



EFRS Statement on
**Radiography
Education**

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Introduction

"Radiography involves the safe use of ionising and non-ionising radiation, high frequency sound waves and magnetic fields to achieve a diagnostic or therapeutic health gain. The profession of radiography is unique in that all of its practitioners (radiographers), accept individual responsibility for minimising the radiation dose and other adverse effects of imaging modalities and radiation therapy to both individual patients and the genetic inheritance of the public at large"[1].

The Radiographer

The radiographer is a healthcare professional who interacts with other team members in the primary and secondary healthcare environment to provide an optimum diagnostic or therapeutic outcome for patients. The radiographer also takes care of all dimensions of patient safety during the patients, diagnostic and therapeutic procedures. Radiographers are professionally accountable to the patients' physical and psychosocial wellbeing, prior to, during and following imaging or therapy procedures. Radiographers require an ability to interpret and effectively analyse information referred from other health care professionals (justify), to maximise health gain whilst minimising risks (optimise) to the patient. Radiographers are key-persons in radiation safety of patients and third persons in accordance with the "As Low As Reasonably Achievable (ALARA)" principle and relevant legislation [2].

Radiographers can plan, organise, apply and evaluate their work process with the aims of promoting health, preventing disease, making the diagnosis and/or treating diseases. Radiographers practise within an ethical and legal framework, obeying national and European guidelines relating to their work. A key part of the radiographer's role is to manage complex interpersonal dynamics, and to act as an advocate for the patient. Radiographers are at the interface between the patient and technology. Team work is a notable feature of practice in both inter-professional and intra-disciplinary communication, with individual and autonomous practice being a significant feature of the radiographer. It is also expected that the application of radiographic and radio therapeutic practice in securing, maintaining or improving health and well-being, the development of knowledge, understanding and skills that underpin radiography education and training will contribute to future health and wellbeing of the patient [3].

These attributes, however, vary across the radiography profession and are reflected in the variations of radiography education programmes across Europe. Results from an EFRS survey [4] amongst higher education institutions registered as affiliate members on radiography curricula, course duration, credit load, accreditation requirements, staff qualifications, staff and student exchange opportunities and availability of post-graduate programmes provided the following conclusions:

- Most institutions adopt the Bologna (Bachelor) cycle for radiography education, however full alignment remains a priority;
- Opportunities for postgraduate radiography education opportunities across Europe appear to be insufficient;
- Further research investigating radiography accreditation processes is recommended with the scope of harmonising radiography practice across Europe.

Radiography Education in Europe

Radiography education across Europe is not uniform, mainly because of the varying history of the profession across Europe. The various roles, responsibilities, and scope of practice, and the very different healthcare systems in place in the different European countries also contribute to the variation in radiography education.

Development of curricula follow the requirements and rules set by several authorities, institutions and organisations. The content, level and duration of radiography education programmes depends very much on the status of the radiography profession within the country. Some countries require national professional/governmental/legislative registration for radiographers to be able to practice. The different forms of registration requirements are designed to protect the interests of the service user.

In a small number of European countries, radiography education is still taking place within the Vocational Education and Training (VET) system, often in close collaboration with the hospital sector, and with the radiographer obtaining a professional diploma. Worryingly, there are also a few countries in Europe where individuals carrying out radiography undertake limited or non-formal training in imaging or therapy techniques.

The radiography profession is in many countries governed by national Ministries responsible for Education and for Health but can also be governed by other authorities. Furthermore, the radiography profession is regulated by the Directive 2005/36/EC of the European Parliament and of the Council on the recognition of professional qualifications, with member states retaining the right to lay down the minimum level of qualification required to ensure the quality of the services provided on their territory.

Recommendations for Radiography Education

The EFRS highlighted the variability in radiography education across Europe in terms of programme type (combined medical imaging/diagnostic radiography, radiotherapy and nuclear medicine programmes, and dedicated programmes in diagnostic radiography, radiotherapy, and nuclear medicine) and programme duration which can vary between two to four years [4, 5].

A key aspect of radiography education are the clinical components of radiography programmes which rely on quality clinical learning environments and the input of clinical radiographers supporting student learning. The amount of clinical time varies from less than 500 to over 1,500 hours across combined and dedicated programmes [5, 6]. Similarities do exist in the provision of clinical education across Europe. Clinical placements are an important component of radiography education. Clinical placements are of greatest benefit when students are supported by experienced clinical supervisors having the required training in student supervision and mentoring. Clinical skills were traditionally always taught within the health care environment (hospitals and clinics). Educational institutions will need to evolve their teaching and learning strategies to embrace opportunities for developing and assessing clinical skills using virtual reality and high-fidelity simulation.

