ACCREDITATION OF MEDICAL EDUCATION PROGRAMS, RESIDENCY PROGRAMS AND CPD ACCREDITATION OF EDUCATIONAL ACTIVITIES - IOMP INITIATIVES

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Abstract — **Harmonization, standardization, and accreditation are essential processes for ensuring the quality and consistency of medical physics education. This article explores the importance of harmonization, standardization, and accreditation in medical physics education, detailing their benefits, challenges, IOMP initiatives and implementation strategies. The IOMP is instrumental in developing and updating educational standards and guidelines which ensure that educational programs provide comprehensive and up-to-date training. The article highlights ongoing Medical Physics education programmes; importance of harmonization, standardization and accreditation in medical physics education; challenges in implementing harmonization, standardization and accreditation; status of medical physics profession; IOMP initiatives for improving medical physics education; and activities of the IOMP accreditation board.**

Keywords— **harmonization, standardization, accreditation.**

I. INTRODUCTION

Medical physics is a dynamic field that bridges the gap between physics and medicine, playing a critical role in the diagnosis and treatment of diseases through advanced imaging and radiation therapy. The continuous advancement in medical technologies and practices necessitates that medical physics education remains current and of high quality.

As the field evolves, the need for harmonization, standardization, and accreditation of medical physics education becomes increasingly vital. These processes ensure that medical physics programs provide consistent, high-quality education that meets global standards and prepares graduates to meet the demands of the profession. Harmonized educational standards enable medical physics professionals to work and be recognized internationally and crucial in a world where healthcare professionals often cross borders to provide expertise and services.

Harmonization ensures that all educational programs meet a minimum standard of quality. This consistency is critical for maintaining the integrity and reputation of the medical physics profession. When educational standards are harmonized, it is easier for institutions to collaborate on research, training programs, and professional development initiatives. This article explores the importance of harmonization, standardization, and accreditation in medical physics education, detailing their benefits, challenges, IOMP initiatives and implementation strategies.

II. ROLE OF PROFESSIONAL ORGANISATIONS IN SHAPING THE PROFESSIONAL CURRICULUM

Professional organizations such as International Organization for Medical Physics (IOMP), the American Association of Physicists in Medicine (AAPM), regional organisations of IOMP and many others play a central role in setting educational standards. In addition to professional organisations, organisations such as International Atomic Energy Agency [IAEA], Abdul Salam International Center for Theoretical Physics [ICTP], World Health Organisation [WHO], Commission on Accreditation of Medical Physics Education [CAMPEP], American Board of radiology [ABR] provide guidelines, accreditation, certification, and continuing education opportunities that shape the curriculum and ensure that programs meet high standards.

Professional organizations are instrumental in developing and updating educational standards and guidelines. These standards ensure that educational programs provide comprehensive and up-to-date training. For example, IOMP Policy Statement No. 2 ‘Basic requirements for education and training of medical physicists’ and the IAEA Publication- Training Course Series No. 56 [Rev. 1] which is endorsed by the IOMP) incorporates the IOMP Model Curriculum provides necessary information for starting Medical Physics educational programmes.

According to the IAEA Human Health Series (HHS 25), the structure of medical physics education and training should be:

- *A university degree in physics, engineering, or equivalent physical science.*
- *Appropriate academic qualifications in medical physics (or equivalent) at the postgraduate level.*
- *At least two years (full time equivalent) structured clinical in-service training undertaken in a hospital*

The holder of a university degree in medical physics without the required hospital training cannot be considered Clinically Qualified Medical Physicist (CQMP). Further this education and training should be recognized by a national accreditation body.

However, for Latin America and Africa region, to facilitate and cope up with the grave shortage of CQMP in the region one-year full time structured clinical residency is enough to be considered CQMP.

For the Africa region, the document - African Regional Cooperative Agreement for Research, Development and

Training Related to Nuclear Science and Technology (AFRA) academic and clinical training programmes and portfolios for the regional training in medical physics - Minimum Requirements for Medical Physics Education in AFRA Member States are used, whiles for the Latin America region the document - Guías de Formación Académica y Entrenamiento Clínico para Físicos Médicos en América Latina - ALFIM- IAEA [Academic Education and Clinical Training Guides for Medical Physicists in Latin America is available and followed.

