Department of Health

Workforce Review Report

Diagnostic Radiography

2019 – 2029

Contents

Abbreviations

AHP	Allied Health Professional
CEC	Clinical Education Centre
CIS	Community Information System
CPD	Continuing Professional Development
CT (CAT)	Computerised Tomography (Computerised Axial Tomography)
DXA	Dual-energy X-ray absorptiometry (previously DEXA)
DfE	Department for Economy
DOH	Department of Health
DR	Digital Radiography
ECG	Education and Commissioning Group
ED	Emergency Department
GP	General Practitioner
HCPC	Health and Care Professions Council
HSC	Health and Social Care
HSC Trusts	Belfast, Northern, Southern, South Eastern, Western & Northern Ireland Ambulance Service Trust (NIAS)
HSCB	Health and Social Care Board
IP	Inpatient
IR	Interventional Radiology
IS	Independent Sector
ISAS	Imaging Services Accreditation Scheme
LCG	Local Commissioning Group
MRI	Magnetic Resonance Imaging
NI	Northern Ireland
NICS	NI Civil Service
NIPACS	NI Picture Archive and Communications System
NISRA	Northern Ireland Statistical & Research Agency
NM (Nuc Med)	Nuclear Medicine
NMP	Non-Medical prescribing
NOUS (US)	Non- Obstetric Ultrasound (Ultrasound)
OP	Outpatient
OUS	Obstetric Ultrasound
PET	Positron Emission Tomography
PF	Plain Film (e.g. Chest x-ray imaging) Also known as Digital Radiography
PfA	Priorities for Action
PHA	Public Health Agency
RQIA	Regulation and Quality Improvement Authority
QA	Quality Assurance
RWPG	Regional Workforce Planning Group
SCOR	Society and College of Radiographers
TIG	Transformation Implementation Group
TYC	Transforming Your Care
US	Ultrasound
UUJ	Ulster University at Jordanstown
WLI	Waiting List Initiative
WLB	Work Life Balance
WTE	Whole Time Equivalent

Foreword

Since October 2016, Health and Social Care workers and the Department of Health have been cooperating to deliver the transformation set out in ***Health and Wellbeing 2026: Delivering Together***. This ambitious ten-year plan was our response to the report produced by an Expert Panel led by Professor Bengoa, who were tasked with considering how best to re-configure Health and Social Care Services in Northern Ireland.

The aim is a health and social care system that helps people to stay well for longer, with services delivered in the community or at home, where possible. Allied Health Professions (AHPs) will play a key part in responding to this challenge, particularly as we expand the role of innovative, multidisciplinary teams across a range of integrated care pathways within health and social care settings. No matter how or where AHP staff work, they will continue to maintain their clear professional focus: ensuring that people, who are ill, have disabilities or special needs, can live the fullest lives possible.

Since these AHP Workforce reviews commenced the landscape across Health and Social Care has changed considerably. Opportunities for AHPs have been created across a range of primary care multi-disciplinary teams. These are to be welcomed but it is important to have the highly skilled workforce required to take these opportunities as they arise. This series of workforce reviews are written with a view to identifying and quantifying the workforce required to meet these challenges and help drive the transformation agenda forward.

The AHP Workforce reviews will help to address one of the immediate priorities set out in the "New Decade New Approach" document published at the time of the establishment of the new NI Executive. The commitment being that the Executive will transform HSC services through reconfiguration of services.

The Covid-19 pandemic challenged us in many ways including the immense pressures placed on our workforce, but there are others pressures challenging us to think and act differently and to consider as to how we currently work and as to how we may work in the future.

In this changing environment, it is even more essential that we have an understanding of our workforce needs, so that we can plan effectively to maintain and develop our services into the future. This was recognised in ***Health and Wellbeing 2026: Delivering Together*** and appears as a key theme in the associated ***Health and Social Care Workforce Strategy 2026: Delivering for Our People.*** Recognising that the HSC is a changing

environment and will continue to evolve, this series of workforce reviews are "living documents" which will be reviewed throughout the period of the reviews.

