (B)?”

Figure 7 shows a correlation between the motivation of the MP to continue working in the field and the definition of their responsibilities in their hospital. A clearer definition of responsibilities is related to higher motivation of the personnel as one may observe. The fact that MP in radiation therapy have limited time to determine the needs and develop a concept for radiodiagnostics tasks may also explain this finding. Medical physics in radiology and nuclear medicine is a quite young profession in Switzerland and time was and may still be necessary to clarify our responsibilities.

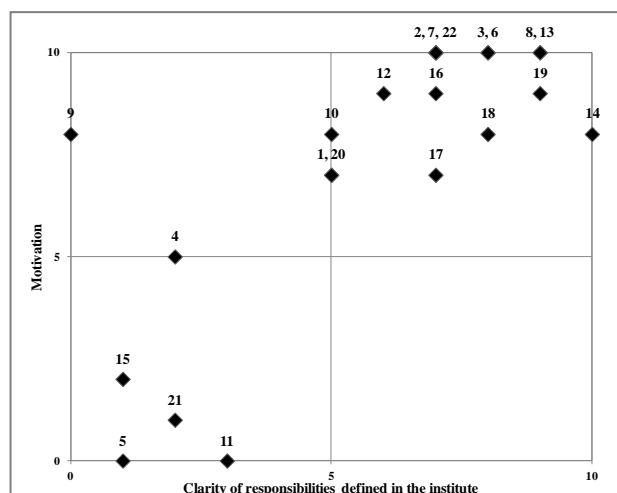
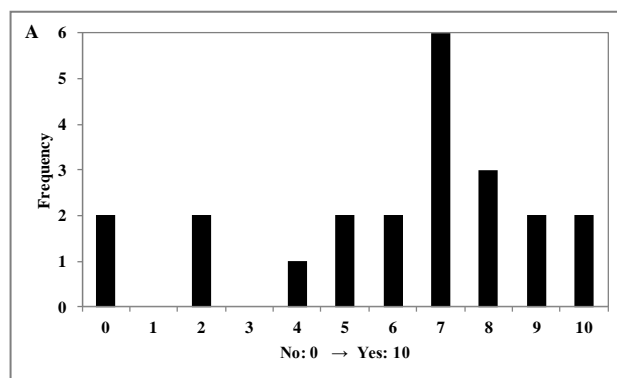


Figure 7: Correlation between the motivation of the MP to continue working in the field and the definition of their responsibilities in their hospital. The data labels correspond to the participant number.

Two questions concerned the feeling of the MP about the recognition of their work, one towards their direct colleagues, i.e. medical physicists and one their colleagues with different occupation (radiologists, technologists, etc.). What was particularly interesting was that for both questions the mean score was equal to 6 (Figure 8) with no significant difference. However, lack of recognition of a MP’s work in his/her institute does not necessarily mean lack of recognition among other colleagues (no correlation was found between the two answers of the participants). The fact that one may feel that his/her work is not recognized by colleagues with different background is understandable and we should work hard to better communicate the importance of our work. However, it is urgent, in our opinion, to improve the esteem of the work of the MP in radiology and nuclear medicine at least among medical physicists that work in radiation therapy.



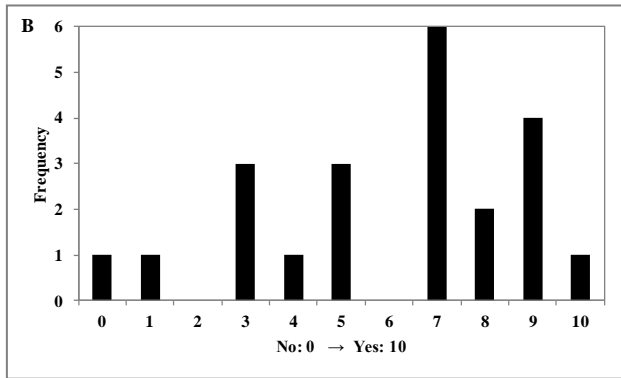


Figure 8: Answers to the question “Do you feel that your work is recognized a) among your colleagues (medical physicists) and b) in the hospital (physicians, radiographers, etc.)?”

An open question about any recommendation to improve our profession was asked and a summary of the proposals of the colleagues is presented here:

- Definition of the role of the MP in radiology and nuclear medicine
- Definition of the responsibilities of the MP in the Swiss legislation
- Strong communication about the role of the MP to other professionals and the related importance and impact in the clinical workflow.
- Reasonable hiring times of MP according to institute activities and needs
- Realistic funding of medical physics activities.

