IMAGING & ONCOLOGY

For imaging and therapy professionals

2016

Contents

Challenges and opportunities in educating the medical imaging practitioner workforce

Charles Sloane

This paper will argue for a fundamental rethink in the education of professionals involved in medical imaging.

The last two decades have seen unprecedented change in the technologies used within medical imaging. This includes the volume of procedures undertaken, as well as the range and complexity of imaging examinations carried out within radiology and medical physics departments. Against this background, radiography curricula have remained largely static, with a divergence of provision and the creation of silos within the regulatory frameworks which govern the education provision of the medical physics practitioner and the radiography practitioner. Both of these factors have contributed to inefficiency, a lack of undergraduate education provision for the medical physics practitioner and generalised workforce shortages which are currently being experienced within the sector[1, 2].

The expansion of cross-sectional imaging and technological changes in projection radiography

The last decade of the 20th century and the beginning of the 21st century have seen an explosion of the number of imaging procedures carried out using cross-sectional imaging modalities. The number of MRI examinations undertaken is currently growing at 12.1% per year and has increased by a staggering 220% over the last ten years[3]. Computed tomography (CT) has seen similar increases with a reported 10% yearly increase. Ultrasound has shown a 5.3% expansion in activity since 2003-4[3]. There has been a 14% growth in PET-CT services between 2008 and 2012[4] and this is set to continue with an increase in the prevalence of cancer and the drive for early detection. The numbers of projection radiography examinations is also increasing albeit at a lower rate of 1.4%[3]. Even though the total percentage of ultrasound (21%), CT (10%) and MRI (7%) examinations undertaken is far less than the number of projection x-ray procedures (56%), they take longer to perform and are consuming a disproportionate amount of the imaging workforce resource.

The introduction of direct digital radiography (DR) has seen an increase in the throughput of patients per unit when compared to traditional film or the newer computed radiography technologies. The limiting factor which determines the workload capacity of the room is the physical fitness of the patient and the time it takes to get them in and out of the room safely, whilst maintaining appropriate levels of care. Consequently, there has been a reduction in the number of DR rooms found within a typical department which are required to meet the demand for projection x-ray imaging, although these rooms are working with a higher throughput of patients[5]. This presents those charged with the clinical education of students with a problem; there is less physical resource available for educating students and the resource that is accessible is under much greater time pressure due to the increased workload. These factors are a challenge in creating an effective and supportive learning environment in which the students can operate. There is less space and time available for the students to develop their skills in a non-pressured environment with the appropriate levels of support and supervision. The current focus of education within diagnostic radiography is directed toward producing practitioners who are competent in undertaking projection radiography with a limited competence in CT head scanning, usually of a relatively fit and healthy patient[6]. The appropriateness of this model within the current context clearly needs to be questioned. The expansion of cross-sectional imaging and reduction in resource available for projection radiography must be seen as key drivers for change within education, but there are other developments which must be considered.

It is a huge disincentive for universities to engage with two bureaucratic processes

Nuclear medicine, the advent of PET-CT and regulation

Historically, the development and location of nuclear medicine departments within hospitals has led to the creation of two workforces, educated by different mechanisms, both of which undertake a very similar or identical role. If the nuclear medicine department resides within a radiology department, then it will usually be staffed by qualified radiographers registered with the Health and Care Professions Council (HCPC). Should the nuclear medicine department be located within the medical physics department, then the practitioners caring for patients and undertaking the imaging procedures are called technologists. The technologists may be graduates who have undertaken an in-house training programme, perhaps supplemented by a more formal training by an external provider. A portfolio of evidence is produced to demonstrate that the technologist has achieved the levels of knowledge and practical competence in a process overseen by the Institute of Physics in Engineering and Medicine (IPEM) which then maintains a voluntary register for technologists since they are ineligible for registration with the HCPC.