This report and the clear recommendations it contains are the result of a wider Workforce Review Programme covering all thirteen AHPs in Northern Ireland. Since March 2017, Project Groups comprising representatives from across the health and social care service, professional bodies, staff side representatives and the Department of Health have been meeting regularly to consider how these professions / services are likely to develop in the period 2018 – 2028. Their work has been overseen by the AHP Workforce Review Programme Steering Group and applies the ***Regional HSC Workforce Planning Framework's*** six-step methodology.

This process and its resulting workforce review reports are the products of active co-design and co-production, delivering together to ensure the workforce needs of the HSC are met. Project Groups have engaged with their stakeholders including service users and carers, both in formal engagement events and through ongoing involvement with relevant individuals and organisations. Their input has been invaluable in producing this final document and its recommendations. We would like to thank everyone who has contributed to the work of the AHP Workforce Review Programme.

Our vision is that to Northern Ireland has an AHP workforce that has the capacity and capability to deliver the best possible care for patients and clients and has the leadership skills and opportunities to lead and transform services to improve population health. This Review Report and its recommendations set us on course to do just that for this profession.

Professor Suzanne Martin
Chief AHP Officer
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Director of Workforce Policy
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Executive Summary

This report is a work force review of the diagnostic radiography profession working across multiple sites in Northern Ireland. The Review was initiated, guided and endorsed by the Department of Health (DoH) and co-produced by the Radiology Service Managers (all identified as the Professional Radiography Lead for their Trust).

The aim of the Review was outlined in an agreed Terms of Reference with the ultimate aim of ensuring that adequate numbers of radiographers are recruited at undergraduate level, are recruited to the Health and Social Care in NI and progress through the required postgraduate Specialist and Advanced training, as per the Allied Health Professional Framework, to meet the anticipated demands for the profession over the next 5-10 years.

In order to ensure there was an opportunity for wide participation a Writing Group was established comprising of the professional leads from each of the five Health and Social Care Trusts, radiology department managers, representatives from the Society of Radiographers, the University of Ulster and the Education Commissioning Group, as well as input from the Health and Social Care Board and Public Health Agency. Input was sought from service users and other stakeholders at an Engage Event held at the University of Ulster in March 2019. The event was used to capture concerns and suggestions from a wide audience and output from the event was essential in informing the content of the report and subsequent recommendations.

A range of methods were employed over the period of the review including gathering and analysing statistical data, review of demographic changes and new service impacts, conducting a range of meetings, surveys, and inclusion of stakeholders across the Health and Social Care system. Relevant national and regional policies and strategies were reviewed to identify proposed

service developments or changes over the next number of years. Although small the impact of the numbers working in the Independent Sector were also considered

It is evident that the Radiography profession, like all Allied Health Professions (AHPs), faces a number of challenges in terms of having a staffing resource with the capacity to manage the anticipated increase in demand in all the service areas it currently operates in. These areas are clearly highlighted in the review content. In doing so the profession is mindful of the need to ensure the delivery of safe and effective services that continue to meet the needs of patients, clinicians and other service users both in primary and secondary care settings, whilst being pragmatic in terms of the available resource, and capacity to train the required number of radiographers over the coming years.

The Review concludes with 7 key recommendations, split into three distinct themes:-

1. **Strategic** to allow the known predicted increase in demand for services to be met
2. **Education Needs for both Undergraduate and Post graduate** to ensure the workforce is adequately trained and competent to deliver radiography and extended role working in line with the Strategic Framework for Advanced Practice
3. **Recruitment and Retention** to ensure the HSC can attract, recruit and retain radiographers who wish to work in the HSC

It is proposed that implementation of the recommendations would permit the HSC to achieve the objectives which are outlined within the Terms of Reference.

