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Original paper

Leadership and mentoring in medical physics: The experience of a medical physics international mentoring program

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ABSTRACT

Mentoring aims to improve careers and create benefits for the participants' personal and professional lives. Mentoring can be an individual or a shared experience for a group, while the mentor's role remains the same in both models. Mentors should increase confidence, teach, inspire, and set examples, helping the mentees to mould their path, contributing to the pursuit of their personal and professional goals. This study aims to report on the experience of early-career medical physics professionals and postgraduate students participating in a global mentoring program and to assess the impact of this activity on their professional development. The objectives of this mentoring program are to develop leadership roles among young medical physicists and to provide guidance and support. An online questionnaire was administered to the mentee participants. The analysis of their responses is reported in this work and the current status of the programme was examined using a SWOT analysis. In general, the mentoring experience had a positive impact on the mentees. The mentors were found especially helpful in the decision-making situations and in other conflicts that may arise with career development. Additionally, the mentees felt that mentoring contributed to the development of leadership skills required for the job market and assist in personal development. This paper concludes that participation of young medical physicists in a mentoring group program is beneficial to their career and therefore should be encouraged.

1. Introduction

Mentoring is a system of support and guidance that helps individuals to achieve their goals. A mentoring relationship assists a less experienced person (the mentee) to benefit from a more experienced and senior person (the mentor), who can be defined as an influential individual in their work environment [1,2]. The mentorship system is recognized as a key factor in the development of specific job task skills as well as social and political skills [3]. For the mentees, higher quality mentoring relationships can also be associated with significantly higher leadership self-efficacy [4]. The mentor-mentee relationship also stimulates emotional, social, and psychological stability in addition to contributing to the individual's success in their professional career [5–9]. Mentoring can be a long-term or a short-term arrangement, providing both the mentee and the mentor with academic and personal growth [10]. The role of a mentor is to assist with goals determination, guide studies, increase confidence, teach, inspire, motivate the mentee to pursue their goals, and building and reaching the essential steps for their professional success [5,7,11–14]. There is evidence that the process is more beneficial when the mentors and mentees come from different institutions, even countries, as they can bring new perspectives and ideas freely, not being bound by rules and relations in the mentees' institutions [15].

Mentoring and leadership have been discussed in several studies on

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training and education of medical physicists. For example, leadership roles are considered a key focus of Medical Physics 3.0 (MP3.0), the American Association of Physicists in Medicine's (AAPM) initiative [16]. According to Caruana et al. [17], nowadays being a good scientist is not sufficient for professional success within the hospital environment. Training and education must be delivered in such a way to turn the trainees into strong leaders and make them adaptable to changes in their profession. This can, in part, be supported through ongoing discussions with more experienced mentors. A more detailed discussion about effective, strategic and robust leadership skills in Medical Physics is provided by Caruana et al. [18,19].

Although many studies point out the importance of mentoring in assisting young professionals to develop the required skills to excel in their career, the impact of mentoring on the development of leadership skills in aspirants in the career of Medical Physics has not been reported. This study, therefore, aims to present the personal experiences of early-stage career Medical Physics professionals participating in an international program on Leadership and Mentoring in Medical Physics. This study investigates the impact of this experience on their lives and careers and evaluates the importance of mentoring for young clinical and academic medical physicists.

2. Material and methods

2.1. Medical Physics: Leadership & mentoring

The programme called *Medical Physics: Leadership & Mentoring*[1] is composed of one permanent mentor, from the University of Malaya, and 16 mentees, comprising of medical physicists, postgraduate students and an early career professor/researcher. The mentees are from different countries in Latin America and Asia (Fig. 1). Other mentors, with various skills and experiences, are invited to join the group for discussions, sharing experiences, and to give advice about a professional career in Medical Physics.

The mentees were mostly recruited during scientific events, for example, the South East Asia Congress of Medical Physics and the Brazilian Congress of Medical Physics, or during visits of the mentor to the research groups at universities, such as the University of São Paulo, Brazil.