III. ONGOING MEDICAL PHYSICS EDUCATION PROGRAMMES

To cope with the growing demand of medical physicists, many Institutes/Universities have started medical education programs across the globe. The Education and Training Committee [ETC] of IOMP has compiled the data on medical physics education programs around the world and at present more than 390 Medical Physics undergraduate / postgraduate and research programmes are available with the distribution in various regions as follows:

- *ALFIM [Latin America] - 46 programmes i.e. 0.076 programs/million population*
- MEFOMP [Middle east] - 21 *programmes i.e.* 0.08 programs/million population
- AFOMP [Asia Oceania] - 119 *programmes i.e.* 0.03 programs/million population
- USA - 42 *programmes i.e.* 0.127 programs/million population
- EFOMP [Europe] -105 *programmes i.e.* 0.141 programs/million population
- FAMPO [Africa] – 37 *programmes i.e.* 0.026 programs/million population
- CANADA – 18 *programmes i.e.* 0.49 programs/million population

The details are available at https://www.iomp.org/education-training-resources/

Further we find a huge diversity and therefore the task of harmonization of Medical Physics education and profession is quite challenging because of heterogeneity in terms of socioeconomic and educational standards. Further there is a big gap in availability of CQMP in various regions and, therefore a great potential to ramp up the structured education and training of medical physicists to cope with the growing need of not only today but also of future.

IV. THE IMPORTANCE OF HARMONIZATION IN MEDICAL PHYSICS EDUCATION

Harmonization refers to the process of aligning educational standards and practices across different institutions, regions and globally. In the context of medical physics education, harmonization is essential for ensuring that all students receive a comparable level of education, regardless of where they study.

a) Global Mobility and Recognition

Harmonized educational standards enable medical physics professionals to work and be recognized internationally. This global mobility is crucial in a world where healthcare professionals often cross borders to provide expertise and services.

b) Quality Assurance

Harmonization ensures that all educational programs meet a minimum standard of quality. This consistency is critical for maintaining the integrity and reputation of the medical physics profession.

c) Facilitating Collaboration

When educational standards are harmonized, it is easier for institutions, professional organisations and regulatory authorities to collaborate on research, training programs, and professional development initiatives. This collaboration can lead to significant advancements in the field and the sharing of best practices for benefit of society.

V. THE IMPORTANCE OF STANDARDIZATION IN MEDICAL PHYSICS EDUCATION

Standardization involves establishing and enforcing consistent educational criteria and practices across medical physics programs. This process is fundamental to ensuring that all students receive the same foundational knowledge and skills irrespective of the nation, state or region.

a) Curriculum Development

Standardization helps in developing a core curriculum that all medical physics programs must follow. This ensures that essential topics and competencies are covered uniformly across programs.

b) Benchmarking and Assessment

Standardized criteria allow for the benchmarking of educational programs and the assessment of their effectiveness. This process helps in identifying areas for improvement and ensuring that programs continuously meet high standards.

c) Certainty for Employers

Employers can be confident that graduates from standardized programs possess the necessary skills and knowledge to perform effectively. This certainty is crucial for maintaining high standards of patient care and safety.

VI. THE IMPORTANCE OF ACCREDITATION IN MEDICAL PHYSICS EDUCATION

Accreditation of medical physics education programs plays a pivotal role in maintaining and enhancing the quality and relevance of these programs. Accreditation is a process by which educational programs undergo rigorous evaluation to ensure that they meet predetermined standards of quality and effectiveness. These standards cover various aspects, including curriculum design, faculty qualifications, clinical training, and resources, ensuring a comprehensive and well-rounded educational experience. There are many stakeholders and beneficiaries of accreditation. Accreditation serves as an assurance of quality for students, educators, and the broader healthcare community. Prospective students can confidently choose accredited programs, knowing that they meet health industry-recognized standards. Employers, in turn, can trust that graduates from accredited programs are well-prepared and possess the necessary competencies for their roles as medical physicists. The presence of **accreditation adds validity to the profession's claims to quality, increasing consumer confidence at all levels.** Therefore, accreditation of medical physics education programs is essential for ensuring high-quality, standardized, and globally recognized training for future professionals. Despite challenges, the advantages far outweigh the drawbacks, making accreditation a cornerstone for advancing the field of medical physics.

VII. ADVANTAGES OF ACCREDITATION OF EDUCATIONAL PROGRAMMES

a) Ensuring Educational Quality

Accreditation ensures that educational programs adhere to rigorous standards of quality. Accredited programs undergo regular evaluations to maintain their status, ensuring continuous improvement and adherence to best practices.

b) Student Confidence

Students enrolled in accredited programs can be confident that they are receiving a high-quality education that will be recognized by employers and professional bodies. This confidence is crucial for attracting and retaining talented students.

c) Professional Certification

Accreditation is often a prerequisite for professional certification. Graduates from accredited programs are typically eligible to sit for certification exams, which are essential for professional practice in many regions.