1 Introduction to Radiography and Medical Imaging

This introductory section is intended to give the reader a sense of the scale and complexity of the services provided by the Radiology (or Medical Imaging) service in NI. It is important to recognise that whilst the bulk of this work is performed on reasonably well patients, e.g. OP and GP patients for x ray, much of it will be done in very difficult circumstances, e.g. in theatre or interventional radiology rooms during procedures, in Emergency Departments during out of hours periods, or dealing with acutely unwell patients and their families and carers who need support, rapid access and expert help from a well-trained, well equipped, motivated and enthusiastic workforce.

Diagnostic Imaging

There were approximately 1,800,000 radiology examinations performed in NI in 2018-19 by radiographers. The demand for imaging has increased significantly over the past two decades at approximately 8% per annum. As well as modest increases in x ray examinations e.g. chest x rays etc. there has been huge expansion of complex imaging. Radiology and Radiography have managed huge technological advances ranging from the introduction of CT and MRI through to advanced interventional treatments. Digitisation of imaging has seen the old style processors and films disappearing completely to be replaced by state of the art Digital Radiography (DR) systems. New extended roles for radiographers have developed to deal with the increased imaging demand, including public health screening for breast cancer, bowel cancer and aortic aneurysm screening. There has been a shift towards imaging being required much earlier in the patient journey as clinicians have become increasingly reliant on imaging as part of the diagnostic pathway. Early diagnosis as well as regular monitoring of patients by imaging is now the norm, with complex imaging such as CT and MRI having the fastest growth rates.

Consequently the number of radiographers required to deliver the diagnostic imaging service has increased with a doubling of the numbers in the professions over the past two decades. This paper aims to outline the

transformation that that is currently evolving in the radiography profession as well as describing the anticipated increase in numbers of radiographers which will be required over the next ten years, if NI is to keep pace with the demand on imaging.

Radiography - The Profession

Radiographers are regulated professionals with the Health and Care Professions Council (HCPC). They are entitled to use one of the protected titles Radiographer, Diagnostic Radiographer or Therapeutic Radiographer. Radiographers undertake a broad portfolio of either diagnostic examinations or radiotherapy procedures. For those unfamiliar with radiography a description of each of the major modalities or specialties has been outlined in Appendix 1. This paper focuses on the work of **Diagnostic radiographers** exclusively whilst acknowledging the close cooperation with our colleagues in the Radiotherapy profession who have developed a separate workforce plan. The term "radiographer" in this paper therefore only relates to work undertaken by diagnostic radiographers.

Radiographers work in partnership with other team members to deliver care that may include screening, diagnosis, interventions or health monitoring for patients. To register with HCPC, radiographers must hold a relevant BSc (hons) or MSc qualification (or equivalent). Some radiographers would have obtained qualifications overseas or hold a Diploma in Radiography which was superseded by the degree. To maintain registration with the HCPC Radiographers must undertake and keep a record of their continued professional development (CPD).

In addition to HCPC standards, radiographers work to the standards of the Society of Radiographers code of professional conduct. The Code has four sections; relationships with patients and carers, scope of professional practice, personal standards in professional practice, and relationships with other health care staff. Application of these standards ensures that individual

members of the radiography professional workforce are able to develop and manage their own practice as autonomous practitioners.

Radiographers undertaking on line mandatory training as part of their CPD

Post qualification, radiographers follow career paths according to a combination of their personal interests and the needs of healthcare services and patients

Inter-professional Relationships

Radiographers work in close collaboration with radiologists in a tightly interlinked symbiotic relationship where both professions rely heavily on each other in order to provide a seamless patient-focussed service. Each Trust has a Professional lead radiographer who is responsible for assuring the professional governance of the radiographers within their Trust. They have responsibility for ensuring high quality best practice in line with HCPC and SCOR Codes of Professional Conduct. All professionals working within the service acknowledge the need for clinical leadership and mentorship which has allowed a wide range of role extension and specialist and advance practice to be developed. This ongoing supportive relationship will require to be nurtured and developed to ensure that the opportunities and challenges identified in this review and the subsequent recommendations can be implemented in a reasonable timeframe.)

The Advanced practice agenda will be core to delivering the increase in diagnostic imaging which is inevitable as we move forward over the next ten years and it is vital that both professional groups maintain a close supportive working relationship based on mutual respect for the skillsets and knowledge of the respective professional groups.