The objectives of this mentoring programme are: (i) to develop leadership roles among young medical physicists, and (ii) to provide guidance and support for young medical physicists by creating an atmosphere of openness where meaningful communication and trust exist. Our mentoring system allows the young medical physicists to gain greater awareness of opportunities and activities that can broaden one's education and network. Through effective communication, mentors can evaluate mentees' level of expertise and practice as well as the areas of strengths and weaknesses as leaders.

2.2. Mode of mentoring, way of communications

E-mentoring is a relatively new way of mentoring that uses electronic communications to establish a relationship between the mentors and the mentees independently of geographic constraints. Akin et al. [20] state that both synchronous and asynchronous tools are necessary to support the relationship. Synchronous tools are those where both parts are engaged at the same time, e.g. virtual meetings and group chat. Whereas asynchronous tools involve tools that both parts are engaged in at different times, e.g. email.

In this group, the mentors (teachers and professionals) from different areas and countries volunteer to guide the participants through video platform meetings. In 1-hour presentations through Skype, mentors share their personal and professional trajectory, their

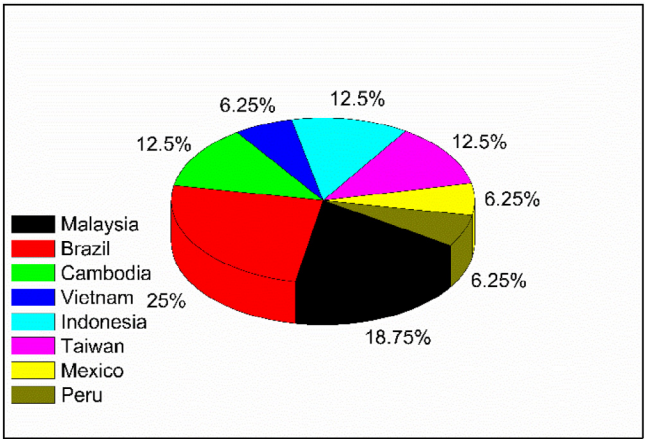

Fig. 1. Countries of the participants of the mentoring program.

experiences as leaders in Medical Physics. The mentees are free to ask questions, ask for advice and discuss topics of interest. These meetings are enhanced by visual cues, for example, the body language, which is sometimes lost in electronic communication.

To stimulate professional development, the mentees are responsible for meetings organization and to contact mentors, usually through email. The activity of organizing a meeting is extremely helpful, especially for the young mentees, to encourage communication with mentors, creating a link between both parts. The activities developed by the mentees are also focused on the development of leadership skills.

These meetings are held every two to three months based on the availability of participants. In between the meetings, the group makes use of email and a text app to share their achievements, new articles, meetings and events in all countries, establishing an information network. This setup is interesting because not only do the mentees establish a good relationship with their mentors, but also with the other mentees.

Due to the geographical location of the mentors and mentees (from Latin America to South East Asia), it is a challenge to have a group meeting at the same time. Since its formation in 2017, the group has utilized mobile instant messaging application (WhatsApp) and Voice over Internet Protocol (VoIP) technologies (Skype) to communicate. These applications allow the users to send real-time text messages to a group at one time or to have group discussions and presentations using voice and video at no extra cost. The WhatsApp group is a useful platform for group discussions, sharing information and experiences in respective fields, as well as for managing group meetings.

Another initiative to establish a mentoring relationship is through an online group conference call (Skype). It is aimed to provide the mentor-mentees with a real-time online platform to share their knowledge, experiences and professional insights; as well as to advise on career development. Since the initiation of the group, mentors from several countries and institutions had participated in the mentoring sessions:

- University of Malaya, Kuala Lumpur, Malaysia;
- University of Wisconsin, Madison, USA;
- Peter MacCallum Cancer Centre, Melbourne, AUS;
- University of South Australia, Adelaide, AUS;
- University of California, Davis, USA;
- University of Edinburgh, Edinburgh, UK;
- General Hospital of Athens, Athens, Greece;
- Emory University, Atlanta, USA;
- University of São Paulo, São Paulo, Brazil;
- The University of Texas MD Anderson Cancer Center, Texas, USA;
- King's College London, London, UK.

