

# STATUS OF MEDICAL PHYSICS PROFESSION IN THE LOWER-MIDDLE AND UPPER-MIDDLE-INCOME COUNTRIES OF THE EFOMP REGION

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**Abstract—** Due to the growing demands on the Medical Physics service in the national healthcare systems in the region of the European Federation of Organisations for Medical Physics (EFOMP), there is a strong need for harmonised and developed Medical Physics Profession in Europe. However, significant differences in the status, level of development and harmonisation of the Medical Physics profession across Europe and especially in the upper-middle-income (UMI) and lower-middle-income (LMI) countries of the EFOMP region are still considerable. A short survey was conducted with the aim of gaining an insight into the status of profession and activities needed to boost the professional development of Medical Physics in the European UMI and LMI countries. These countries are Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Russian Federation Serbia and Moldova. The survey reveals significant differences among the UMI and LMI member countries of the EFOMP region and lack of the structure of the Medical Physics profession. While the number of Medical Physicists working in healthcare is strongly growing in all UMI and LMI countries (on average more than 100% in last ten years), the structure of the Medical Physics profession remains incomplete. In most countries, training and education programme in Medical Physics does not exist, and in some of the countries, Medical Physics is not recognised as an independent profession in healthcare. In these countries, strong activities are needed in the management of the Medical physics profession to boost the development and harmonisation of the profession with the EFOMP guidelines.

**Keywords—**Medical Physics profession, EFOMP, IOMP, training and education, healthcare.

## I. INTRODUCTION

In most of the European countries, Medical Physics is a well-defined profession. The importance of medical physicists in the development and clinical application of different healthcare technologies is well known, and medical physicists roles, responsibilities, and education and training requirements are defined in the International Atomic Energy Agency (IAEA), International Organisation for Medical Physics (IOMP) and European Federation of Organisations for Medical Physics (EFOMP) documents and policy statements [1-6]. As the number of new cancer cases is increasing globally and as projected by the World Health Organisation (WHO) this number will rise from 14.1 million in 2012 to 24.6 million by 2030 [7], Medical Physics will play even more important role in diagnostics and treatment of cancer than today. Clearly, in the EFOMP

region, there is a strong need for harmonised and developed Medical Physics Profession. However, differences in the status, level of development and harmonisation of the Medical Physics profession across Europe are still considerable. The differences are especially prominent for the upper-middle income (UMI) and lower-middle-income (LMI) countries. According to the World Bank country classification [8], EFOMP member UMI countries are Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Russian Federation and Serbia, while LMI country is Moldova. For those countries, the status of the Medical Physics profession is ranging from the unrecognised profession without appropriate qualification framework to fully recognised independent profession. A short survey was conducted to get an insight into the status of profession and activities needed to boost the professional development of Medical Physics in the European UMI and LMI countries.

## II. MATERIALS AND METHODS

A questionnaire was prepared and sent to the National Member Organisation (NMO) for Medical Physics of each UMI and LMI country member of the EFOMP (Fig.1 and Fig.2), with the aim of collecting the necessary information for the survey. The questionnaire was divided into six parts: General, Requirements to enter Medical Physics education, Training and education programme in Medical Physics (Fig. 1), National health system requirements and position of Medical Physicists, Medical Physicists registration and Medical Physics profession management and communications (Fig. 2).

  
**Questionnaire on Status of Medical Physics Profession**  
IOMP/IUPAP Workshop on Medical Physics Partnering, Prague 6 June 2018

**GENERAL**

Country of: \_\_\_\_\_

Name of the medical physics Society/Association in English (abbreviation): \_\_\_\_\_

An approximate number of medical physicists in 2018:

- working in RT: \_\_\_\_\_
- working in DIR: \_\_\_\_\_
- working in NM: \_\_\_\_\_
- working in RP: \_\_\_\_\_

An approximate number of medical physicists in 2008 (ten years ago):

- working in RT: \_\_\_\_\_
- working in DIR: \_\_\_\_\_
- working in NM: \_\_\_\_\_
- working in RP: \_\_\_\_\_

Approx. number of new MPs expected to enter the national health system in next ten years: \_\_\_\_\_

**REQUIREMENTS TO ENTER MEDICAL PHYSICS EDUCATION**

Basic education requirement/degree to enter medical physics education:

- basic education/university degree required: \_\_\_\_\_
- how many years of studies does it represent: \_\_\_\_\_