It is essential that the recommendations of this Workforce Review are considered alongside the recommendations of the Dept of Health Imaging Review as the delivery of the recommendations of the Imaging Review are inextricably linked to the provision of suitably qualified trained radiographers

Recommendation 1. This paper proposes that the recommendation made are incorporated into the Strategic Framework for Imaging Services to ensure a balanced approach to the redesign and delivery of a modern Radiology Service in NI

2. Introduction to the Radiography Workforce Review

a. Strategic Context

The direction of travel for transformational change within the HSC has been clearly set through the publications of 'Health and Wellbeing 2026 – Delivering Together' and 'Systems not Structures: Changing Health and Social Care – Expert Panel Report'. These documents have been developed to help shape Health and Social Care (HSC), to ensure services can meet the predicted demographic needs and challenges facing the region over the next decade and beyond.

These strategic drivers stress the importance of investing in our workforce, providing opportunities to develop their skills and find suitable career paths at all levels.

'We must invest in our staff and provide the environment to allow them to do what they do best – provide excellent high quality care' – 'Delivering Together'

In doing so it has been recognised that effective workforce engagement and planning are key enablers to HSC transformation. Therefore, in December 2016 the Department of Health (DoH) Northern Ireland (NI) embarked on a number of regional workforce reviews across a range of Allied Health Professional (AHP) groups. Radiography was included late in this process as there had been a workforce review performed as part of the wider NI Imaging Review. However the rapidly changing position in NI resulted in a complete workforce review being undertaken using the same methodology as the rest of the AHP family. These workforce reviews were deemed necessary to ensure AHP services delivered across NI would be sustainable to meet future demands, needs of the population and to ensure services were delivered to an appropriate standard in line with strategic policy directions. It is well acknowledged that there are a range of challenges faced by the HSC system which supports the need for the workforce to be balanced correctly in terms of size and skills, ensuring there is

an adaptive workforce, well organised and deployed correctly to provide the best possible care for service users and their families.

Focused engagement between all relevant organisations and stakeholders facilitated effective and active participation and subsequent ownership throughout the duration of the review. Another challenge experienced in completing the review, was in determining the necessary workforce to deliver sustainable services in the future, some of which was unknown. The review completed a horizon scanning exercise to determine future service needs. This involved:

- Analysis of demographic trends;
- Analysis of complexity of need;
- Predicting subsequent need;
- Predicting service developments and;
- Identifying changes in clinical practice which would impact on demand
- Addressing other service pressures identified in various other strategic documents, e.g. the NI Imaging Review, the AHP Strategy 'Achieving Health and Well-being Through Positive Partnerships' 2012-2017, and the AHP Framework for Advanced Practice
- Predicting the required number of Undergraduate Training places and alternative routes for training including Apprenticeship opportunities, direct entry for non radiographers to specific specialties e.g. US and MRI
- Predicting the required number of post graduate Training needs and skills enhancement linked to professional practice Frameworks and a sustainable qualified workforce.
- Pressures on other professional groups specifically radiology which are resulting in changes in capacity and providing opportunities for advance practice.
- Identifying potential drains on the HSC workforce including the growth of the Independent Sector.

The main focus of the 'Delivering Together' Framework is to put people at the forefront of services, to enable them to stay well for longer, with any specialist

interventions required being delivered to a high standard in a safe and timely manner in appropriate locations and facilities.

The Health Minister's 'Delivering Together' Strategy proposes a whole system transformation plan that requires cultural and operational change in order to meet future demands. This proposed transformation of HSC services is a long-term goal. The model, reproduced below Diagram 1., is the basis on which the workforce review has been based

Diagram 1.