[1] https://medphysmentoring.wixsite.com/medphys-mentoring

Table 1
Discussion topics in the online conference calls between 2017 and 2020.

Meeting number/year	Topic of discussion
1/2017	Introduction and self-evaluation
2/2017	Research needs in medical physics: the importance of reading and discussion of papers (session of papers discussion)
3/2017	Medical physicist accreditation
4/2017	Qualifications for the future Medical Physicist: Certification and/or PhD?
1/2018	How to develop and improve leadership skills
2/2018	The essential skills to have a successful experience in clinical Medical Physics and become a leader in an academic clinical setting.
3/2018	Stepping Stones to Academic Success: A Personal Journey
4/2018	Breast CT technology and Leadership in Medical Physics
5/2018	Annual meeting and 2019 plan
1/2019	Leadership in Medical Physics
2/2019	The Sprawls Resources
3/2019	Radiological Accident in Goiania, Brazil
4/2019	Transition and Transformation: Experience from a Diagnostic Medical Physicist
1/2020	Making career decisions: the mix of research, clinical work, teaching and professional development

The online meetings are pre-arranged with the volunteering mentors about the timing and discussion topics, under the coordination of the mentees. Table 1 shows the list of the online group conference calls conducted between 2017 and 2020.

Mentees are encouraged to excel in their professional skills throughout the mentoring program, such as article writing and conference participation. Good examples of collaboration among the mentees are demonstrated through the publication of the article [21] and conference presentations. The article titled “Women in physics: pioneers who inspire us” was written by an initiative of female mentees of the group, guided by one mentor. Conference presentations, such as “ Global Leadership and Mentoring in Medical Physics” (World Congress of Medical Physics and Biomedical Engineering-2018), and the group’s website are other relevant ways to the dissemination of the work that has been developed in this group.

2.3. Online survey

The impact of the experience of early-career professionals and postgraduate students in Medical Physics in participating in this global mentoring scheme was assessed using an online survey sent to all mentees in the group. The survey was developed based on previous studies that used questionnaires to evaluate mentoring relationships [22–24]. The survey’s questions used in this study covered 10 main topics: mentee’s profile; the impact of mentoring relationships; the ability for development of mentoring relationships; satisfaction with mentoring; productivity; mentees’ roles; mentors’ roles; leadership initiative; leadership learning; leadership skills. The questionnaire (see Appendix) consists of open questions, multiple-choice questions (MCQ), e.g. questions to describe the mentee’ profile, and opinion questions, using a 5-point Likert scale with descriptors of agreement, difficulty, satisfaction, intensity, and frequency.

Concerning the mentee’s profile, the questionnaire asked about their background; country of origin; occupation area; time of participation in the group; and general questions about the impact that the mentoring group has had on their professional and personal lives. Besides, there was space for the participants to leave their opinions about the mentoring group. The following questions were used regarding the development of mentoring relationships: “How easy has it been for you to identify someone whose career could serve as a model for your own?” and “ How easy has it been for you to develop a relationship with the mentors of the group?”.

The satisfaction with the mentoring group was measured by asking the respondents about how much they were satisfied with the mentorship provided by this group. Productivity was assessed using questions related to papers and conference presentations for which the mentees had the participation and/or help of the mentor.

Since participation in this mentoring programme is voluntary, the mentees’ role can be related to their interest in working in this group. This topic was evaluated using six questions such as: “How much are you disposed to execute an activity as a volunteer in this group?” and “How much are you committed with the responsibilities that you assume as a volunteer in this group?”. Similarly, the mentors’ role for the mentees was assessed using six questions such as: “How much have your mentors served as role models?” and “How much have your mentors advised about getting your work published?”.

