



Original paper

## Early career medical physicist groups in Europe: An EFOMP survey

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### ABSTRACT

**Introduction:** Training, educating, and fostering of young professionals are key requisites for the progress of any profession. The young medical physicists (MPs) of today are the medical physics professionals and leaders of tomorrow. It is, therefore, essential that they learn to work collectively and in a coordinated manner at both national and European levels at an early stage in their career. In view of this, EFOMP is planning to create a special interest group (SIG) encompassing early career MPs from across Europe.

**Methods:** A survey was developed by EFOMP and circulated to all National Member Organisations (NMOs) to gather information on the status of early career groups in their respective societies and on the interest to partake in such group within the Federation.

**Results:** Of the 36 NMOs that are part of EFOMP, 32 responded to the survey. Only 9 NMOs have established early career MPs groups within their NMOs, while the remaining countries are either considering setting up young MPs groups in the future (15 NMOs) or do not show such interest (8 NMOs). Of all responders, 59% expressed interest in the creation of the EFOMP SIG, 34% remained neutral towards this issue by not answering the question and for two NMOs the SIG idea had no appeal.

**Conclusion:** Most NMOs showed interest in the creation of an early career MPs group within EFOMP and offered constructive feedbacks on the roles they envisage for the group. EFOMP will use and implement this information when establishing the special interest group.

## 1. Introduction

The young medical physicists (MP) of today will be the national medical physics and European medical physics professional and leaders of tomorrow. If the profession is to be developed and become stronger in a rapidly evolving environment, education and training of the young medical physicists is vital so that they may develop into the effective and robust scientific and strategic leaders that the profession needs in the future [1]. Young medical physicists need to learn how to act in a coordinated manner at both national and European levels. To achieve this goal, a strong, flexible, and dynamic link is needed between academic education and professional training, across all countries. This is

particularly important at a time of tough economic conditions and a time when the medical physics profession is facing stiff competition from other professions.

EFOMP aims to develop an early career medical physicists Special Interest Group (SIG) within Europe to support young medical physicists' groups in the National Member Organizations (NMO), assist young medical physicists directly where such groups do not exist and help develop a stronger European identity among its younger members. The objective is for EFOMP to create a safe and secure incubation space in which young medical physicists in Europe may interact amongst themselves as well as with the present scientific and political leaders of the profession - a platform where young medical physicists can develop links

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which will firstly help them mature professionally at a personal level and secondly forge the European level networking necessary to assist them later on in their career. It is EFOMP's vision that this space will provide opportunities for our young medical physicists to develop not only their substantive scientific and research skills but also their soft skills, as scientific competence on its own does not ensure success in today's demanding hospital environment. Skills such as strategic planning, marketing, good communication and pedagogical skills, proficiencies in qualitative research methodology as well as skills in conflict resolution, organizational politics, negotiation, and teambuilding are also needed [2].

A Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis of the Medical Physics profession indicates that most of the weaknesses of the profession lie precisely in the area of soft skills [1–4]. If the profession is to thrive it is important that any plans for its further development also incorporate strategies for addressing these critical weaknesses amongst our young physicists [5]. Similar initiatives are being developed elsewhere which could help indicate a way forward [6]. To assist EFOMP in this task, the European Matters committee of EFOMP surveyed the NMOs on the present state of the young medical physicist groups in their countries. This article presents the results of the survey and suggests a vision and way forward for the consideration of the NMOs.

## 2. Methods

The survey designed by the European Matters Committee was sent out in June 2021 to all 36 NMOs that are currently members of EFOMP. Results of the questionnaire were collected between June 2021 and December 2021. The questionnaire was directed to NMO Presidents and EFOMP's delegates. Answers were collected through the Google Forms platform, an open-source web-based application for surveys. Of the 36 member countries, 32 responded to the survey. The questionnaire can be found as an Appendix to this manuscript.

The aim of the survey was to obtain information regarding the existence of early career medical physicists' groups among the NMOs and

the willingness of NMOs to establish such groups in the future and/or to partake in the Early Career Medical Physicists Special Interest Group (SIG) that EFOMP is aiming to establish.

The 11 questions of the survey included both quantitative (related to the number of members within the NMO and the number of early career physicists) and qualitative queries (the roles of early career MP groups, the benefits of being part of an early career MP group). The questionnaire also allowed the responders to suggest ideas regarding the possible roles and membership benefits the NMOs would like to find within EFOMP's proposed Early Career Medical Physicists SIG.