**TRAINING AND EDUCATION PROGRAMME IN MEDICAL PHYSICS**

Is there established national training and education program in MP? YES NO

How long is the programme and when it was established? \_\_\_\_\_

Is there a separated programme for each speciality (RO, DIR, NM)? YES NO

Does the programme lead to any official diploma/qualification? YES NO

If yes, what is the name of diploma/qualification in English? \_\_\_\_\_

If the programme is established, is it official, recognised and approved? YES NO

If approved, who and when approved it? : \_\_\_\_\_

If no, is there an unofficial training and education programme or programme in the status "waiting for approval"? YES NO

Where does the training programme take place? Hospital University both

Are the training centres (University, Hospital) accredited and who gives the accreditation? \_\_\_\_\_

Fig.1. Questionnaire on Status on Medical Physics Profession, page 1.

Does the training and education programme follow the recommendations given in the European Guidelines for Medical Physics Experts (EC RP 174)? YES NO

Does the programme follow the EFOMP Policy Statement No. 12.1? YES NO

Did you use help from EFOMP/IOMP/IAEA experts during the program setup? YES NO

**NATIONAL HEALTH SYSTEM REQUIREMENTS AND POSITION OF MEDICAL PHYSICISTS**

Is there legal requirements for Medical Physicist involvement in medical procedures? YES NO

Is there a license or diploma required to work as Medical Physicist? YES NO

If yes, is it officially provided (i.e. by Ministry of Health, Government etc.)? \_\_\_\_\_

Is Medical Physics recognised at the national level as an independent profession in health care? YES NO

Is your national legislation harmonised with the EU Directive EURATOM 2013/59? YES NO

Is your national legislation harmonised with the requirements of the International Basic Safety Standards for protection against ionizing radiation? YES NO

**MEDICAL PHYSICISTS REGISTRATION**

Is there a Register of Medical Physics Professionals in the country? YES NO

If yes, is it officially recognised by the authorities? YES NO

If yes, who is in charge of Register (i.e. Ministry of Health, national board)? \_\_\_\_\_

Is there a renewal mechanism in the Register? YES NO

Does the organisation of Register follow the EFOMP Policy Statement No. 6.1? YES NO

If yes, is it based on a Continuing Professional Development system (CPD)? YES NO

If yes, does it follow the EFOMP Policy Statement No. 10.1? YES NO

**MEDICAL PHYSICS PROFESSION MANAGEMENT AND COMMUNICATIONS**

Is there established communication between medical physics Society and Ministry of Health? YES NO

Is there established communication between Medical Physics Society and other professional societies (radiation oncology, nuclear medicine, diagnostic radiology)? YES NO

In the most of the cases, who is initiating changes in legislation and provisions regarding medical physics profession (MP Society, Ministry of Health, State Office for Radiation Protection etc.) \_\_\_\_\_

Please return the Questionnaire to: [hhksak@kbc-zagreb.hr](mailto:hhrsak@kbc-zagreb.hr)

Thank you for your contribution to the collecting of data for the IOMP/IUPAP Workshop

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Fig.2. Questionnaire on Status on Medical Physics Profession, page 2.

### III. RESULTS AND DISCUSSION

A questionnaire was sent to the following country members of the EFOMP: Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Moldova, Romania, Russian Federation and Serbia. 5 out of 8 country members responded (Bosnia and Herzegovina, Bulgaria, Croatia, Moldova and Serbia).

In all countries that responded to the questionnaire, the number of Medical Physicists working in healthcare was significantly increased in the last ten years (Fig. 3). The increase in the number of medical physicists is ranging from the 20 % in the countries with the highest number of medical physicists (Bulgaria and Serbia) to 330 % in the countries with the lower number of medical physicists (Bosnia and Herzegovina). A special case is Moldova in which ten years ago no medical physicists were working in healthcare.

