

MEDICAL PHYSICS IN THE EFOMP REGION: HISTORY, EDUCATION, AND PROFESSIONAL RECOGNITION

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Abstract— The European Federation of Organisations for Medical Physics (EFOMP) was founded in 1980 in London. Its aims were to foster communication and coordinate activities between medical physics organisations, create such organisations where none existed, provide educational standards, content and facilitate exchange of medical physicists. EFOMP has largely delivered on these core objectives for its 9,000 members in 36 countries which are summarised in its slogan of “Communicate, Integrate and Educate”. The current focus for EFOMP remains the recognition of a common training standard, and delivery of enhanced educational offerings for medical physicists and radiation protection experts.

Keywords— Medical Physics, Education, Training, Accreditation, EFOMP, Europe

I. INTRODUCTION

The historical origins of medical physics can be traced from the first use of weighing as a means of monitoring health by Sanctorius in the early seventeenth century to the emergence of radiology, phototherapy and electrotherapy at the end of the nineteenth century. There are many origins of medical physics, stemming from the many intersections between physics and medicine. Overall, the early nineteenth-century definition of medical physics still holds today: “Physics applied to the knowledge of the human body, to its preservation and to the cure of its illnesses” [1]. Medical physics is now an established and important branch of medical science. The physical scientist applies their fundamental scientific knowledge to problems appearing in ionizing and non-ionizing radiation, radiology, nuclear medicine, radiotherapy, ultrasound, laser, physiological measurement, bioengineering, surgery, audiometry and photometry. Nowadays, the contribution of the medical physics community extends from fundamental research on the effects of radiation, proper dosimetry, to equipment and facilities design, optimisation of the benefit risk ratio in both the treatment and diagnosis of medical conditions. EFOMP plays a key role in supporting the European medical physics community in delivering these goals.

II. HISTORY OF MEDICAL PHYSICS IN EUROPE

In February 1978, the Council of the UK’s Hospital Physicists’ Association (H.P.A.) identified the need to

establish a body that would be recognised throughout Europe as representing the unified opinion of European Medical Physics, “A voice for Medical Physics in Europe”. The draft constitution of the proposed Federation was circulated to all interested national organisations and at a second meeting held in London, from 7th-9th May 1980 (Fig. 1), the constitution was formally accepted by delegates representing the medical physics organisations of fourteen countries, who thus became the founder members of the Federation. Delegates from several organisations who at that time had not approved the proposed constitution were able to express the wish of their respective organisation to join the Federation at an early date [2].



Fig. 1 Founding members of EFOMP pictured at the inaugural meeting in London

When the formalities were completed, the European Federation of Organisations for Medical Physics (EFOMP) represented about 3,000 medical physicists. The following officers were elected: President: I. Clifton (UK), Vice President: I. Chavaudra (FR), Past President: J.S. Orr (UK) Secretary General: A. Benini (IT) Treasurer: F. Welde (NO). Four EFOMP committees were constituted: Education and Training, chaired by A. Kahl (DE), Committee on Professional Matters chaired by P.K. Asard, (SE), Publications Committee chaired by C. Franconi (IT), and Scientific Activities chaired by R.E. Ellis (UK). The aims and purpose of EFOMP were defined as follows:

- Fostering and co-ordinating the activities of Member Organisations;
- Encouraging exchanges between Member Organisations and disseminating professional and

scientific information;

- Encouraging scholarships and the exchange of Medical Physicists between countries;
- Proposing guidelines for education, training and accreditation programmes;
- Making recommendations on the appropriate general responsibilities;
- Encouraging the formation of organisations for Medical Physics where such organisations do not exist.

These aims still exist today, when EFOMP represents over 9,000 medical physicists in 36 European countries (Fig. 2). Throughout the years, two committees were formed on top of the initial ones: European Matters and Projects. The governing body of EFOMP is its Council which consists of representatives of the National Member Organisations (NMOs). Each country can only be represented by one NMO. When a country has more than one eligible society there must be a formal arrangement as to which will represent the country as its NMO. The executive committee consists of the President, Past/Vice President, Secretary General and Treasurer. The executive committee and chairs of the six committees meet at least twice a year, as a Governing Committee. Its remit is to manage the affairs of EFOMP and prepare papers for the Council. In January 2021, EFOMP relocated its seat from the UK to the Netherlands.