More recently, a second method of education has evolved via the Modernising Scientific Careers Healthcare Science initiative[7]. The National School for Healthcare Science has produced a medical physics technology curriculum designed for universities to use in the creation of a three year Bachelor of Science programme for nuclear medicine technologists, but also for technologists working within radiation physics and the emerging role of the dosimetrist within radiotherapy[8]. Graduates register with the accredited register operated by the Academy of Healthcare Science. These programmes have struggled to be viable due to small numbers of students and the unattractiveness of the programme, which requires students to pay fees compared to radiography, which is fully funded. The funding arrangements are set to change in 2017 but the issue of low numbers will remain, as there is little public awareness of healthcare science as a profession. This will continue to threaten the viability of medical physics technology programmes. The current regulatory frameworks governing medical imaging and therapy have become a complex minefield for educators and managers to negotiate. Some professionals are registered with the HCPC, some with IPEM and others with the Academy of Healthcare Science. It would surely be in everyone's interest if a more standardised system of regulation was introduced, especially when we see a convergence of roles brought about by new technologies

The limiting factor in training imaging professionals will be the clinical placement capacity

such as PET-CT, PET-MRI or MRI-guided linear accelerators.

A recent issue has emerged concerning technologists who use PET-CT. This is connected to radiation governance or competence issues relating to their use of CT, as this may not have been included within their education and hence is beyond their scope of practice[9]. The issue does not apply to radiographers as CT forms part of their curriculum, although it should be emphasised that the clinical experience of the radiographer may be limited, as their first post competence may not extend beyond the performance of a head CT scan. The development of the two education pathways and roles for nuclear medicine practitioners would now seem inappropriate, as there is clear convergence within the roles, the use of PET-CT being a good example. Arguably, there is scope for the delivery of a common programme to meet the needs of both pathways. It is merely the physical separation of nuclear medicine facilities between radiology and medical physics departments that has resulted in the unnecessary development of two professions, ie radiographer and nuclear medicine technologist, whose roles are essentially the same within this field of imaging. An examination of the core competences and curriculum requirements from the HCPC for radiographers and the National School of Healthcare Science for medical physics practitioners, shows a large degree of commonality. The arguments for economies of scale in marketing and running relatively small programmes together are compelling and would again point towards curriculum and regulatory reform. It is a huge disincentive for universities to engage with two bureaucratic processes for course approval and quality assurance, in addition to the extensive internal quality assurance processes that the university will already have in place.

It is interesting to observe that the Professional Standards Authority, whose role is to independently oversee nine statutory bodies that regulate health professionals (including the HCPC), note that current regulatory frameworks are becoming unfit for purpose. These frameworks inhibit the innovation required to support the changes needed to counter the challenges faced by 'a healthcare system creaking under the strain of an ageing population, long-term conditions, co-morbidities, the rising costs of health technologies and a global shortage of healthcare workers'[10].

The historical siting of nuclear medicine departments or PET scanners either within medical physics or radiology departments has led to, and explains, the development of the current system of education. However, this is a poor rationale for the maintenance of the current training arrangements, which are inherently inefficient and are a disincentive for higher education institutions to educate technologists. There will however, remain a requirement to work within the existing structures in the short- and medium-term as regulation cannot be reformed easily or quickly.

Education funding changes, commissioning and caps

For many years the education of allied health professionals (AHPs) has been organised entirely from within the NHS. Health Education England and the Local Education and Training Boards (which operate at a regional level) are currently responsible for workforce planning, commissioning and monitoring the quality of placement provision. Universities are commissioned to educate a certain number of radiography students who have their course fees paid and are entitled to apply for a means tested bursary, student loan and receive reimbursement for costs associated with attending clinical placement.

Mostly, this has been an effective system for managing the education of healthcare professionals but this finite publicly funded resource, coupled with the ever increasing demand for healthcare, has not kept pace with the need for new graduates resulting in the current skills shortages[11]. Poor workforce planning has also been cited as a factor contributing to the shortages[12]. The Government's response to this was announced in the comprehensive *Spending Review* published just before Christmas 2015. There were fanfares of the new system removing the caps that existed under commissioning and thus enabling universities to allow 10,000 more health professionals to enter the education system[13]. As a consequence, about a third of Health Education England's budget will be passed over to the student loan company. From September 2017, students wishing to study for a nursing or AHP degree, will be required to obtain a loan for their fees and further loans to support their living costs. It is unclear at the time of writing whether students' clinical placement expenses will be reimbursed, but if this is not supported it will be a major disincentive for students to embark on a course of study, particularly where significant distances will be covered in travelling to clinical placements. What is certain is that universities will be able to recruit many more students, which will enable the skills shortages in medical imaging to be addressed, providing the issue of reimbursement of clinical placement expenses is properly taken into consideration within the new funding arrangements. The limiting factor in training imaging professionals will be the clinical placement capacity. This is a challenge which now must be addressed through curriculum redesign.