By embedding the 'Delivering Together' Strategy into all stages of this review, there is greater assurance that the ultimate findings will be in keeping with the strategic direction for the future model of HSC in NI.

b. Imaging Review

In June 2018, following a public consultation, the Department of Health, Social Services and Public Safety published its final Strategic Framework for Imaging Services in NI. The Strategic Framework aims to further enhance and modernise the HSC's imaging services over the next 10 years to ensure that Northern Ireland continues to deliver high quality healthcare services and stays at the forefront of technological advances in imaging. The pace of implementation will of course be determined by the availability of finance to implement the commitments and actions set out in the plan. The proposals in the draft framework were developed following consultation with medical staff

from a variety of disciplines closely aligned to imaging, (radiologists, cardiologists, obstetricians) Radiographers, managers and users of the service across the HSC. Responses to the consultation demonstrated widespread support across the range of 8 guiding principles and 19 strategic recommendations. A short workforce review was included in the preparation of the Strategic Framework but did not focus specifically on radiography, nor did it follow the same principles applied to the other AHP professions. In light of this it was acknowledged that the same methodology should be used to address the needs of the Radiography AHP workforce.

c. Workforce Plan Methodology

The review followed the sequenced six-step methodology outlined within the Skills for Health, Regional HSC Workforce Planning Framework as denoted in diagram 2. below with completion agreed by March 2019.

By standardising the model used across all of the AHP consistency of approach and content could be assured. The model also provided a meaningful template for the professions to adequately describe the future requirements

Diagram 2.

d. Meeting the Terms of Reference

A key component for the successful completion of the review was to obtain relevant stakeholder engagement. In the initial stages of the review, a regional professional sub-group was established with relevant stakeholders. This group agreed and worked through specific actions outlined within the Programme Plan, and clear reporting lines were set and communicated to AHP Workforce Review Programme Steering Group at regular intervals. The Terms of Reference were agreed (Appendix 2)

The senior radiology managers were tasked with developing a draft and providing the required expert knowledge to progress the review. A writing group was established comprising of the senior managers, University of Ulster representation and SCOR representation.

Consideration was also given to the Society of Radiographers' publication of April 2019 "Principles of Safe Staffing for Radiography Leaders". (Appendix 3)

e. Assumptions and Constraints

A number of identified assumptions, constraints and/or risks were identified early in the process – these are listed below with the measures taken to manage and reduce their implications throughout the process of the review.

Assumptions

1. **That the views expressed in the document by the professions and contributors accurately reflect the views of all of the professions and stakeholders.**
2. **Availability and Access to relevant data** – Information on activity and staffing levels across the region is currently collated in different formats and to varying levels because of the different HSC Information systems deployed throughout Trusts/region which raised comparisons / benchmarking challenges.
3. **Impact of Current and Future Developments** – Radiography practice requires access to significant pieces of capital equipment. Assumptions relating to workforce may be underestimated should additional capital

funding become available or if the required clinical improvements are not supported by the commissioner.

4. **Future Population Health and Social Care Needs**– The predicted demographic trends and needs of the population will inform the type of service models and subsequent workforce required for the future.
5. **Other Transformational Changes in the model of health care are understood** Recommendations from other workforce reviews and transformation projects will impact on radiographers in terms of requirements for access to imaging. This paper works on the assumption that there is full visibility of all the transformational projects and the radiography impact will be identified agreed and supported to ensure achievement of the Transformation agenda and to provide a sustainable radiography workforce in NI for the next 10 years.

Constraints

1. **No new technology will be introduced over the next 10 years.** Radiography is a technology dependent service. Over the past three decades progress in technology has seen the introduction of CT, MRI, PET CT, Ultrasound and interventional techniques which has transformed the world of radiology. It is assumed that nothing of this magnitude will occur over the period of this review.
2. **Timeframe** - completion within the timeframe was challenging.
3. **Professional Capacity** – The availability of HSC staff to be diverted from clinical and managerial functions to complete the review
4. **Multidisciplinary Working** Radiography whilst identified as a stand-alone profession requires significant team work with a number of other professions, particularly Radiology. A close working relationship with the consultant body is required to ensure that recommendations within the review are not detrimental to the delivery of care in the diagnostic arena.
5. **Difficulty In Achieving Effective Engagement for this piece of work** – is an area to be addressed with key stakeholders at each stage to ensure co-production.