Finally, concerning the leadership, the respondents were asked about how many times they had the initiative to lead and suggest an activity for this group. Besides that, they had to comment on what lessons they learnt about leadership and to point out the leadership skills they already had as well as those they needed.

Responses to the survey were used to perform a SWOT analysis to examine the current status of the programme.

3. Results

Based on the responses to the online questionnaire, it was possible to summarize the group profile. As mentioned previously, the participants are from American and Asian continents (Fig. 1). Most of them are performing activities in Radio-diagnostics (43.8%) and Radiotherapy (31.3%). Postgraduate students form 50% of the group. One of them recently got a permanent position as a professor and researcher at a University. A significant proportion of the group (31.3%) works as medical physicists at clinics, hospitals or universities. Also, some participants work as health technology consultants.

Regarding the impact of participation in the mentoring group, most mentees (81.3%) have reported that the activities have positively impacted on both their personal and professional lives. One of the main activities of the group is to hear invited speakers (temporary mentors) share their knowledge of their expertise area or experiences as professionals. In this case, the young mentees have demonstrated a preference for talks about the mentors’ personal experiences and leadership advice instead of talks about Medical Physics techniques. A positive outcome of these mentors-mentees interactions is that some mentees (56.3%) communicated with mentors outside the group meetings, e.g. by sending e-mails directly to mentors with specific questions or asking for recommendation letters. The mentees have reported (~80%) that their participation in the group improved their leadership skills. Moreover, all of them believe that on some level, participation in the group changed their behaviour in challenging times and helped them to make decisions about their career.

When asked directly about the impact of the group on their personal and professional lives, the responses were varied. Positive aspects of the participation in the Leadership and Mentoring in Medical Physics are summarized below:

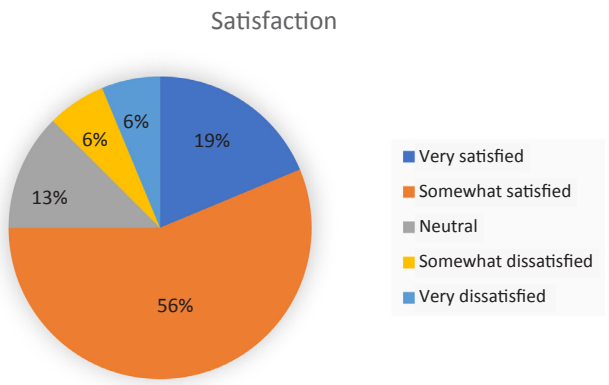

Fig. 2. Satisfaction level with the mentoring.

- Connection with members of the group for discussing questions.
- Opportunity to step out of one's comfort zone and to learn to handle international meetings.
- Professionally, the impact would be on writing papers together.
- The group helps to give a global view of the career.
- The group is a space to share experiences with pioneers and get advice on how to improve leadership skills.
- Increased self-confidence and reduced anxiety about new stages of the career.
- Managing the challenge of leading activities in a heterogeneous group where each person has a particular way of working.
- The exercise of being less shy when working in a group.
- Provides a platform to seek professional advice and learn from each other in the field of medical physics

The level of difficulty in establishing mentoring relationships between the respondents is considerably low. Only 12.5% of the respondents found it difficult to develop a relationship with the group mentors. About 25% of the respondents had difficulty in identifying someone whose career could serve as a model for their own.

As presented in Fig. 2, most of the participants were satisfied with the mentoring programme.

Although the main objective of the group is not the production of scientific works, half of the participants published at least one manuscript with some help or participation of the mentors as their co-author. Moreover, about 45% of participants have at least one conference presentation with the contribution of the mentors.