The EFRS survey of 2017, administered among 38 radiographic societies, shows that for the initial qualification there has been an ongoing move from vocational education to formal Higher Education. Most responses (80%) indicated that the initial qualification is at Level 6 (Bachelors) out of which 79% have a combined curriculum which includes: medical imaging; nuclear medicine and radiotherapy (10% run these as separate courses) [4, 7].

The EFRS European Qualifications Framework (EQF) Level 6 Benchmarking Document: Radiographers [8], now lays the foundation for informing readers about what the EFRS membership agreed to be the entry level to the radiography profession in Europe. The document serves as a point of reference for use by professional bodies, educational institutions, employers, and other relevant bodies throughout Europe. Qualification frameworks describe the qualifications of an education system and how they interlink [8, 9].

For countries to make comparison of radiography qualifications easier, the EFRS developed radiography learning outcomes at EQF level 6. In the light of the EFRS educational survey 2017 [7], the benchmarking document has been widely accepted and national radiographer societies use these learning outcomes in their negotiations with the appropriate Ministries to put forward a case for radiography education to be incorporated at the Higher Education level.

Radiography education programmes should be developed with the important scope of equipping radiographers with those subject specific and generic competencies which will provide an optimum service to support local, national and international needs with the health and wellbeing of the patient being paramount. It is essential that radiography educational programmes are designed with both patients and students in mind, and should reflect the latest developments in pedagogical knowledge. Radiography education requires that the curriculum covers a wide range of scientific, medical, sociological, ethical and technical subjects together with the development of appropriate clinical skills. It is also essential that radiography education programmes must be responsive to changing / future clinical service needs.

The curriculum should also include evidence-based practice (EBP), requiring all healthcare decisions to be based on the best available, current, valid and relevant evidence. Radiographers must be able to attain, evaluate, apply and integrate new knowledge and can adapt to changing circumstances throughout their professional life. The development of research and audit skills are therefore essential to ensure the constant improvement of service quality for the benefit of service users. It is considered vital that professional advancement arises out of EBP and is informed through focused research [10-12].

The EFRS Board recommends to organisations in Europe with a vested interest in the development of the radiography profession, to implement the following recommendations to ensure the continued development and improvement of the service for the benefit of the patient.

Recommendations related to curriculum development:

1. All European countries should accept that pre-registration radiography education courses be at 1st cycle Bologna/Bachelor level;
2. Radiography qualification to be at the appropriate level in national qualifications frameworks referenced to EQF level 6;
3. The total course ECTS to be either: 180 ECTS or 210 ECTS or 240 ECTS
 - (1 ECTS = 25 to 30 study hours);
4. Clinical placements should ideally constitute a minimum of 25% of the total ECTS course value to acknowledge the importance of clinical placements in relation to the course programme.
 - Clinical placements balanced between simulated practice and hospital-based practice;
5. Qualifications initially obtained as corresponding to EQF level 5 should enable, through a lifelong learning approach, a level 6 in both frameworks to be achieved;
6. Generic and subject specific learning outcomes outlined through the Tuning [13] and EFRS EQF publications [8, new] to be reflected in the radiography course documentation alongside national benchmarks, should these exist;
7. Vertical and horizontal curriculum alignment for EBP is recommended;
8. Curriculum documentation should be written so that the links between research and teaching are clearly defined;
9. A mix of EBP models are recommended for use within the curriculum:
 - a. Research-led teaching: based on the specialist research interests of teaching staff through the presentation of research data and findings during classroom teaching sessions;
 - b. Research-oriented teaching: focused on principles of research, research ethos, research methods, research ethics and information literacy skills sessions;
 - c. Research-tutored practices: focused on students writing discursive and critical essays using published papers, literature reviews and research projects to support development of critical analysis [14].

10. Recommended methods for inclusion of these approaches in study units for the promotion of EBP within the curriculum may include:
- a. Annotated bibliography;
 - b. Case-based, problem-based or project-based assignments;
 - c. Concept maps;
 - d. Critical review of a journal paper;
 - e. Information literacy specified in assessment guidelines and marking or grading schemes;
 - f. Literature reviews;
 - g. Patient information booklets;
 - h. Posters;
 - i. Search strategies;
 - j. Self- and/or peer-assessment;
 - k. Research projects;
 - l. Timely EBP-focused feedback to students for all assignments [14-17].