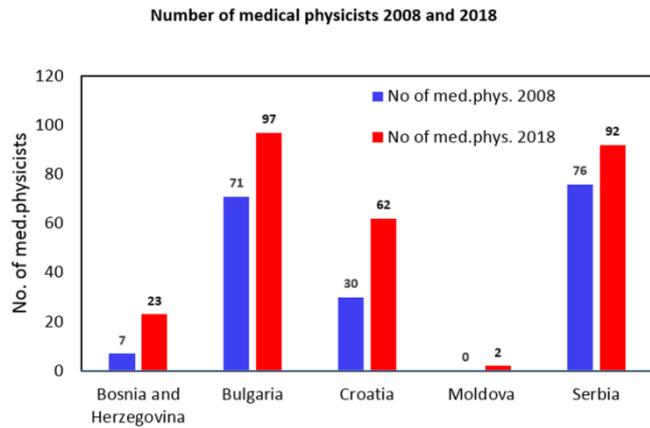


Fig. 3 Number of medical physicists working in the healthcare 2008 and 2018 for UMI and LMI country members of the EFOMP

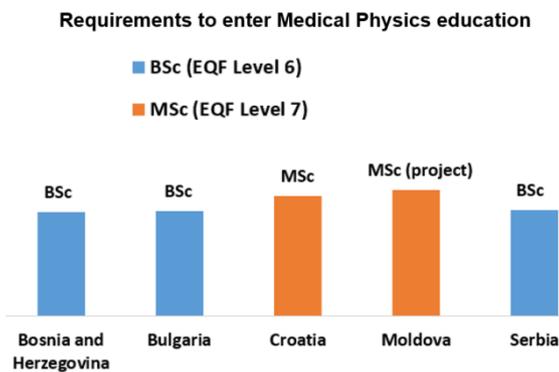


Fig.4 Basic requirements to enter medical physics education for UMI and LMI country members of the EFOMP

The basic educational requirements to enter Medical Physics education is a university degree in physics or equivalent (Fig 4), which complies with the European Guidelines on Medical Physics Expert Radiation Protection No 174 (RP174) [9].

National training and education program in Medical Physics exists in two countries (Bulgaria and Serbia) (Fig 5), resulting in the qualification “Medical Physics Specialist”. However, the program is approved at the national level only in Bulgaria. Only Bulgarian program follows the recommendations given in the European Guidelines for Medical Physics Experts RP174 [9] and EFOMP Policy Statement No. 12.1 [6]. In three countries this program is in the status of the ongoing project (Bosnia and Herzegovina, Croatia, Moldova).

**Training and education programme in Medical Physics**

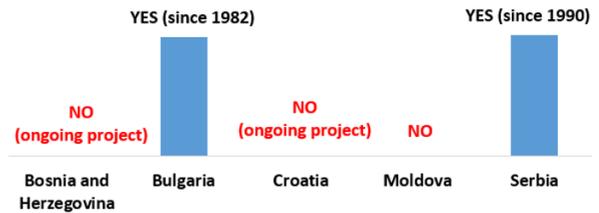


Fig. 5 Established national training and education program in Medical Physics

In all countries except Moldova, there are legal requirements for Medical Physicist involvement in medical procedures (Fig 6). Usually, these requirements are imposed by the State offices for radiological and nuclear safety. However, only in Bulgaria and Serbia Medical Physics is recognised as an independent profession.

**Legal requirements for Medical Physicist involvement in medical procedures**

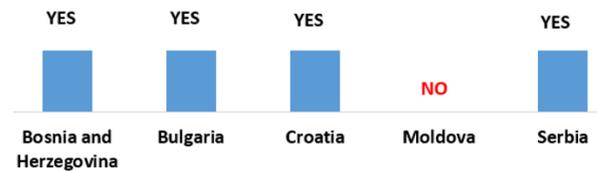


Fig. 6 Existence of national legal requirements for Medical Physicist involvement in medical procedures

**Harmonisation of national legislation with the EU Directive EURATOM 2013/59**

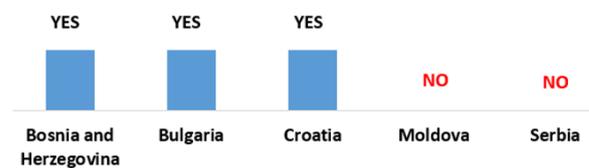


Fig. 7 Harmonisation of the national legislation with the EU Directive EURATOM 2013/59

National legislation is harmonised with the EU Directive EURATOM 2013/59 [10] in Bulgaria, Bosnia and Herzegovina and Croatia (Fig 7). The harmonisation is usually provided within the national law on radiological and nuclear safety. Usually, State offices for radiological and nuclear safety are in charge of preparing the proposal of harmonisation of national legislation with the EURATOM 2013/59.