III. EDUCATION AND TRAINING

Education and training are provided by the three main pillars of EFOMP, namely to “Communicate, Integrate and Educate”. ESMPE, the European School for Medical Physics Experts, organizes medical physics education and training events specifically targeted to Medical Physicists who are already Medical Physics Experts (MPEs) or would like to achieve Medical Physics Expert (MPE) status. These events are open to all European Medical Physicists and are accredited by an independent body, the European Board of Accreditation for Medical Physics (EBAMP) to ensure that they are at the required educational level, i.e., Level 8 of the European Qualifications Framework. Several editions have been organized jointly with COCIR, the European Trade Association representing the medical imaging, radiotherapy, health ICT and electromedical industries, driven by the need for a closer cooperation between manufacturers and medical physicists to increase the awareness of features of medical devices related to imaging and therapy. This collaboration extends in many levels such as joint actions related to the age profile of medical equipment which is installed in European countries since obsolescent equipment can undermine patient safety as well as developing guidelines for manufacturers to meet the requirements of article 78.2 of the Basic Safety Standards (BSS) Directive (96/29/Euratom) which sets out standards for radiation protection in the Member States. Indeed, having such links with COCIR allows us to assess the

Member State	Current National Member Organisation
 Albania	Albanian Association of Medical Physics (AAMP)
 Austria	Austrian Society of Medical Physics (ÖGMP)
 Belgium	Société Belge des Physiciens des Hôpitaux Belgische Vereniging Ziekenhuis Fysici (SBPH-BVZF)
 Bosnia and Herzegovina	Association of Medical Physicists in Bosnia and Herzegovina (AMPBH)
 Bulgaria	Bulgarian Society of Biomedical Physics and Engineering (BSBPE)
 Croatia	Croatian Biomedical Engineering and Medical Physics Society (CROBEMPS)
 Cyprus	Cyprus Association of Medical Physics and Bio-Medical Engineering (CAMPBE)
 Czech Republic	Czech Association of Medical Physicists (CAMP)
 Denmark	Danish Society for Medical Physics (DSMP)
 Estonia	Estonian Society for Biomedical Engineering and Medical Physics (ESBEMP)
 Finland	Finnish Association of Hospital Physicists (FAHP)
 France	Société Française de Physique Médicale (SFFPM)
 Germany	Deutsche Gesellschaft für Medizinische Physik (DGMP)
 Greece	Hellenic Association of Medical Physicists (HAMF)
 Hungary	Hungarian Society of Medical Physics (HSMP)
 Ireland	Irish Association of Physicists in Medicine (IAPM)
 Italy	Associazione Italiana di Fisica Medica (AIFM)
 Latvia	Latvian Medical Engineering and Physics Society (LMEPS)
 Lithuania	Lithuanian Association of Medical physics and Biomedical Engineering (LMPBIA)
 Malta	Malta Association of Medical Physicists (MAMP)
 Moldova	Association of Medical Physicists from the Republic of Moldova (AFM/Moldova)
 Netherlands	Nederlandse vereniging voor klinische fysica (NVKF)
 North Macedonia	Association of Medical Physics and Biomedical Engineering (AMPBE)
 Norway	Norwegian Association of Medical Physics (NFMF)
 Poland	Polish Society of Medical Physics (PSMP)
 Portugal	Medical Physics Division of the Portuguese Physics Society (PPS)
 Romania	Romanian College of Medical Physicists Colegiul Fizicienilor Medicali din Romania (CFMR)
 Russia	Association of Medical Physicists of Russia (AMPR)
 Serbia	Serbian Association of Medical Physicists (DMFS)
 Slovakia	Slovak Society of Physics and Biophysics Slovak Medical Society (SKBS)
 Slovenia	Slovenian Biophysical Society (SBS)
 Spain	Sociedad Española de Física Médica (SEFM)
 Sweden	Swedish Hospital Physicists Association (SHPA)
 Switzerland	Schweizerische Gesellschaft für Strahlenbiologie und Medizinische Physik Société Suisse de Radiologie et de Physique Médicale Società Svizzera di Radiobiologia e di Fisica Medica (SGSMP-SSRPM-SSRFM)
 Ukraine	Ukrainian Association of Medical Physicists (UAMP)
 United Kingdom	Institute of Physics and Engineering in Medicine (IPeM)

Fig. 2 National Member Organisations of EFOMP in 2021[3]

current and future medical physics requirements for delivery of clinical services. Currently, the numbers vary widely in each region. For example, Western Europe has of the order of 7 Linacs per million population (3.1 in Eastern Europe), 24 CT scanners per million population (15 in Eastern Europe), 20 MRI scanners per million population (7 in Eastern Europe), 2.6 PET scanners per million population (0.7 in Eastern Europe) [5,6].

Since the end of February 2020, European countries have been in the midst of an unprecedented challenge due to the COVID-19 pandemic, and this was a challenging time for the whole Medical Physics community. Thus, a series of online Medical Physics webinars and workshops were organized in order to sustain EFOMP education and training activities. EFOMP digital resources have been used to host educational and training events organized by the NMOs.

