

IOMP

PROFESSIONAL AND EDUCATIONAL ACTIVITIES

BENEFITS TO MEDICAL PHYSICS FROM THE RECENT INCLUSION OF MEDICAL PHYSICISTS IN THE INTERNATIONAL CLASSIFICATION OF STANDARD OCCUPATIONS (ICSO-08)

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Abstract- The occupation of ‘Medical Physicist’ is explicitly included for the first time in the latest version of the International Standard Classification of Occupations (ISCO-08), published by the International Labour Organisation (ILO), under Unit Group 2111 ‘Physicists and Astronomers’. Both the structure of the Standard and the background to the inclusion of medical physicists are briefly explained. ILO decided not to classify medical physicists under Sub-major Group 22 ‘Health Professionals’ primarily as classification under Unit Group 2111 best fits the conceptual model of ISCO as the basis of knowledge required for medical physics is physics. However ILO recognises that medical physicists work in health services and this is reflected in the inclusion of two notes, one under Unit Group 2111 stating “.....medical physicists are considered to be an integral part of the health work force alongside those occupations classified in sub-major group 22, Health professionals.....” and a second one under Sub-major Group 22 Health Professionals. The two main benefits of inclusion of medical physicists in the Standard are reviewed – these are the value for the development of medical physics services, particularly in developing countries, of the formal recognition of medical physics as a profession, and in the collection data on the number of physicists in the health services in different countries.

Keywords- medical, physicist, ILO, ISCO- 08, classification.

INTRODUCTION

The International Standard Classification of Occupations (ISCO) is a tool for organizing jobs into clearly defined groups according to the tasks and duties of the jobs. One of its main aims is to provide a basis for international reporting, comparison and exchange of statistical and administrative data about occupations. It is prepared and revised by the International Labour Organization, a United Nations agency [1].

The International Organisation for Medical Physics (IOMP) represents the worldwide medical physics community and has as one of its objectives the advancement healthcare by the adequate provision of medical physics services [2]. Whilst not a primary purpose, ISCO is used by some governments and employers to determine the status and other factors, such as salaries, of a particular occupational group. The inclusion of the occupation ‘medical physicist’ in ISCO, included in the latest version of the classification for the first time, is of significance to the profession of medical physics, particularly in some countries where the medical physicist profession is not formally recognized by either the government or health authorities.

ILO AND ISCO-08

The International Labour Organization (ILO) has a tripartite structure bringing together representatives of governments, employers and workers [1]. The ILO Department of Statistics to provide users within and outside the ILO with relevant, timely and reliable labour statistics, to develop international standards for better measurement of labour issues and enhanced international comparability, and to help member States develop and improve their labour statistics.

The ILO is custodian of the International Standard Classification of Occupations (ISCO) and responsible for its maintenance, updating and revision [3]. ISCO is a tool for organizing jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. Its main aims are to provide:

- a basis for the international reporting, comparison and exchange of statistical and administrative data about occupations;
- a model for the development of national and regional classifications of occupations; and
- a system that can be used directly in countries that have not developed their own national classifications.

The International Standard Classification of Occupations 2008 (ISCO-08) is the latest version of the classification and it is a four-level hierarchically structured classification that covers all jobs in the world. ISCO-08 is fully supported by the international community as an accepted standard for international labour statistics [3]. It allows the production of relatively detailed internationally comparable data. Many countries are now updating their national classification either based on ISCO-08 or to improve alignment with the new international statistical standard.

ISCO-08 classifies jobs into 436 unit groups. These unit groups are aggregated into 130 minor groups, 43 sub-major groups and 10 major groups, based on their similarity in terms of the skill level and skill specialization required for the jobs[3].

The main groups of interest to the medical physics are illustrated in Figure 1. Major Group 2 'Professionals' is divided into 6 sub-major groups, two of which are 'Science and Engineering Professionals' and 'Health Professionals'. The former has as one of its minor groups 'Physical and Earth Sciences Professionals' which in turn has 'Physicists and Astronomers' as a unit group. 'Health Professionals' has as one minor unit 'Other Health Professionals', which itself has 'Health Professionals Not Elsewhere Classified' elsewhere as one of its unit groups.

The framework of ISCO is based on two main concepts – *job* and *skill*. A job is 'a set of tasks and duties performed ...by one person..'. *Occupation* refers to the kind of work performed in a job. Skill is defined as the ability to carry out the tasks and duties of a given job and

two dimensions of skill are used to arrange occupations into groups. These are skill level and skill specialization and one of the measures of skill level is the level of formal education. Four broad skill levels are used in ISCO-08 and Major Group 2 contains only occupations at the highest ISCO skill level – skill level 4[3].

