

THE NEED OF REGULAR ASSESSMENT OF THE MEDICAL PHYSICS EDUCATION STATUS FOR SUPPORT OF THE PROFESSIONAL GROWTH

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Abstract

The development of medical physics education is directly related to professional growth and from there to the healthcare provision today. Regular assessment of this educational development is necessary in order to establish the trend and stability of this process. Before the launch of the MPI Journal two books were published on this subject and several conferences were held in different parts of the world. Further activities and publications additionally supported the medical physics global professional growth. These activities are necessary to continue and accelerate in order to reach the needed number of medical physicists by 2035 (as per the GTFRC predictions).

The 1995 book “Medical Radiation Physics – A European Perspective”

This book was published after the European Conference on Medical Physics Education and Training, organised in Budapest 1994. The book collected papers from the Conference delegates (senior medical physicists from various European countries) and from other countries and institutions: Austria; Belarus, Belgium; Bulgaria; Croatia; Cyprus; Czech Rep; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Netherlands; Poland; Portugal; Romania; Russia; Slovakia; Spain; Sweden; Switzerland; Turkey; Ukraine; United Kingdom; EFOMP (European Federation of Organisations for Medical Physics) ; IFMBE (International Federation of Medical and Biological Engineering); IAEA (International Atomic Energy Agency).

There were 13 Central/Eastern European countries present at the Budapest Conference. Later most of them developed their own medical physics educational programmes. It is interesting to note that this book was published in 1995 both as paper book and as e-book on a diskette (thus becoming one of the first e-books published on this medium) [3]. The latter aimed at better distribution in Europe and other continents.

In an MPI paper from 2020 we described this activity and its impact in Central and Eastern Europe [1]. The book itself was annexed to the MPI – History Editions No.10 , 2024 (“Medical Radiation Physics – A European Perspective” editors C Roberts, S Tabakov, C Lewis, King’s College London, 1995) for free use [2].

This book was followed by other activities and books on the subject of medical physics and engineering education:

- “Towards a European Framework for Education and Training in Medical Physics and Biomedical Engineering”, (2001), ISBN 1 58603 151 1, IOS Press, Amsterdam
- The materials of the project BIOMEDEA and its associated Conferences (2004-2005), available from www.biomedea.org.
- The special issue “e-Learning in Medical Engineering and Physics”, Journal of Medical Engineering and Physics, 2005, vol.27, N.7
- El Fisico Medico: Criterios y Recomendaciones para su Formación Academica, Entrenamiento Clinico y Certificacion en America Latina, OIEA, VIENA, 2010, STI/PUB/1424, ISBN 978-92-0-311209-3

Additionally over 40 educational activities, seminars and courses were co-organised by the IOMP Education and Training Committee (ETC) in the period 1997 to 2006, as per the reports in the IOMP Newsletter Medical Physics World [4]. In the same period was opened the first educational web site in the profession and e-learning was introduced [5].

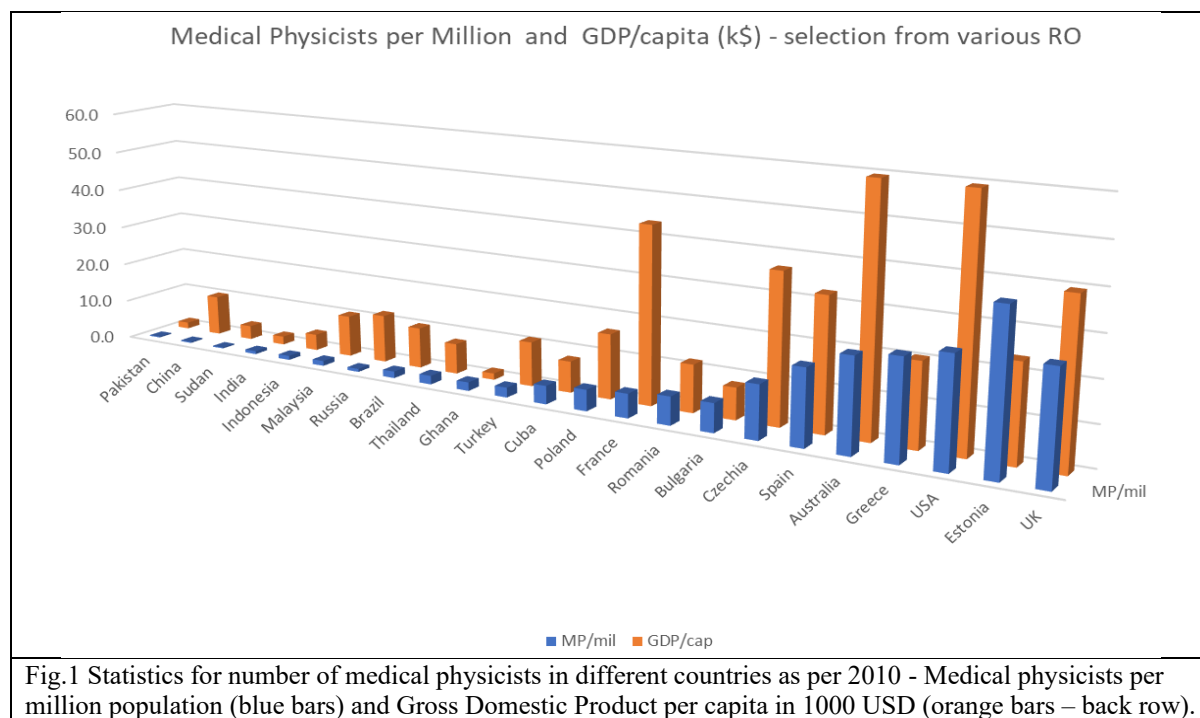
The 2011 book Medical Physics and Engineering Education and Training