Some issues related to the mentees' role in the group were identified from the questionnaire responses, such as presented in Fig. 3. Only 25% of participants are willing at a high level (a lot/quite a bit) to volunteer activities in the group. The reason for this can be prioritization of obligations in their academic and professional lives, which are time-consuming. However, once they assumed a task, 50% were committed at a

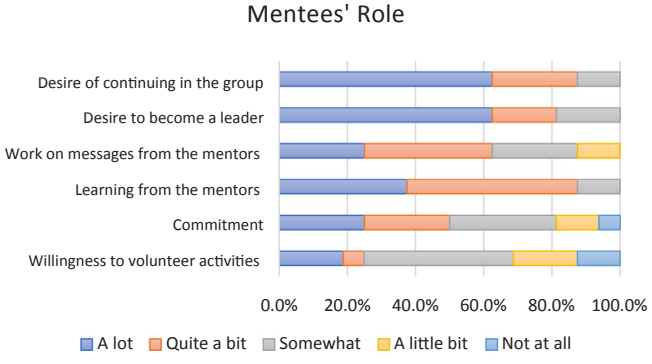

Fig. 3. Mentees' role in the mentoring program.

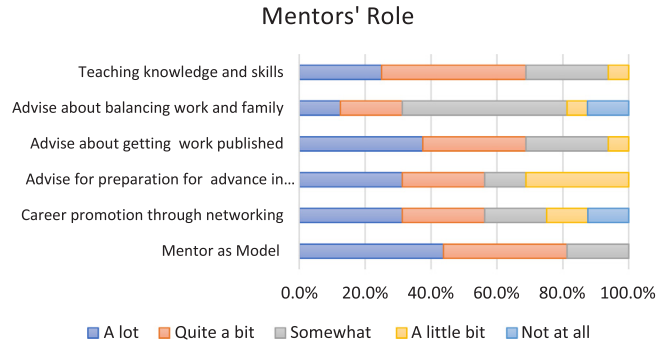

Fig. 4. Mentor's role in the mentoring programme.

high level to the accepting responsibility. Additionally, as shown in Fig. 3, most participants believe they have learnt from the mentors, they work on the messages from these experienced professionals, wish to become a leader and to continue being part of the mentoring programme.

Fig. 4 shows the responses to questions related to the mentors' role in the mentoring group. Most of the participants agree, at a higher level, that the mentors served as role models for their professional careers. Most participants also agree that the mentors helped to promote their careers through networking, advised them on preparation for career advancement, about getting their work published, and taught knowledge and skills. The balance between work and family is an issue not much discussed in this mentoring relationship.

Almost 68% of participants affirmed that they learnt (a lot/quite a bit) lessons about how to become a good leader, as presented in Fig. 5.

Answers given on leadership learning lessons, as shown in Fig. 5, likely refer to perceived opinions, since in practice, the number of participants acting as leaders inside the group is lower (Fig. 6). 43.8% of them have never led activity and 37.5% have never had the initiative to suggest an activity to be developed in the group, as presented in Fig. 6. This mentoring program is a space where young professionals, residents or students in Medical Physics are free to suggest or lead activities with a degree of autonomy. The result suggests that this space may be underused.

The participants were asked about the skills they think: i) a leader must have, ii) the leadership skills they have and iii) what they should improve to become a good leader. Responses to these questions are presented in Table 2. The survey revealed that most of the mentees believed they needed to improve confidence, communication, organization, and knowledge.

4. Discussion

There is increasing recognition of the importance of leadership

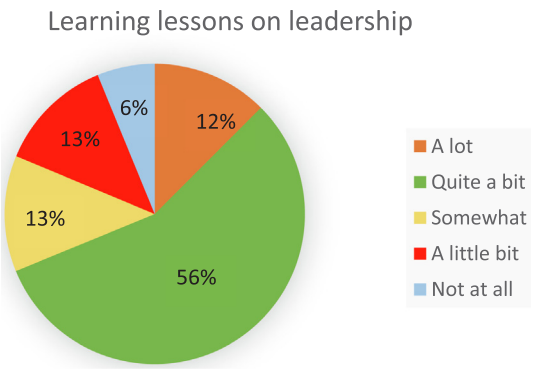

Fig. 5. Responses to the question "have you learned some lessons about how to became a good leader from this group?