Addressing clinical education placement capacity shortages

The dwindling number of clinical rooms for projection radiography means less capacity to support students following a curriculum largely focused on such imaging. Clearly there is an urgent need for curriculum reform, especially if we are to create the clinical education capacity required to educate the additional students allowed as a consequence of the removal of recruitment commissioning caps.

Recent years have also seen a large expansion of private healthcare companies offering imaging services. This has been fuelled by the recent reforms in the NHS and the 'any qualified provider' policy[14]. Expansion in services has seen a further drain on the already depleted imaging staff resource base to operate these services[15]. Private companies do not at present provide widespread and regular clinical placements for undergraduate students. This is not from a lack of willingness to do so, but is a consequence of the services they are mainly involved with providing, ie MRI and PET-CT imaging. As has been discussed, the majority of undergraduate radiography curricula are focused toward projection radiography with students gaining an awareness of other imaging modalities. Students would not spend sufficient time gaining the experience they currently need to meet the course learning outcomes focused on projection x-ray imaging, if they were to spend more time working in cross-sectional imaging. Clearly, there is a large educational resource both in the private and public sector that is currently underutilised. This is not a sustainable position given large expansions in cross-sectional imaging modalities and the chronic workforce shortages. If a new curriculum was developed, with routes which provided a greater emphasis on CT and MRI, then this clinical education resource could be fully utilised and provide the extra clinical training capacity which is so desperately required.

The future of medical imaging and medical physics technology education

It is well beyond the scope of this paper to discuss the role and education of the assistant practitioner (AP) workforce within radiology. It is worth noting however, that this role is likely to expand as the skill mix develops, staff shortages remain and services expand[16]. New undergraduate programmes could offer greater flexibility in allowing 'step on' and 'step off' points which may be important if the education funding reforms affect the ability of certain groups, such as mature students, to engage with professional training.

The evidence provided from the increase in the volume and mix of medical imaging procedures undertaken by the breadth of healthcare provider organisations, supports the need for reform of undergraduate curricula. If this does not occur, there will be insufficient training capacity to meet the workforce requirements and graduates will not possess the range of skills needed to support the diversity of services offered by providers, both now and in the future as technology continues to evolve. It would seem sensible that future courses are made up of a core curriculum, which meets the demands of professional bodies and which also contains the range of core skills common to all the relevant career pathways including APs. Students could then opt to study one or two specific areas in the latter part of the programme, eg projection radiography, nuclear medicine, MRI, CT or PET-CT. There is a danger here that projection radiography could be seen as a less attractive option, but this need not be the case if new curricula include development of skills such as reporting and patient discharge, which are complementary to projection radiography. This would need to be coupled with a clear career development pathway within projection radiography, which would be attractive to graduates.

Conclusion

The changes in the funding arrangements which will apply from September 2017, do present potential threats to the education of the future professional workforce, but they also offer an opportunity to increase the number of graduates and plug chronic workforce shortages. This can be achieved through innovative curriculum redesign which supports the proliferation of imaging technologies, and corresponding changes in diagnostic pathways which have occurred over the last two decades.

The existence of a range of commissioning bodies, quality monitoring organisations, regulators and accreditation bodies, coupled with their inability to adapt to the very rapid changes in healthcare delivery, is a barrier to innovation and development. This has partly contributed to the current workforce shortages. The need for regulatory reform is therefore urgent and vital to ensure the protection of patients, by enabling educators to develop programmes which support the dynamic and rapidly evolving practice within the medical imaging context, as well as the wider healthcare environment.