About 15 years after the book from 1995 another book on the subject was published in 2011 [6]. It was based on contributions from the attendees of the ICTP College on Medical Physics in the period 2002-2010, as well as specific events organised by the IOMP Education and Training Committee (ETC) at our professional World Congresses in Sydney (2003), Seoul (2006) and Munich (2009). From these we have to specially mention the large Workshop “Medical Physics and Engineering Education and Training – a global perspective”, held at WC2006, Seoul, 29 August 2006, co-organised by the Editors of the 2011 book and specialists from AFOMP (Asian Federations of Organisations for Medical Physics) and SEAFOMP (South-East Asian Federations of Organisations for Medical Physics).

The 2011 book included papers from Australia and New Zealand; PR China; Hong Kong, China; India; Sri Lanka; Nepal; Pakistan; Indonesia; Malaysia; Philippines; Thailand; Bangladesh; Russia; Turkey; Estonia; Romania; Bulgaria; Czech Rep.; Brazil; Cuba; Morocco; Ethiopia; Sudan; Ghana; United Kingdom; IOMP (International Organisation for Medical Physics); ICTP (International Centre for Theoretical Physics, Trieste, Italy); IAEA (International Atomic Energy Agency); AFOMP (Asian Federations of Organisations for Medical Physics); Emerald project; Biomedea project; Emitel Encyclopaedia project; Sprawls Foundation.

The book included also the IOMP project for development of a Model Curriculum for Medical Physics MSc programmes. This activity was further developed by the IAEA, who published in 2013 their TCS-56 Postgraduate Medical Physics Academic Programmes [7]. The latter was updated in 2021 [8]. In parallel with IOMP and various projects, IAEA was very active in the field of building and supporting educational activities [9].

The materials from the 2011 book also included information about the GDP (Gross Domestic Product) of the countries, what presented a very interesting information – Fig.1.



It appeared that the number of medical physicists is not directly related to the GDP of a given country at the time of the book publication. Some large countries have significant capacity for educating more medical physicists, while other small countries have a very good number of medical physicists, despite their lower GDP. This led to the conclusion that publicity in a given country (at various levels) is more important for increasing the number of medical physicists. This result was an additional catalyst for the introduction of the International Medical Physics Day (IDMP) in 2013 [10], aiming to publicise more widely our profession, as well as the related IDMP Award in 2015 (these award colleagues from each continent for their excellence in promoting the profession and highlighting our contribution to patient care).

The book from 2011 is available free and is attached as a free ANNEX to this issue of MPI-History Editions.

Further assessments of the Medical Physics Education Status

Following the activities in 2003, 2006 and 2009, later World Congresses and International Medical Physics Conferences included also specific topics and Workshops on medical physics and engineering education – Beijing (2012); Brighton (2013); Toronto (2015); Bangkok (2016); Prague (2018). The activities co-organised with IUPAP, IAEA and WHO were specially important for assessing the current status of medical physics education and planning new activities in LMI countries – Fig.2.



Attendees at the Seminar for Medical Physics Education and Professional Development in Low and Middle Income (LMI) countries, at WC2018, Prague, Czech Rep

Additionally in 2018 the IOMP Medical Physics International (MPI) Journal organised the publication of series of papers from each of the 6 IOMP Regional Organisations (Federations per continent):

-MPI 2019 (vol7) No.1 - Latin America (ALFIM), related also to the ICMP 2019 in Chile. This issue also presented a paper about the North America professional development [11];

-MPI 2019 (vol7), No.2 – Africa (FAMPO), Contributing Co-Editors: T Ige and F Hasford [12];

-MPI 2020 (vol.8), No.1 – South-East Asia (SEAFOMP), Contributing Co-Editors: Kwan Ng and A Krisanachinda [13];

-MPI 2020 (vol.8) No.2 – Asia-Oceania (AFOMP), Contributing Co-Editors: A Chougule, E Bezak, A Azhari [14];

-MPI 2021 (vol.9) No.1 – Middle East (MEFOMP), Contributing Co-Editors: H al-Naemi and M H Kharita [15];

-MPI 2021 (vol.9) No.2 – Europe (EFOMP), Contributing Co-Editors: D Lurie, E Koutsouveli and P Gilligan [16].