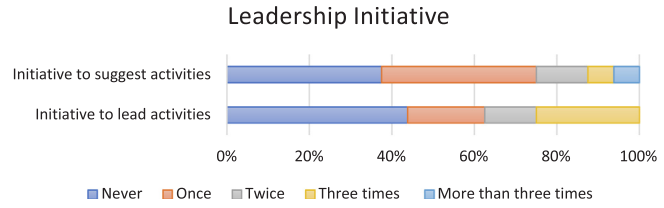

Fig. 6. The number of times the mentees had initiative to lead and suggest an activity.

among the medical physics profession [16–19]. This is particularly important in the healthcare sector which requires strong leadership to be actively involved in major decision making because of the ever-challenging and dynamic environment that we are facing now and in the future. Nevertheless, to our knowledge, no study has assessed the impact of mentoring as a tool for leadership development in Medical Physics. This article reports on the establishment of an international program on Leadership and Mentoring in Medical Physics and its impact on young medical physicists. The programme aspired to instil leadership values and skills amongst the professionals during the early stage of their career. Based on the feedback provided through the questionnaire, a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) was carried out to examine the current status of the programme. It is a subjective assessment based on the judgement of individual participants.

4.1. Strengths

The programme was developed based on the mutual agreement between the mentors and the mentees, and there was no cost incurred for programme participation. The volunteered mentors consisted of world leaders or practitioners in the field of Medical Physics who were willing to share their vast experiences and expert knowledge. These have provided the mentees with a widen perspective and personal insight into the issues and challenges that we are facing now. The study revealed that the majority of the mentees (> 80%) considered the mentors to be their role models and they have gained knowledge and skills from the mentors.

Most of the mentees are based in the developing countries (Latin America and South-East Asia) where the roles of medical physicists are still evolving or are even operating in resource-limited settings. Accessing a formal leadership training that is available in Europe [19] and North American regions [16] might be challenging as this involves significant costs and the trainee has to leave their job for some time to participate in the on-site programmes. Using the freely accessible online platform, group meetings or discussions can be conducted in real-time without the need for physical attendance. This is considered a cost-effective mode of training to provide a supportive environment to grow future leaders.

4.2. Weaknesses

On the other hand, the fact that the interactions are exclusively online has also created a virtual 'barrier' among the mentee-mentee and mentee-mentor. Some of the participants might not meet each other physically since the beginning of the programme. Moreover, they only 'meet up' with the mentors virtually for a limited time. Hence only 44% of the mentees think that the way to build up a relationship with a mentor is easy.

Participation in this program represents an extra activity completely voluntary for the mentees. Although it requires a few hours of their time in a year, the activities of the group can sometimes be less urgent than mandatory activities of the mentees' work routine. Different time zones also make it difficult to participate in group meetings. To overcome this problem, the meetings are recorded so that all mentees can be informed about the content of the meeting they missed.

The heterogeneity of the group and different ways of working of each person challenge the work in a group. Some mentees, for example, can naturally lead a group of colleagues in certain activities while others seem more comfortable in doing delegated activities. However, this heterogeneity provides an opportunity to learn diverse ways of working collectively. We believe that, if the mentees can lead a group as heterogeneous as this in some activities, they would be capable to lead

Table 2
Responses to questions about leadership skills.