## 3. Results

Of the 36 national member organisations that are part of EFOMP, 32 responded to the survey leading to a very good response rate (88.9%), which can be interpreted as being representative for EFOMP. A geographical illustration of the current status or interest in creating early career MP groups is depicted in Fig. 1. According to the questionnaire responses, only 9 NMOs have established early career MP groups, while the remaining countries are either considering setting up young MP groups in the near future (15 NMOs) or do not show such interest (8 NMOs) (Fig. 2).

In those national member organisations that reported having early career MP groups, the percentage of MPs belonging to these early career groups in their respective countries varies greatly across Europe, from as low as 1% up to 68%. Membership eligibility of Early Career Medical Physicists Group in these countries is set primarily according to the number of years of experience as MP. This, however, varies from 3 or 4 years experience (as reported by most NMOs) to 7 years' experience. Only two NMOs reported age (under 35 years) as a criterion for eligibility as early career MP. Medical physics residents in a hospital training program partake in most early career MP groups, while some NMOs also reported university students in Medical Physics (under/post-graduate) being part of these groups.

When asked to list the roles of their early career MP group, the NMOs with established groups supplied the following answers:

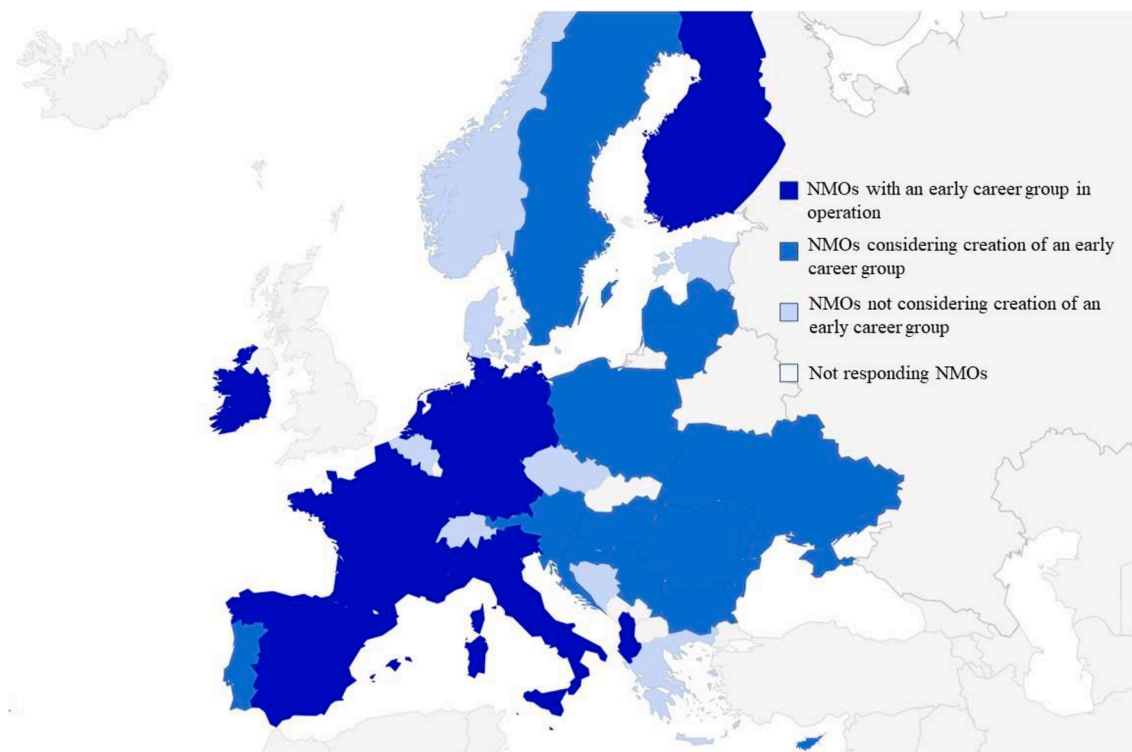


Fig. 1. Geographical representation of the status and interest in the creation of an Early Career MPs group in Europe.