BACKGROUND TO INCLUSION OF MEDICAL PHYSICISTS IN ISCO-08

The classification system is infrequently updated – approximately every 20 years; the previous one being in 1988 (ISCO-88) which did not include any mention of medical physicists or medical physics. In 1995 the President of International Organization for Medical Physics (IOMP), Keith Boddy, formally wrote to ILO requesting the specific inclusion of medical physics as profession in the next revision ISCO [4]. Over the next two decades officers of IOMP, together with other individuals and organisations, engaged in dialogue with ILO [5-8]. ILO twice consulted member countries. After the first consultation ILO concluded that medical physicists were not sufficiently numerous to justify a separate unit group.

The second consultation focused on where medical physics should be included in the classification and responses were equally divided between including medical physics under 'Physicists and Astronomers' and under 'Health Professionals'. IOMP, and others, proposed that medical physicists should be classified under 'Health Professionals' [5, 7] and in the classification system of a number of countries medical physicists have been classified under 'Health Professionals' [8]. The ILO finally decided in favour of classification under 'Physicists and Astronomers' for the following two main reasons [9]:

- Since the basis of knowledge required for medical physics is physics, it is consistent with the ISCO conceptual model to include them in the same Unit group as other physicists.
- The view that medical physicists should be classified as health professionals because they work in the health system was not accepted as ISCO is not a classification of industrial activities.

Following further discussions involving IOMP two notes were added to ISCO-08 clarifying the position of medical physicists in relation other health professions and the list of tasks under 'Physicists and Astronomers' was extended and modified to include tasks typically undertaken by medical physicists [3].

THE INCLUSION OF MEDICAL PHYSICISTS IN
ISCO-08

‘Medical physicist’ is classified in ISCO-08 as an example of an occupation which comes under unit group 2111 ‘Physicists and Astronomers’. Medical physicists are also listed in Volume 2 of ISCO-08 ‘Index of occupational titles’ [10]. The list of tasks undertaken by ‘Physicists and Astronomers’ include tasks undertaken

by medical physicists, such as ‘ensuring the safe and effective delivery of radiation (ionising and non-ionising) to patients to achieve a diagnostic or therapeutic result as prescribed by a medical practitioner’, as well as the more general tasks undertaken by many different physics professions, including ‘conducting research and improving or developing concepts, theories, instrumentation, software and operational methods related to physics and astronomy. Appendix 1 reproduces the full text of this unit group [11].

Groups	Major Groups	Sub-major Groups	Minor Groups	Unit Groups
Total No.	10	43	130	436
	1. Managers 2. Professionals 3. Technicians & Assoc. Profs. 4. Clerical Support Workers 5. Service & Sales Workers 6. Skilled Agricultural, Forestry etc. 7. Craft and Related Trades 8. Plant & Machinery Operators 9. Elementary Occupations 10. Armed Forces	21 Sci. & Eng. Profs. 22 Health Profs. 23 Teaching Profs. Etc.	211 Physical & Earth Sci. Profs. Etc. 226 Other Health Profs. Etc.	2111 Physicists & Astronomers Etc. 2269 Health Profs. Not Classified Elsewhere Etc.

Figure1. Illustration of structure of ISCO-08 and specific groups relevant to medical physics

As noted there were discussions as to whether medical physicists should be included under sub-major group ‘Health Professionals’. To recognize that medical physicists work in health care and alongside other professions classified under ‘Health Professionals’ the ISCO-08 has a note at the end of unit group 2111 ‘Physicists and Astronomers’ which includes the statement ‘...medical physicists are considered to be an integral part of the health work force alongside those occupations classified in sub-major group 22, Health professionals..’. See Appendix 1 for full text. This is reinforced by a note under sub-major group 22 ‘Health Professionals’ which states ‘In using ISCO in applications that seek to identify, describe or measure the health work force, it should be noted that a number of professions considered to be a part of the health work force are classified in groups other than sub-major group 22, Health professionals. Such occupations include but are not restricted to: addictions counsellors, biomedical engineers, clinical psychologists and medical physicists.’ [11].

BENEFITS OF INCLUSION OF MEDICAL
PHYSICISTS IN ISCO-08

The inclusion of medical physicists in ISCO-08 achieves the original objective of the International Organization for Medical Physics and others in confirming the status of medical physics as a profession alongside other health professions such as medical doctors. In some countries specific jobs are opened only if the profession exists in ISCO [5]. Ministries of Health, health employers, medical physics organizations, and individual medical physicists can refer to ISCO-08 to ensure medical physicists are correctly classified and accorded the appropriate recognition, status and salary. A related benefit is that the recognition of medical physicists should assist in ensuring the correct staffing of medical physicists when establishing new healthcare infrastructure, particularly in developing countries.