Response Number	Questions		
	Cite 3 skills do you think a leader must to have	What skills of a leader do you have?	What could you improve to make yourself a good leader?
1	Communication, positivity, decision making	Positivity	I could trust more in myself
2	Organization, integrity, team building	Integrity and organization	Decisiveness and ability to teach
3	Management, hands on experience, networking	Hands on experience	Organize tasks and make it manageable, speak up
4	Time management, people skills, empathy	Empathy and some time management skills	Social skill
5	Confidence, responsibility, communication	Delegation, responsibility, communication	Confidence, organization, influence
6	Initiative, lead, persistence	Persistence in doing thing.	Keep practicing the leader role
7	Planning, communication, sympathy	Planning, communication, sympathy, problem solving	Gain experience
8	Effective communication, motivational and supportive	Active listening, organizing, and delegating	Prioritizing, time management and communication
9	Wisdom, ability to remain neutral, confidence	Confidence	Wisdom
10	Good communication skills, passion, hardworking	Hardworking, explore new things	Step out of the box (current limitations) and excel myself to enabling more contributions to the fields and the society
11	Collaboration, resilience, innovation	Resilience	Collaboration
12	Communication, Management, Decisive	Management	Communicate and do more networking
13	Courage, calm, knowledge	Courage and calm	The knowledge
14	Effective communication, ability to motivation, organization	Flexibility, positivity, analytical	Confidence and organization
15	Presentation, inspiring, negotiation	Presentation	Preparing a good knowledge and being more confident
16	Friendship, active, confident	Friendship, active	I need to have more confidence

other workgroups without much difficulty.

Moreover, this programme is neither a structured nor time specific training programme. The success of the programme mainly depends on the discipline of the mentees and mentors' willingness to share experience and commit time.

4.3. Opportunities

As indicated in this study, there are plenty of opportunities for the programme that could further enhance leadership skills. This study revealed that more than half of the mentees took the opportunity to expand their networks and formed research collaborations among themselves and the mentors, in particular, publishing their research work with the help of the mentors or preparing themselves for career advancement. With the development of these exclusive networks and relationships, this could be a useful platform for information exchange, academic collaboration and even clinical trials in the future.

Based on the feedback, it was found that most of the mentees (81%) had the same goal which is to become future leaders. They wished to continue participating in the programme. As the programme depends on the initiative of the mentees to coordinate the activities, it is envisaged that with the strong willingness of the mentees' involvement, the programme could be further improved.

With the rapid development of new technologies, the role of a medical physicist is not only to provide technical guidance but also to lead in strategic implementation and safe the use of complex medical devices particularly those involving radiation [16]. It is suggested that leadership skills should be integrated into the medical physics curriculum [17]. Besides, the requirements on the qualified expert or medical physics expert (MPE), as stipulated in Europe (directive 2013/59/EURATOM) and respective local regulatory requirements, demand a critical and consistent mass of medical physicists in leadership development. These represent further opportunities and relevancy for the programme to be further developed.

4.4. Threats

The flexibility of the programme and individual daily commitments resulted in relatively large time gaps between group meetings, causing a 'cooling down' period of the programme. The number of mentors is somewhat low considering the number of mentees, and it should be increased. Caruana [25] also discussed the threats to the medical physics profession in cases where the numbers of physics graduates were low and the medical physics roles were taken over by other professions. This could potentially slow down the progress of the programme.

4.5. Way forward

Leadership development is a crucial step to equip early-career medical physicists to deal with ever-increasing complexities of clinical tasks and to ensure the safe use of clinical technologies. This programme has the potential to create more 'future leaders' to cater for future needs. The efficiency of the training programme could be further improved by converting it to a structured training programme recognized by the local authorities. Further collaborations with European and American counterparts in their formal programmes could expand networks of mentees. The leaders of the programme should work towards appointing successors.

5. Conclusions

Through the experience reported, it was possible to observe positive consequences of mentoring in the personal and professional lives of the participants in the Leadership and Mentoring in Medical Physics group. According to the participants, guidance and support from mentors have had a great impact on decision making and strongly influenced the participants at different levels of their lives. Participation of medical physicists in the mentoring group shows nothing but positive impressions, indicating that this practice should be extended. We recommend mentoring for leadership to be implemented as an extracurricular activity whenever possible. We intend to expand and diversify the group with the participation of medical physicists from other continents, such as Africa and Europe, soon.

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Appendix. Questionnaire applied via google forms

Leadership and mentoring group experience

This quick quiz will be used to collect information about the experience within the group. Answers are private and names are not required. All data collect will be used to write a paper about our experience. Thank you all for participating.