ECMP is the European Congress of Medical Physics. During the period 1987 to 2016, EFOMP has collaborated with National Member Organisations in holding regular

European Conferences of Medical Physics in conjunction with their events. In 2016, the idea of organizing a biennial EFOMP congress became a reality, thus the 1st ECMP took place in Athens, Greece and the 2nd in Copenhagen, Denmark. The 3rd ECMP was initially planned to be held in Torino, Italy but due to the pandemic was converted to a fully digital event. The 4th ECMP will take place in Dublin, Ireland in 2022 as a hybrid event.

EJMP, the European Journal of Medical Physics (EJMP), is the official scientific journal of EFOMP. The owner of the journal is the Italian Association of Medical Physics (AIFM), and it is also the official organ of the French (SFPM), Irish (IAPM), Czech Republic (CAMP) and Hellenic (HAMP) Societies of Medical Physics. In 2019, EJMP became the official publication of the International Organization for Medical Physics (IOMP) and provides an international forum for research and reviews on imaging, therapy, radiation protection, professional and educational topics as well as new emerging technologies. A volume is published every month.

The main target of EFOMP is the harmonization of Medical Physics education and training standards throughout Europe. For this purpose, two elements have been implemented:

1. NMOs National Registration Scheme (NRS), a system for education, training and registration of MPEs in place. This can be validated by the Professional Matters Committee and approved by the EFOMP governing committee. The long-term aim of the NRS is a generally accepted level of expertise, facilitating an exchange of professionals across Europe. EFOMP has published several policies concerning the education, training and registration of MPEs [7]. Four of these policies [PS2, PS3, PS4, PS6] describe recommendations which have to be fulfilled by an NRS in order to meet the EFOMP standard.
2. The European Examination board (EEB) awards the European Diploma of Medical Physics (EDMP) and the European Attestation Certificate (EACMPE) to those Medical Physicists that have reached the Medical Physics Expert level. EEB examinations are tests of excellence in Medical Physics, and they are designed to assess the knowledge, skills and competences requisite for the delivery of high standard Medical Physics services.

In 2019, EFOMP developed an e-learning platform, where video recordings of the lectures given during the EFOMP school editions, webinars and workshops, and NMOs' events have been made available to Individual Associate Members of EFOMP.

IV. SCIENTIFIC EXCHANGE

Included in the scope of the federation is to coordinate scientific activities and to support the development of

guidelines and directives. A number of Working Groups have been established and operate for a specific time period to create quality control protocols, guidance documents, harmonise practices, update core curricula in all subspecialties.

Special Interest Groups (SIG) are also formed to establish networks of medical physicists working in a specific area such as Nuclear Medicine Dosimetry, Dental Imaging etc. The SIGs aim to fulfil the need for networking, education, research and professional exchanges in this field.

Scientific exchange is also fulfilled through Memoranda of Understanding and collaborations with European and International bodies including AAPM, COCIR, EANM, ESR, ESMRMB, EFRS, EUSOMII, EURADOS, EORTC, ESTRO, HERCA, IAEA, IOMP, MEFOMP.

EFOMP's Governing Committee continuously encourages early career colleagues to take active roles in the work of the federation by being part of the congress scientific committee, the organization committee of EFOMP school editions, the editorial board of the EFOMP newsletter, or participating in programmes such as "Mentoring in Research" which aims to support early career Medical Physicists (MPs) who want to set up a research project or successfully develop or explore their innovative ideas.

V. PROFESSIONAL RECOGNITION

EFOMP recognises that training and standards are the key to assuring safety and quality for the patients who benefit from our medical physics and radiation protection expertise. It is also the key to establishing our identity as medical physicists and allowing mobility of experts throughout Europe and beyond. The IAEA Basic safety standard [8] and EU directive 13/59 mandate registration and accreditation schemes. The EFOMP accreditation for national registration scheme establishes a common platform for training. If a critical number of states achieve the EFOMP standard these can form the basis in the European Union recognition of professional qualifications and interstate recognition of these qualifications under EU directives 05/36 and 13/55. This will also act as a foundation for such recognition outside the European Union.

VI. CONCLUSIONS

EFOMP is constantly working to create a trajectory towards a standardised approach to the training of the radiation protection expert and medical physics expert, mobility and mutual recognition in the European Union and beyond.

It is also in the Organisation's objective to ensure that highest standards of scientific knowledge, training and expertise that meet considered criteria are available to patients, healthcare staff and public throughout Europe.

Although communication and medical technology may have changed in the four decades since our inception, the founding principles of the federation and the need to Communicate, Integrate and Educate are still as relevant in 2021 as they were in 1980.

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