These MPI issues included papers from 65 countries from all continents: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama; Chile; Brazil; USA and Canada; South Africa; Zimbabwe; Nigeria; Ghana; Morocco; Algeria; Tunisia; Egypt; Zambia; Rwanda; Kenya; Vietnam; Indonesia; Thailand; Philippines; Myanmar; Lao PDR; Australia and New Zealand; Bangladesh; Japan; India; Korea; Malaysia; Mongolia; Nepal; Philippines; Singapore; Thailand; Pakistan; Iraq; Jordan; Kuwait; Lebanon; Oman; Palestine; Qatar; Saudi Arabia; Syria; Yemen; Denmark; France; Bulgaria; Hungary; Lithuania; Malta; Norway; Poland; Spain; Serbia; Sweden; Ukraine.

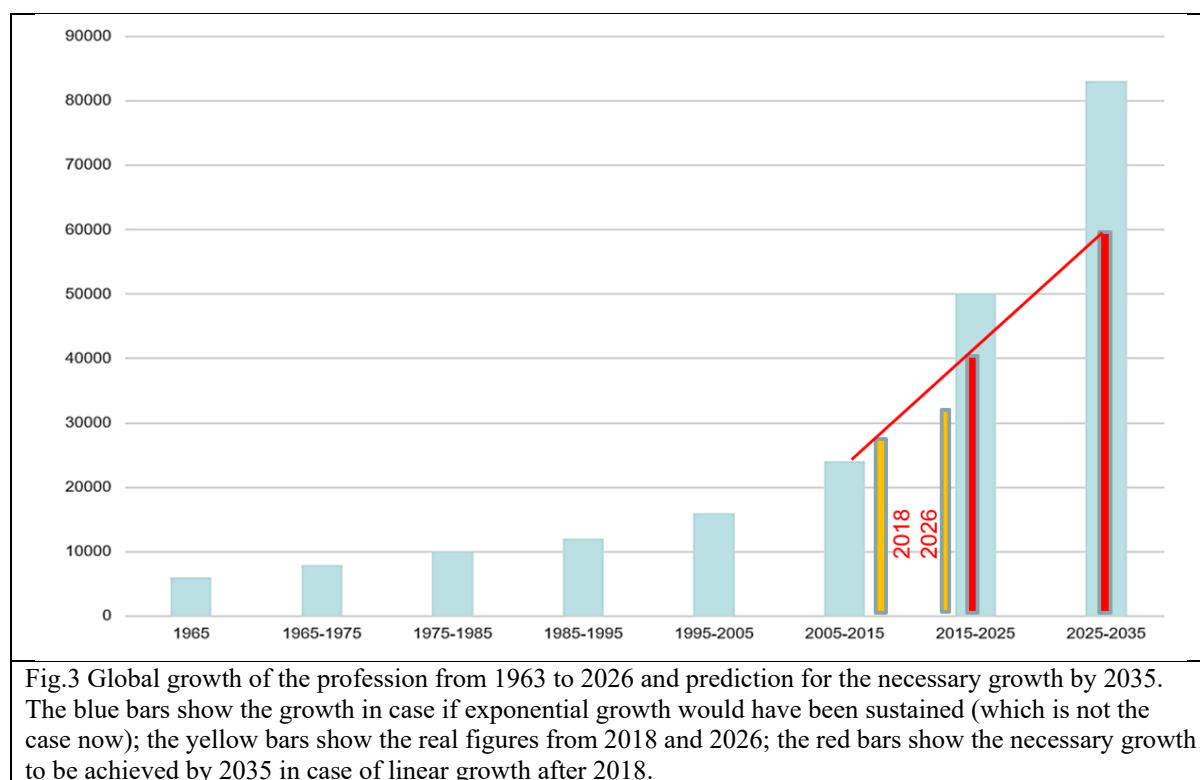
Discussion and Conclusion

Using the previous assessments of our professional growth [17] and the current number of medical physicists we can see that at the moment the trend of this growth presents growth, which is lower than needed – Fig.3.

The initial professional growth (in the three decades after IOMP establishment (1965-75; 1975-85; 1985-95) of the profession has a linear growth (with a growth of about 2000 medical physicists per decay). The following 3 decades (1995-2005; 2005-2015; 2015-2025) there is almost exponential growth, but it slows by 2025. This means that we shall not be able to achieve even a linear growth from 2015 to 2035 (the red line on Fig.2). The latter will not create conditions allowing the profession to reach the predicted workforce requirements of the Global Task Force on Radiotherapy for Cancer (GTFRC) and further discussions on the subject [18,17] - about 60,000 to serve both Radiotherapy and Medical Imaging plus Radiation Safety.

Together with the above, the profession has currently a new challenge – the introduction of Artificial Intelligence (AI), which should be included in the new medical physics curricula. Most of the Conferences and Workshops now address AI related research, but it is necessary to address also new educational programmes, which will introduce AI in the education of young medical physicists. The current ICTP College on Medical Physics will pilot such an activity in 2026, what could be a good starting point for future activities on this subject. In future proper introduction, exploitation and assessment of AI in medicine (including medical physics) will be paramount element of patient safety. Undoubtedly this will increase the expected numbers of medical physicists by 2035 – staff whose responsibility for patient safety will further increase.

The regular assessment of the medical physics education status must continue in the future years. New Workshops and other activities on the subject are necessary in order to have strong development of our education programmes and from there – further increased global professional growth of medical physicists.



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