Recommendations to support information literacy development:

1. Students should be required to access sources and evidence which contribute towards assessment grades. A wide variety of up to date sources of information, both primary and secondary, are essential and should be made available to students. Such sources of information may include: published peer-review scientific papers, published systematic reviews, professional guidelines, and textbooks;
2. Activity should be incorporated vertically through the curriculum with increasing levels of complexity as the student progresses through the program of studies. Complexity of the sources should also be aligned to student development;
3. Training should be provided to all students on effective search strategies. This should be supported by library services through training sessions at the start of their studies and at appropriate stages as they progress;
4. Additional support mechanisms on information skills such as hard-copy guides or e-learning resources should be made available through the student virtual environment;

5. Clear criteria for evaluating information gathered, as part of EBP critique, should be provided with coursework and assessments;
6. Recommended databases and information repositories for use in EBP activity should be available to students and sources should be aligned with profession-specific needs;
7. Clear guidance should be provided on how to reference literature/ information sources at the start of their studies;
8. Curriculum documentation should clearly identify EBP activity [14-17].

Recommendations related to clinical placements:

1. Students should be given access to an appropriately diverse range of cases within the clinical environment;
2. Appropriate strategies should be in place to provide adequate student supervision within the clinical environment;
3. Clinical colleagues involved in student training should receive appropriate training and guidance;
4. Mechanisms should be in place to assess the quality and appropriateness of student placements;
5. High-quality relationships between clinical sites and educational institutions should be developed in order to promote student learning;
6. An appropriate range of clinical competency assessments should be undertaken within the clinical environment;
7. Students should be provided with appropriate pastoral support arrangements whilst on clinical placement [6].

Recommendations for patient and public engagement:

Engaging patients and members of the public as stakeholders has become commonplace across different areas within national health services, however, this also presents a great opportunity for radiography education programmes to embrace this approach. Data from the 2017 member surveys indicated that only 17 of 47 (36.2%) of educational institutions responded positively to the question *'Do members of the public or patients contribute to your programmes in any way?'*. Of the 17 who indicated that they did involve patients or members of the public, examples included:

- *'We have patient volunteers and service user feedback';*
- *'Many patients / citizens do participate in education from a (multi) professional perspective';*
- *'Patients share experiences';*
- *'Patient experience, educators and Stakeholders contribute to teaching and curriculum development';*
- *'We have PPI involvement in course design and service users involved in teaching';*
- *'We have a board of radiography education comprising of various stakeholders'.*

A recent publication of the Society and College of Radiographers (UK) Patient, Public and Practitioner Partnership Group, outlines a series of core values to make sure radiography education programmes are more person-centred [18]. The EFRS supports these values, which are written in the patient voice, include:

1. Include real life, authentic patient experiences as part of learning;
2. Invite me to talk to students and staff about my lived experiences;
3. Invite me to be involved in assessing students' patient care skills;
4. Invite me to be involved in the development of courses of study;
5. Invite me to be involved in the selection of students;
6. Recruit students with compassion in mind, and educate and support them to embed compassion in their practice;

7. Encourage students and staff to consider exploring patient experiences in their research options;
8. Develop and use materials which focus on person-centred care, making this a mandatory subject for CPD;
9. Educate staff (clinical and academic) and students about why and how to work with me as a partner to improve care;
10. Take time to educate school children and other members of the public about radiography, imaging and radiotherapy [18].

Postgraduate Considerations

It is now widely accepted that the knowledge and skills attained by radiographers in their undergraduate training years provide a foundation for their career and that those knowledge and skills will not be enough to fully support them in future years.

Continuous changes to the evidence base and the continual technological advancements in Radiography result in potential gaps between 'best practice' and 'actual practice'. It is therefore crucial that radiographers build upon the knowledge and skills gained at undergraduate level to ensure their practice is in line with what is considered best practice over time by undertaking formal postgraduate programmes at EQF Level 7, Masters Level, as outlined in EFRS Level 7 benchmarking document [19], together with other continuous professional development (CPD) activities.

Postgraduate education and CPD are essential to ensure that patients continue to receive the highest quality care from competently trained professionals. The EFRS issued recommendations and guidance notes on CPD based on the growing recognition among those practicing in diagnostic and therapeutic Radiography of the importance of CPD in providing an able and competent workforce [20].

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