A benefit from inclusion of medical physicists under Unit Group 2111 ‘Physicists and Astronomers’ is the collection of data on employment of medical physicists in healthcare. If medical physicists had been classified under ‘226 Other Health Professionals’ then only the total

number of 'Other Health Professionals' would be recorded. Their inclusion in group 2111 allows them to be identifiable in data cross-tabulated by occupation and administrative data on the health service work force using ISCO-08, as there are no other professionals classified under group 2111 who are employed in healthcare.

DISCUSSION

The IOMP argued over many years that medical physicists should be classified under 'Health Professionals' [5, 7]. However the disadvantages of classifying medical physicists Sub-major Group 21 'Science and Engineering Professionals' have been considerably mitigated by the inclusion of tasks specific to medical physics in the overall list of tasks of physicists and astronomers and also by the notes under both groups 2111 'Physicists and Astronomers' and 226 'Other Health Professionals' emphasising that medical physicists are integral part of the healthcare workforce alongside other healthcare professionals [13].

Biomedical engineers are treated in a similar fashion to medical physicists in ISCO-08, listed as one of the occupations classified under Unit Group 2149 'Engineering Professionals not Classified Elsewhere'. Neither group is likely to attain sufficient size to be considered as a separate unit group on its own. It should be noted that medical physics technicians and biomedical engineering technicians (and similar occupations) that do not meet the classification requirements for medical physicists and biomedical engineers will normally be classified under Major Group 3 'Technicians and Associated Professionals'. Also medical physicists and biomedical engineers employed by universities will be classified under Minor Group 231 'University and Higher Education Teachers'. A separate unit group including medical physicists, biomedical engineers and other comparable healthcare professions, such as physiological scientists and biochemists, might achieve the requisite size and a case prepared, if considered desirable by the professions involved, for inclusion of such a group as a new unit group under Sub-major Group 22 'Health Professionals' and submitted to ILO.

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APPENDIX 1

2111 PHYSICISTS AND ASTRONOMERS

Physicists and astronomers conduct research and improve or develop concepts, theories and operational methods concerning matter, space, time, energy, forces and fields and the interrelationship between these physical phenomena. They apply scientific knowledge relating to physics and astronomy in industrial, medical, military or other fields.

Tasks include -

(a) conducting research and improving or developing concepts, theories, instrumentation, software and operational methods related to physics and astronomy;

(b) conducting experiments, tests and analyses on the structure and properties of matter in fields such as mechanics, thermodynamics, electronics, communications, power generation and distribution, aerodynamics, optics and lasers, remote sensing, medicine, sonics, magnetism, and nuclear physics;

(c) evaluating results of investigations and experiments and expressing conclusions, mainly using mathematical techniques and models;

(d) applying principles, techniques and processes to develop or improve industrial, medical, military and other practical applications of the principles and techniques of physics or astronomy;

(e) ensuring the safe and effective delivery of radiation (ionising and non-ionising) to patients to achieve a diagnostic or therapeutic result as prescribed by a medical practitioner;

(f) ensuring the accurate measurement and characterization of physical quantities used in medical applications;

(g) testing, commissioning and evaluating equipment used in applications such as imaging, medical treatment and dosimetry;

(h) advising and consulting with medical practitioners and other health care professionals in optimizing the balance between the beneficial and deleterious effects of radiation;

(i) observing, analysing and interpreting celestial phenomena and developing methods, numerical models and techniques to extend knowledge of fields such as navigation, satellite communication, space exploration, celestial bodies and cosmic radiation;

(j) developing, implementing and maintaining standards and protocols for the measurement of physical phenomena and for the use of nuclear technology in industrial and medical applications;

(k) preparing scientific papers and reports.

Examples of the occupations classified here:

- Astronomer
- Medical Physicist
- Nuclear Physicist
- Physicist

Some related occupations classified elsewhere:

- Specialist physician (nuclear medicine) - 2212
- Radiation oncologist - 2212
- Radiologist - 2212
- Radiographer - 3211

Notes

It should be noted that, while they are appropriately classified in this unit group with other physicists, medical physicists are considered to be an integral part of the health work force alongside those occupations classified in sub-major group 22, Health Professionals and others classified in a number of other unit groups in major group 2, Professionals.