VIII. CHALLENGES IN IMPLEMENTING HARMONIZATION, STANDARDIZATION AND ACCREDITATION

There is a huge disparity in economic, social, educational standards across the globe. Some countries and regions are highly developed and has high standards of education as well healthcare system and therefore it is quite difficult and challenging to achieve perfect harmonization, however efforts are put to have a minimum standard and uniformity. In this direction IOMP and IAEA are working in collaboration and have brought out many guidelines for harmonization, standardizing and accreditation of medical physics education.

a) Diverse Educational Systems

Different regions and countries have diverse educational systems, making it challenging to implement uniform standards. Overcoming these differences requires significant coordination and cooperation among various stakeholders.

b) Resource Limitations

Implementing and maintaining harmonization, standardization, and accreditation processes can be resource intensive. Institutions may face challenges in allocating the necessary resources for these activities.

c) Resistance to Change

Institutions and individuals may resist changes to established practices and curricula. Overcoming this resistance requires effective communication and demonstrating the benefits of these processes.

IX. STRATEGIES FOR EFFECTIVE IMPLEMENTATION

a) Stakeholder Collaboration

Collaboration among professional organizations, academic institutions, healthcare facilities, and regulatory bodies is essential for effective implementation. Stakeholders must work together to develop and enforce standards that meet the needs of the profession.

b) Regular Review and Updates

Educational standards and accreditation criteria should be regularly reviewed and updated to reflect advancements in the field and emerging best practices. This ensures that programs remain relevant and effective.

c) Capacity Building

Efforts should be made to build the capacity of institutions to implement and maintain harmonization, standardization, and accreditation processes. This includes providing training, resources, and support to educators and administrators.

d) Global Initiatives

Global initiatives, such as those led by the International Organization for Medical Physics (IOMP) and the International Atomic Energy Agency (IAEA), can play a crucial role in promoting harmonization and standardization. These initiatives can provide guidelines, resources, and support to institutions worldwide. The IAEA has been instrumental in supporting medical physics education in developing countries through its Human Health Division. By providing educational resources, training programs, and fellowships, the IAEA helps to raise the standards of medical physics education globally.

X. STATUS OF THE MEDICAL PHYSICS PROFESSION GLOBALLY

The status of medical physicists varies significantly across regions, influenced by local healthcare systems and regulatory frameworks.

A) High-Income Countries (HICs):

- **Recognition**: Medical physicists are well-established as integral members of healthcare teams in regions like North America, Europe, and Australia.
- **Regulation**: Many countries require certification by professional bodies, such as the American Board of Radiology (ABR) or EFOMP.
- **Challenges**: Despite high recognition, there is a growing demand for medical physicists due to advancements in technologies like proton therapy and AI-based systems.

B) Low- and Middle-Income Countries (LMICs):

- **Recognition**: In many LMICs, medical physics is still an emerging profession, with limited understanding of its role in healthcare.
- **Regulation**: Few countries have established certification or licensure requirements.
- **Challenges**: Lack of accredited education and training programs; Inadequate resources for clinical practice; Brain drain, with trained professionals migrating to high-income countries.

XI. IOMP INITIATIVES FOR IMPROVING MEDICAL PHYSICS EDUCATION

Establishing Global Education Standards

One of the IOMP's primary missions is to harmonize medical physics education globally, ensuring consistent training standards.

- **Educational Modules**: The IOMP has developed a series of educational materials, including textbooks, online resources, and structured training programs, to support medical physics education worldwide.
- **Core Curriculum**: The IOMP has published guidelines on the essential components of medical physics education, encompassing topics like radiation safety, imaging physics, and treatment planning.
- **IOMP School**: A virtual platform offering webinars, online courses, and certification programs.
- **Collaborations**: Partnerships with organizations like IAEA, WHO to develop documents, training materials.

XII. IOMP ACCREDITATION BOARD

IOMP Accreditation Board [AB] has been set up in 2016 to ensure that accredited medical physics programs satisfy the highest standards established by IOMP. The IOMP accreditation board accredits medical physics degree/Post graduate programs, residency programmes, medical physics education and training institutions/centers and education and training events.