The next question concerned the collaboration of the MP with the physicians, radiographers and manufacturers in order to optimize radiation protocols. The general feeling is encouraging as showed in Figure 9. Furthermore, the participants described the collaboration as satisfying (32%) and mentioned that “it is changing with time towards the best” (55%), while no one believes the contrary. One more positive aspect is the mutual collaboration in radiation protection matters, where people feel free to express to MP their own ideas (46%) and apply the propositions of the MP (32%). Naturally, there are cases where the collaboration is described as difficult or that it should be closer, as mentioned by 27% of the participants or that there are still people that do not know what an MP does in radiodiagnostics.

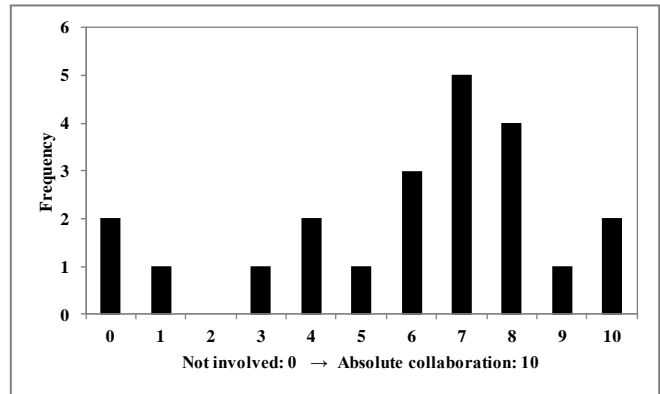


Figure 9: Answers to the question “How closely do you work with physicians, radiographers and manufacturers in order to optimize radiation protocols?”

Lastly, soft skills are necessary to our profession (Figure 10). We need to teach and train in medical physics people with different background, we need to convince people to change their habits in order to protect effectively their patient and themselves, we need to prove to the institute management that we provide good service and we improve the quality of the institute where we work and as shown from the previous questions we need to improve the collaborations with our partners.

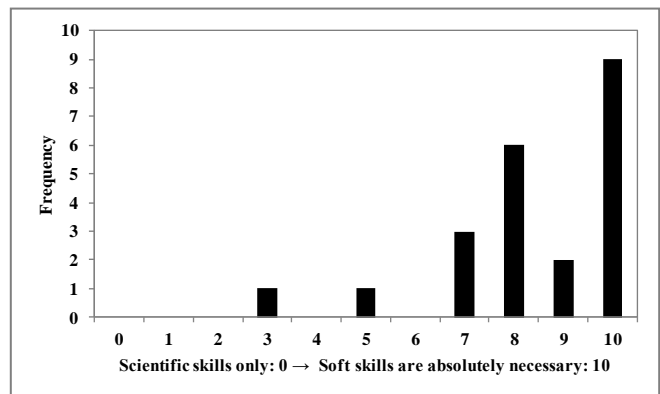


Figure 10: Answers to the question “Do you feel that the medical physicist has to develop skills other than scientific in order to work in radiology and/or nuclear medicine (for example effective communication, dialogue, management, decision making, teaching, etc.)?”

VIII. CONCLUSIONS

In conclusion, the survey showed encouraging results about the future of medical physics in radiodiagnostics. MP actually working in the different institutes are highly motivated to work in this field. Most of MP agree that the work in radiodiagnostics should evolve towards radiation management. In Switzerland, we need to define our mission and responsibilities as MP in radiology and nuclear medicine in order to develop our profession. This will improve our every-day work in terms of collaboration with other professions and raise our personal satisfaction.

REFERENCES

1. Radiological protection ordinance (RPO) at <https://www.admin.ch/opc/en/classified-compilation/19940157/index.html>
2. Requirements for medical physicists in nuclear medicine and radiology at <http://www.bag.admin.ch/themen/strahlung/02883/02885/index.html?lang=fr>

Contacts of the corresponding author:

Author: Eleni-Theano Samara
Institute: Valais Hospital
Street: Avenue du Grand Champsec 80, CH-1951
City: Sion
Country: Switzerland
Email: Elina.Samara@hopitalvs.ch

Conflict of Interest Statement

The authors have no conflict of interest to declare