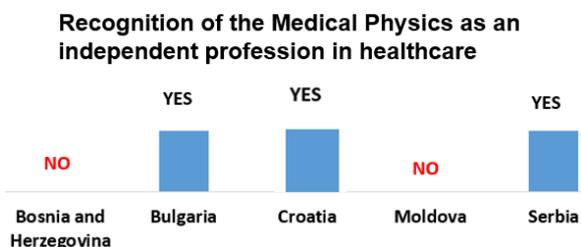


Fig. 8 Recognition of the Medical Physics as an independent profession in national healthcare

In Bulgaria, Croatia and Serbia Medical Physics is recognised as an independent profession (Fig 8). No register of Medical Physics professionals exists in any of the UMI and LMI member countries in the EFOMP region (in Bulgaria national register of Medical Physics professionals is in the status of a project). A formal Continuing Professional Development programme (CPD) exist only in Bulgaria.

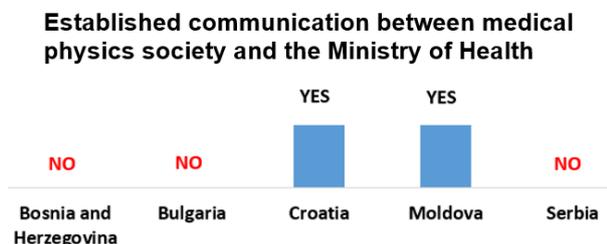


Fig. 9 Established communication between the national medical physics society and the Ministry of Health

Systematic communication between the national medical physics society and the Ministry of Health exists only in Croatia and Moldova (Fig. 9) in the form of advising in the medical equipment procurement or the legal issues regarding the use of ionising radiation in medical procedures.

**Who is initiating changes in legislation and provisions regarding medical physics profession?**

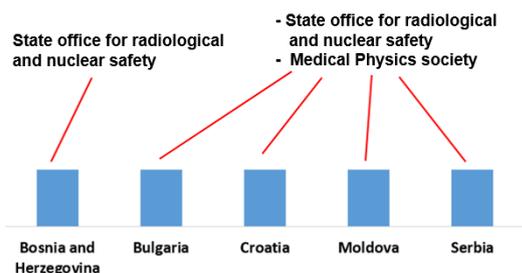


Fig. 10 The changes in the legislation and provisions regarding the Medical Physics profession are mostly initiated by the State office for radiological and nuclear safety

Usually, the changes in the national legislation and provisions regarding the medical physics profession, such as recognition of the profession, the involvement of medical physicists in medical procedures or similar, are initiated by the State offices for radiological and nuclear safety and Medical Physics societies throughout the mutual communication and the procedure of advising (Fig 10).

It is clear that the Medical Physics Profession in the UMI and LMI member countries of the EFOMP region is far from being harmonised with the EFOMP guidelines and at the satisfactory level. The differences are considerable, and for these countries, the status of the Medical Physics profession is ranging from the unrecognised profession without appropriate qualification framework to fully recognised independent profession.

The international guidelines and policy statements, given by IAEA, IOMP, EFOMP and EU Council, are providing a clear path for establishing a well-defined profession to the benefit of the patient and healthcare. However, it seems that somehow these guidelines are not reaching the national healthcare stakeholders (Ministry of Health, Government), responsible for making decisions on the healthcare future. As the need for the profession capable of providing a high-quality medical physics service to healthcare is growing, the number of medical physicists working in healthcare is rapidly growing, but the profession itself does not transform along with the growing need, and there is a gap between the demands on the profession and structural capacity of the profession. Strong activity in the Medical Physics profession management is needed in the UMI and LMI member countries of the EFOMP region to boost the development of the profession. NMOs should be more active in networking with the national Healthcare stakeholders, Medical Physics societies and hospitals to boost the development of Medical Physics profession.

IV. CONCLUSIONS

There is a significant increase in the number of Medical Physicists in the European UMI and LMI countries (on average more than 100% in last ten years) due to the growing demands of the national healthcare systems. However, there is a lack of structural changes and development of the medical physics profession along with the IAEA, IOMP, EFOMP and EU Council guidelines and provisions. As a result, the status of the Medical Physics profession for those countries is ranging from the unrecognised profession without appropriate qualification framework to fully recognised independent profession. There is a growing gap between the structural capacity of the profession and healthcare demands. Strong activity in the Medical Physics profession management is needed in the UMI and LMI member countries of the EFOMP region to boost the development of the profession.

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