Until November 2024, IOMP AB has accredited 7 masters' in medical physics education programmes, 05 Medical Physics residency programmes and 23 CPD accreditation of educational/training programmes. As a case study, accreditation of Master's in Medical Physics [MSc-MP] program from National University of Colombia, Bogota, Colombia accomplished in September 2024 and IOMP accreditation awarded for 5 years from 1 November 2024 is discussed herewith.

IOMP Accreditation was received from course coordinator on 05 May 2024. The Chair of IOMP Accreditation Board assessed the documents submitted, provided preliminary feedback, and requested additional information. As per the accreditation manual, Chair of AB constituted the assessment team [AT]. The AT sought relevant information, detailed clarifications and documents from course coordinator. Finally, an accreditation visit to the program was arranged during 18-20 September 2024 to verify the facilities, the submitted documents, interaction with students, alumni, faculty, supervisors and feedback documents.

The IOMP On-Site AT was satisfied with the structure, quality and performance of the program. The program meets all the criteria recommended by the IOMP for a high-quality postgraduate medical physics education program. Upon endorsement of report, AB recommended for IOMP accreditation of the Master of Medical Physics (MSc-Medical Physics) program offered by the National University of Colombia, Bogota for 5 years which was approved by IOMP ExCom. Chairman of the AB issued the accreditation certificate for the program.

XIII. DETAILS ABOUT THE PROGRAM

The Master of Medical Physics (MSc- Medical Physics) program offered by the National University of Colombia, Bogota was founded in 2006. It is the first postgraduate medical physics education program in Colombia to cater to need of medical physicists for the country.

Another private university has started the Postgraduate medical physics program recently, second program in Colombia. The program closely follows the academic syllabus and curriculum recommended by IAEA [TCS 56 (Rev)].

The program admits 12 students annually and nowadays has 22 active MP master's students. The selection process consists of a knowledge test (40%), a curriculum vitae (30%), and an individual interview (30%). The program has graduated a total of 119 MP students since 2006, where 94% are working as medical physicists in healthcare institutions, 3.4% in companies and government, and the rest in companies created by former graduates. The master's activities are divided into coursework and clinical practice. Coursework is primarily conducted in the University Bogotá campus.

Clinical practices are carried out in 9 hospital institutions located in Bogotá (Instituto Nacional de Cancerología, Fundación Santa Fé, Radioterapia Oncologia Marly, Fundación Clinica Shaio, Hospital Universitário Nacional de Colombia), Cali (Fundación Valle del Lili and Hospital Universitário del Valle Evaristo García), Medellín (Hospital Pablo Toben Uribe), and Neiva (Hospital Hernando Moncaelano Perdomo).

The maximum Grade Point Average (GPA) is 5.0, and the passing GPA is 3.0 or above.

Further it is important to note that the Master Medical Physics program at National University of Colombia has received high-quality accreditation from the Ministry of National Education on August 30th, 2024 (Resolution nº 013943).

Some of important benefits of IOMP accreditation are:

- Reputation of accredited programs and courses which will result in more demand for these education and training activities
- Provision of an international dimension to an education event that will attract participants from other countries
- Evidence of highest teaching standards and best preparation of medical physicists for the work environment
- Publication of accredited programs and courses on the IOMP website

Further details about IOMP accreditation program, manual, application forms, list of accredited programmes and related information are available at https://www.iomp.org/accreditation/

XIV. PHOTOS OF ACCREDITATION BOARD ACTIVITIES

Fig. 1: Meeting with Vice President of Aacdemic Affairs [Vice Chancellor], Deans of faculties, Coordinator and course director

Fig. 2: Visit to Medical Physics Demonstartion labs

Fig. 3: Visit to National Cancer institute, Bogota

XV. CONCLUSION

Harmonization, standardization, and accreditation are essential processes for ensuring the quality and consistency of medical physics education. These processes provide numerous benefits, including improved educational outcomes, enhanced professional practice, and global consistency. While there are challenges to implementation, effective strategies and collaboration among stakeholders can overcome these obstacles. As the field of medical physics continues to evolve, the importance of these processes will only increase, ensuring that educational programs remain relevant and capable of preparing professionals to meet the demands of modern healthcare. Accreditation is not a one-time achievement but an ongoing

commitment to continuous improvement. Accredited programs are expected to engage in self-assessment, regular evaluations, and updates to stay contemporary with evolving educational practices, emerging technologies, and advancements in the field. This commitment ensures that graduates are equipped with the latest knowledge and skills relevant to contemporary healthcare needs.

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