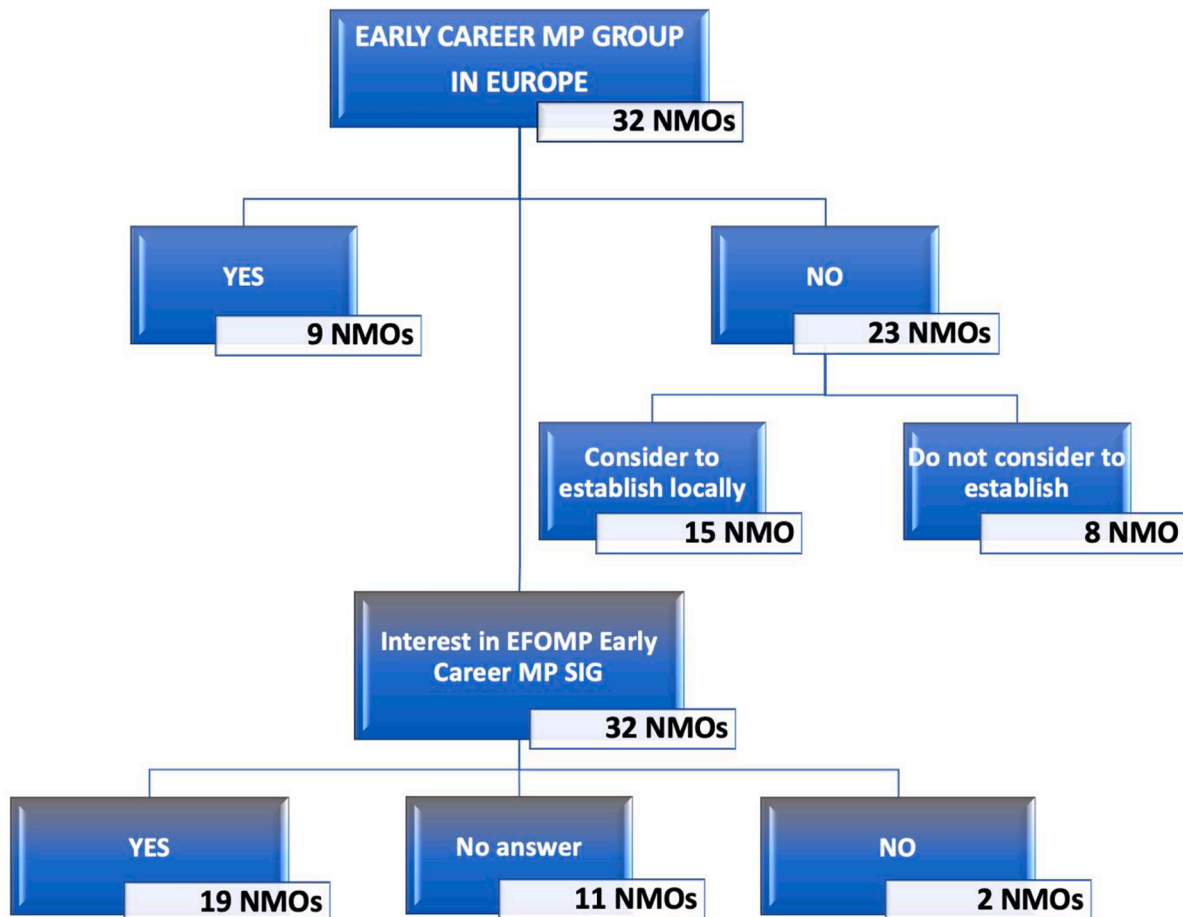


Fig. 2. Current status and interest in the creation of an Early Career MPs group in Europe.

- Outreach to university students, organisation of continuous professional development (CPD) sessions, discussions regarding training needs, feedback to NMO council.
- Mentoring students on their way to becoming medical physicists and provide support if they have any questions. Very active in social media activities with the aim to increase the visibility of the profession.
- Community outreach, organization of discussion afternoons, social events, newsletters, company visits – an organization which strives for the best possible education and working conditions for young MP.
- Try to get young MPs heard, network, future planning, helping them find MP positions, improve their well-being.
- Leading positions within the NMOs, also responsible for social media and support.
- Bound with student in training, establishing relations between young and senior MPs.
- A platform that eases communication between university students and MPs.

Regarding the benefits of being part of an early career MP group, the following answers were provided by the responders:

- Discuss issues related to training, special focus education, job positions.
- Peer-to-peer support, additional training workshops.
- The opportunity to further improve training and to help younger people get a good start in their profession.
- Community outreach, organized discussion afternoons, social events, newsletters, company visits.