References

1. IPEM. Position Statement on the Radiotherapy Physics Workforce. 2015. http://www.ipem.ac.uk/Portals/0/Documents/Publications/Position%20Statements/POSITION%20STATEMENT%20on%20the%20Radiotherapy%20Physics%20Workforce%20FINAL.pdf. Accessed January 2016.
2. UK Government. Tier 2 Shortage Occupation List. 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/423800/shortage_occupation_list_april_2015.pdf. Accessed January 2016.
3. NHS England. NHS Imaging and Radiodiagnostic Activity 2013-14 release. 2014. https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2013/04/KH12-release-2013-14.pdf. Accessed February 2016.
4. CREDO. A White Paper investigation into the Proposed Commissioning of New PET-CT Services in England. 2014. http://www.credo-group.com/downloads/PET-CT%20Whitepaper.pdf. Accessed 2nd February 2016.
5. Reiner B., Siegel E., Hooper F. et al. Multi-institutional Analysis of Computed and Direct Radiography Part 1. Technologist Productivity. Radiology. 2005;236 (2) 413-419.
6. Health and Care Professions Council. Standards of Proficiency: Radiographers. 2013. http://www.hpc-uk.org/assets/documents/10000dbdstandards_of_proficiency_radiographers.pdf. Accessed February 2016.
7. IPEM. Modernising Scientific Careers. Undated. http://www.ipem.ac.uk/CareersTraining/ModernisingScientificCareers.aspx. Accessed March 2016.
8. National School for Healthcare Science. BSc (Hons) in Healthcare Science Learning Outcomes and Indicative Content. 2011. https://www.networks.nhs.uk/nhs-networks/msc-framework-curricula/documents/BSc_HCS_Medical_Physics_Technology%202011-12.pdf. Accessed February 2016.
9. Society and College of Radiographers. Computerised Tomography (CT) scanners in Nuclear Medicine facilities; use by nuclear medicine practitioners from both radiographic and technologist backgrounds. 2015. http://www.sor.org/learning/document-library/computerised-tomography-ct-scanners-nuclear-medicine-facilities-use-nuclear-medicine-practitioners. Accessed March 2016.
10. Professional Standards Authority. Rethinking Regulation. 2015. http://www.professionalstandards.org.uk/docs/default-source/psa-library/rethinking-regulation.pdf?sfvrsn=2. Accessed February 2016.
11. The Independent Cancer Taskforce. Achieving World-Class Cancer Outcomes. 2015. http://www.cancerresearchuk.org/sites/default/files/achieving_world-class_cancer_outcomes_-_a_strategy_for_england_2015-2020.pdf. Accessed February 2016.
12. BBC News. Thousands of NHS nursing and doctor posts lie vacant. 2016. http://www.bbc.co.uk/news/health-35667939. Accessed March 2016.
13. Department of Health. Policy Paper: NHS bursary reform. 2015. https://www.gov.uk/government/publications/nhs-bursary-reform/nhs-bursary-reform. Accessed January 2016.
14. Department of Health. Operational Guidance to the NHS. Extending Patient Choice of Provider. 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216137/dh_128462.pdf. Accessed January 2016.
15. Centre for Workforce Intelligence. Workforce Risks and Opportunities: Diagnostic Radiographers. 2012. http://www.cfwi.org.uk/intelligence/workforce-risks-and-opportunities-education-commissioning-risks-summary-reports. Accessed March 2016.
16. Skills for Health. Assistant Practitioners in the NHS in England. 2015. http://www.skillsforhealth.org.uk/index.php?option=com_mtree&task=att_download&link_id=175&cf_id=24. Accessed March 2016.

Charles Sloane is the Professional Lead for Medical Sciences within the Department of Medical and Sport Sciences at the University of Cumbria. His background is diagnostic radiography and nuclear medicine, and his main focus is the education of professionals within medical imaging. He is a Trustee of the BIR and also a member of the BIR Accreditation Committee. Charles is passionate about projection radiography and has been a co-author of the previous and latest editions of *Clark's Positioning in Radiography*.