*Required

Question	Response				
Mentee's profile					
Where are you from? *					
Which year did you join the group? *					
What is your main field? *	☐ Radiotherapy	☐ Nuclear Medicine	☐ Radio diagnostic	☐ None of alternatives	☐ Other: _____
How you describe your position? *	☐ Researcher (Undergrad/ Masters/PhD Student)	☐ Medical Physicist at clinical/hospitals	☐ University Professor	☐ Other: _____	
Impact of mentoring relationships					

The participation on the group had more impact on your personal life or on your professional life? *	☐ Personal life	☐ Professional life	☐ Both	☐ The participation on the group had NO impact on my personal and professional life	☐ Other: _____
Do you prefer when mentors share about their personal experience or talk about medical physics techniques? *	☐ Talks about personal experience and leadership			☐ Talks about medical physics techniques	
Did you have contact with mentors outside the group meeting? (e.g. Send e-mail directly to the mentor with specific questions, asked for recommendation letters) *	☐ Yes			☐ No	
The participation in the group impact my way to make decisions. *		1	2	3	4 5
	Do not agree	☐	☐	☐	☐ ☐ Agree
My participation in the group improve my leadership skills. *		1	2	3	4 5
	Do not agree	☐	☐	☐	☐ ☐ Agree
The participation in the group change my behaviour when facing hard times. *		1	2	3	4 5
	Do not agree	☐	☐	☐	☐ ☐ Agree
The participation in the group helped me to make decisions about my career. .*		1	2	3	4 5
	Do not agree	☐	☐	☐	☐ ☐ Agree
Which advice most impact your life? What mentor gave it? *					
Please share the impact of the group on your professional or personal life. (Optional)					
Development of mentoring relationships:					
How easy has it been for you to identify someone whose career could serve as a model for your own? *	☐ Very easy	☐ Easy	☐ Neutral	☐ Difficult	☐ Very difficult
How easy has it been for you to develop a relationship with the mentors of the group? *	☐ Very easy	☐ Easy	☐ Neutral	☐ Difficult	☐ Very difficult
Satisfaction with mentoring					
How much are you satisfied with the mentorship provided by this group? *	☐ Very dissatisfied	☐ Somewhat dissatisfied	☐ Neutral	☐ Somewhat satisfied	☐ Very satisfied
Productivity					
How many papers have you published with some help or participation of the mentors as your co-author? *	☐ None	☐ One	☐ Two	☐ Three	☐ More than three
How many times did you have help or the participation of the mentors as your co-author in a conference presentation? *	☐ Never	☐ Once	☐ Twice	☐ Three times	☐ More than three
Mentee's roles					
How much are you disposed to execute an activity as volunteer in this group? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much are you committed with the responsibilities that you assume as volunteer in this group? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have you learned from the messages given by the mentors? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much do you work on the messages from the mentors? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much do you want to become a leader? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much do you want to continue being part of this group? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
Mentor's roles					
How much have your mentors served as role models? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have your mentors promoted your career through networking? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have your mentors advised about preparation for advancement (eg, Promotion, leadership positions, scholarships (master, PhD), post doctorate)? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have your mentors advised about getting your work published? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have your mentors advised about balancing work and family? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
How much have your mentors taught you knowledge and skills? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
Leadership initiative					
How many times did you lead an activity in this group? *	☐ Never	☐ Once	☐ Twice	☐ Three times	☐ More than three times
How many times did you had the initiative to suggest an activity in the group?	☐ Never	☐ Once	☐ Twice	☐ Three times	☐ More than three times
Learning to be a leader in the group					
Have you learned some lessons about how to become a good leader from this group? *	☐ Not at all	☐ A little bit	☐ Somewhat	☐ Quite a bit	☐ A lot
Leadership skills					
Cite 3 skills do you think a leader have to have *					
What skills of a leader do you have? *					
What could you improve to make yourself a good leader? *					

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