- Networking, getting info, getting yourself heard, discussion, changing thoughts, trying to make an impact.
- Have the possibility of organizing events, help students with doubts about the future as medical physicist, improve training of residents, be the voice of the students and residents in the Society, learn about the organization of this kind of groups.
- Direct participation in all activities organised by the NMO.
- Increased communication between university students and medical physicists; helps to build a relationship between the two.
- Access to professional lectures in medical physics and engineering.

NMOs that did not show interest in establishing early career MP groups within their societies/organisations have justified their position through answers which cover different perspectives. Some of the answers are listed below:

- This issue has not been discussed within the organisation.
- It is not a priority for the society, as there is a separate ‘young colleagues’ registration opportunity for MPs that would like to enrol in the society with a special (low) fee.
- No need for special group as each medical physicist (and even a student of medical physics) can become a member of our association and ask for support or help.
- Our society is very small, the number of young members specializing in MP is very small, thus difficult to form a separate group (this answer, or answers along similar lines was provided by 3 NMOs).
- No need. Local training is offered in hospitals.

The final question of the survey allowed the responders to list any

ideas/suggestions they may have regarding the possible roles and membership benefits that EFOMP could implement when establishing the European Early Career Medical Physicists Special Interest Group. The suggestions offered by the NMOs cover a wide range of topics, from professional to financial aspects:

- Reduced fee for MPs up the age of 35 (including students and residents), special training courses, workshop, etc.
- Connecting to other young groups.
- Grant support.
- Training workshops.
- This could possibly lead to the training of medical physicists being adapted across Europe, so that in future it could be easier to work as a medical physicist in another EU country. In addition, it would be nice to be able to build up a platform for professional discussions throughout Europe.
- Learn from each other's organizations, European networking, young MP symposium.
- Facilitate rotations (during the formation period) between countries, representative person of each country to improve the communication, report about research grants in hospitals.
- A platform of exchange among young professionals, organize courses with specific topic necessary for young professionals.
- Being informed for jobs positions and trainings, access to trainings and material (e.g. quality controls).
- Possibility to have more practical/clinical trainings, possibility to participate and collaborate in international research projects.
- Organizing practical courses everywhere in Europe for the inexperienced ones in the field of medical physics, so they can see different types of machines/units and practices.

Responders to the above question were also from NMOs that do not currently have an early career MP group. This indicates support towards the formation of a SIG within EFOMP to include all young MPs under an umbrella with common goals for the medical physics profession. Of all 32 NMOs, 59% expressed their interest in the creation of the EFOMP SIG while 34% remained neutral towards this issue by not answering the question. For two NMOs the SIG idea had no appeal. One NMO expressed no readiness to get involved in EFOMP activities through the early career MP group despite the fact that they are willing to consider creating such group locally in the future, while the second NMO that responded negatively to this invitation (without justifying their choice) interestingly enough had suggestions regarding the roles and membership benefits that EFOMP could implement when establishing the early career MP group.

#### 4. Discussion

One of the key points for the future of a modern profession lies in strengthening the link between university education and the professional world. In the field of physics applied to medicine, the strength of this link is not uniform as there appear to be significant differences across Europe. One of the main objectives of EFOMP is to define homogeneous training and accreditation schemes, also allowing easy exchanges of professionals between different countries. To make the link between educational and professional world even more effective, it is essential that those who are at the beginning of their careers develop contacts with colleagues from other countries in order to identify development needs and to take corrective actions when necessary. This active participation could provide a twofold result by ensuring the cultural development of young MPs and a general strengthening of medical physics across Europe. In this regard, the following excerpt from the EFOMP Policy Statement n.2 of 1984 "The Roles, Responsibilities and Status of the Clinical Medical Physicist" clearly highlights the future needs of our profession [7]: "In the future, physics will be of even more importance both in clinical medicine and in medical science. Medicine can be

expected to become more scientific and quantitative. Scientific data will be of more significance in the diagnosis and treatment of diseases. Medical physics will play an increasingly important part in this development. High standards in medical physics services must be maintained and sufficient resources directed towards this." "...Thus, the clinical medical physicist must be responsible within this area of competence for the standardization and calibration of medical physical equipment and for the accuracy and safety of physical methods used in routine clinical applications in close co-operation with other health care professionals and medical specialists. The MP has also a responsibility in research and in the development of new techniques and physical methods and equipment. Furthermore, the MP has a responsibility for providing education and training in applied physics for all healthcare professionals, student physicists and technical staff."

