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.

1. 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 Serbia and 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).
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.
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).

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.

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.
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.

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.

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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