Employment in the health sector is expected to increase, a fact largely attributed to the evolution of technology and the demographic shifts towards an ageing population across Europe. The expected increasing activity will create additional needs to be covered through the recruitment of new MPs. In addition, given the strains of healthcare systems across Europe, the integration of young MPs into the workforce will be required to be completed in a relatively short period of time. The creation of early career groups, with participation of senior professionals across Europe, will facilitate cross-country knowledge and experience sharing, thus accelerating the learning curve of these new healthcare workers. It is also expected that these early career groups will evolve into dynamic networking platforms for years to come, creating knowledge sharing hubs, advancing the profession, and establishing a sustainable pipeline of new healthcare workers. Early career groups across Europe will facilitate the cross-country collaborations which are of utmost importance especially in challenging periods.

For all this to be achieved over time, a continuous development of university education and professional skills is necessary, while training must be kept up to date with respect to economic, social and scientific evolution [8]. Early career MPs can play a decisive role in facing this challenge. The need for bridging the educational and professional areas also emerges from many of the responses from the NMOs. In fact, when asked to indicate the role of early career groups, some of the answers provided were: "outreach to university students, discuss training needs, bound with students in training, establishing relations between young and senior MPs, create a platform that eases communication between university students and MPs".

However, the role of these groups should not be misunderstood and limited only to passive scientific training. Today's young medical physicists will become the future leaders of our profession. Thus, participating in leadership roles offered by EFOMP to young MPs through the SIG, would prepare these young professionals to assume future leadership roles at national and European levels as well as internationally.

Surveys are an important tool for determining the current state regarding any medical physics issue in Europe. For example, similar surveys have been recently used as the impetus for the updating of the Core Curriculum for Medical Physicists Experts in radiotherapy [9] and for the status evaluation of training schemes for young MP in all clinical disciplines [10]. Cross-referencing the information from both aforementioned surveys, it can be noted that countries with no recognised National Registration Scheme (NRS) training scheme for young medical physicists are much less likely to create an early career group in their society. A NRS is defined as a national agreement detailing the way in which medical physicists are trained and educated, together with the availability of a formal training programme for medical physicists. Common education and training standards across Europe is the key to the Medical Physics identity and automatic recognition of qualifications in all European countries, an item our young colleagues should aim for.

Most of the countries in our survey indicated that they do not have an early career MP group but expressed their interest to get involved if EFOMP creates such group. Some NMOs justified the absence of early career MP groups through their small size, reasoning that creating a



subgroup would not be efficient in their circumstances. However, there are a few EFOMP member countries with an even smaller number of medical physicists (for instance Malta has 19 total members, with 13 young MPs; or 8 members with half early career MPs in Albania) that have successfully set up young MP groups within their societies to further promote the profession and to offer a better platform for training and collaboration between generations.

An EFOMP SIG consists of medical physicists with an interest in the field of the particular SIG [11]. The SIG operates under the umbrella of an advisory committee which is responsible for monitoring the activity of the SIG and for reporting on its activities to council through the governing committee. It comprises of individual medical physicists as well as colleagues nominated by NMOs that have a similar SIG within their organisation to facilitate collaboration and common activities. Medical physicists are entitled to apply for SIG membership by completing the application form available on the EFOMP website after the announcement of the start of a recruiting period. The members of the SIG elect their Steering Committee (SC) and then the Board which comprises of a convener, a vice convener, secretary and any other officer the SIG deems necessary for its smooth functioning. The convener of each SIG is automatically a member of the EFOMP committee under which the SIG operates and is responsible for reporting on the activities of the SIG. Each SIG has the freedom to decide on its operational procedures; name of the SIG, frequency of general and steering committee meetings, definition of tasks and priorities among the members, preparation of scientific documents and codes of practice, collaboration with EFOMP committees, use of communication channels provided that these do not contravene the EFOMP internal regulations. The term of the SIG SC and Board is 3 years and can be renewed once. Although, the steering committee members can act as coordinators to monitor the status of each task, the active involvement of all members is required for fulfilling the goals. Supportive documentation and resources, discussion forum, interaction with similar NMOs' and affiliated organisations' groups, regulatory issues and liaison with EU bodies are within the activities of an SIG. An update of the SIG work is provided to the entire medical physics community via the publication of related articles in the EFOMP quarterly newsletters [12].

EFOMP's Governing Committee continuously encourages early career colleagues to take active roles in the work of the Federation by being part of the various activities such as the European Congress of Medical Physics (ECMP) scientific committee, organizational aspects of the EFOMP School for Medical Physics Experts (ESMPE) editions and webinars and the editorial board of the EFOMP newsletter. A mentoring in research programme which aims to support early career Medical Physicists (MPs) who wish to set up a research project or successfully develop and explore their innovative ideas has been created for this purpose [13]. The EFOMP Projects Committee seeks funding opportunities to support early career colleagues to get trained, expand their knowledge and develop new skills and competences in all areas of medical physics as well as facilitate cross-border mobility of young professionals. Thus, an EFOMP permanent structure devoted to early career scientists would be the ideal place for all medical physicists across Europe to integrate, discuss early career challenges, common initiatives and new perspectives, organise career informative events, liaise with universities and institutions and seek support and advice on their professional development. By joining such a group, young colleagues will not only broaden their horizons both professionally and personally, make social connections and learn more about the organisation, but they

will have an active role in decision-making and share their fresh ideas and experiences to EFOMP Council via the parent committee which consequently would benefit the entire federation.

## 5. Conclusions

The results of the EFOMP survey on the status of European early career medical physicist groups revealed the fact that most NMOs consider the establishment of an early career SIG as a positive step for fostering young medical physicists within the federation.

In view of the above, EFOMP will consider the ideas advocated by the NMOs and implement them in the practices of the early career SIG that would be set up soon. We believe that the new ideas and views promoted within this group will assist young medical physicists in their education and training, will stimulate collaborations and professional exchanges among young physicists from different NMOs and will be a hub for shaping the future leaders of our profession.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ejmp.2022.02.001>.

## References

- [1] Caruana CJ. *Leadership and challenges in medical physics*. Bristol: Institute of Physics Publishing; 2020.
- [2] Caruana CJ, Damilakis J. Being an excellent scientist is not enough to succeed! Soft skills for Medical Physicists. *Eur J Radiol* 2021;110108. <https://doi.org/10.1016/j.ejrad.2021.110108>.
- [3] Caruana CJ, Wasilewska-Radwanska M, Aurengo A, Dendy PP, Karenauskaitė V, Malisan MR, et al. A comprehensive SWOT audit of the role of the biomedical physicist in the education of healthcare professionals in Europe. *Phys Med* 2010;26(2):98–110.
- [4] Caruana CJ, Wasilewska-Radwanska M, Aurengo A, Dendy PP, Karenauskaitė V, Malisan MR, et al. A strategic development model for the role of the biomedical physicist in the education of healthcare professionals in Europe. *Phys Med* 2012;28(4):307–18.
- [5] Caruana CJ, Cunha JAM, Orton CG. Subjects such as strategic planning, extra-disciplinary communication, and management have become crucial to medical physics clinical practice and should become an integral part of the medical physics curriculum. *Med Phys* 2017;44(8):3885–7.
- [6] Santos JC, Goulart LF, Giansante L, Lin YH, Sirico ACA, Ng AH, et al. Leadership and mentoring in medical physics: the experience of a medical physics international mentoring program. *Phys Med* 2020;76:337–44.
- [7] EFOMP Policy Statement No.2: The Roles, Responsibilities and Status of the Clinical Medical Physicist, 1984. [www.efomp.org](http://www.efomp.org).
- [8] Czaplinski I, Fielding AL. Developing a contextualised blended learning framework to enhance medical physics student learning and engagement. *Phys. Med* 2020;72:22–9. <https://doi.org/10.1016/j.ejmp.2020.03.010>.
- [9] Garibaldi C, Essers M, Heijmen B, Bertholet J, Koutsouveli E, Maas AJJ, et al. Towards an updated ESTRO-EFOMP core curriculum for education and training of medical physics experts in radiotherapy—A survey of current education and training practice in Europe. *Phys. Med* 2021;84:65–71.
- [10] Maas AJJ, Lammertsma AA, Agius S, Bert C, Byrne B, Caruana CJ, et al. Education, training and registration of Medical Physics Experts across Europe. *Phys. Med* 2021;85:129–36.
- [11] EFOMP manual, paragraph 4.2, p 8. [www.efomp.org](http://www.efomp.org).
- [12] Gabiña P. Special Interest Group for Radionuclide Internal Dosimetry (SIGFRID). *European Medical Physics News* 2021;2-4 [www.efomp.org](http://www.efomp.org).
- [13] Koutsouveli E, Gilligan P. Medical physics in the EFOMP region: history, education, and professional recognition. *Med Phys Int J* 2021;9(2):27–9.