6. **The Future HSC and Political Structures** – NI political state and the restructuring of the HSC system is uncertain and this is influencing the availability of current and future funding.
7. **The absence of truly standardised recording of imaging activity is acknowledged to have a detrimental impact on benchmarking,** i.e. there remains some variation in recording methodology as well as two sites in Belfast City and Royal Victoria Hospitals not being recorded in NIPACS

Defining the Plan - Step 1

a. Purpose, aims and objectives guiding principles scope of the workforce review

The main focus of the Radiography workforce review was to ensure services across NI are both sustainable and delivered to an appropriate standard, which is currently identified as the UK Accreditation Scheme – Imaging Services Accreditation Scheme. The range of challenges faced by the HSC system has reinforced the need to ensure that the radiography workforce is balanced correctly in terms of numbers and skills. This will ensure that an efficient, patient-facing high quality motivated and adaptive radiography workforce is deployed in the right way and ensure services provide timely support for clients at both population and specialist levels.

To effectively achieve this vision a number of key actions have been set within the Terms of Reference (see also appendix 2) this includes:

- Making recommendations on measures, including structures and skills, to recalibrate the radiography workforce to assist with HSC wide transformation;
- Making recommendations to the DoH via the AHP Workforce Steering Group regarding the commissioning of pre-registration training;
- Making recommendations regarding post-registration training requirements;

- Developing a shared understanding of the core elements of effective workforce planning;
- Providing greater clarity of roles and responsibilities, processes, structures and governance;
- Providing an understanding of how organisations and individuals can contribute effectively in a mixed economy;
- Audit, research and benchmarking locally, regionally and nationally are key methods of assessing value and effectiveness of services, user engagement and informing service development and innovation.
- Encouraging partnership working both within and between organisations; and;
- Enabling better-informed education commissioning decisions.

b. Ownership

Relevant professional and workforce leads were identified as nominated members of the AHP Workforce Review Programme Steering Group. This included nominations from relevant organisations such as DoH, Radiography Heads of Service from each of the HSC Trusts, Public Health Agency (PHA), Staff side, the SCoR and service user involvement in line with requirements of the Public and Personal Involvement (PPI) legislative frameworks. It was identified that the review would be reported on, to the DoH, on a monthly basis through the relevant processes outlined by DoH.

c. Drivers for Change

The following section identifies a number of change pressures whose impacts will need to be considered as part of the design for the future radiography workforce.

Strategic Drivers - there are many strategic drivers that support workforce planning, such as:

- The recognition of the changing nature of health and social care needs and the link to demographic changes in local populations; (greater emphasis on preventative approach and supporting people)
- The need for revised service delivery models, to meet the needs of patients and clients and health and social care staff, and in meeting the career needs of the health and social care workforce in the wide ranging geography of Northern Ireland;
- Patient safety and quality of care;
- Affordability of services given the challenging financial context for all organisations; and;
- The need to connect workforce issues with the overall strategic direction, e.g. Delivering Together, Programme for Government, Transforming Your Care, Making Life Better, HSC Quality Strategy 2020, AHP Strategy for Northern Ireland and the annual Commissioning Plan Direction.

The Bengoa (Expert Panel) Review was tasked with producing proposals to remodel the HSC in order to deliver safe, high quality, and sustainable services for the population in Northern Ireland. Recommendations were submitted to the Minister in the summer of 2016 and following consideration of these, the 'Bengoa/Expert Panel report 'Systems not Structures: Changing Health and Social Care' was published in October 2016.

In response to the Bengoa/Expert Panel report the Department published 'Health and Wellbeing 2026 – Delivering Together'. This report re-affirmed that effective workforce engagement and planning are key enablers to HSC transformation, and that the far-reaching transformation journey needs the commitment and engagement of workers across every grade, if it is to succeed. 'Delivering Together', is now to be considered the only road map for reform. Published in May 2018 the development of a workforce strategy was identified as one of 18 key priority actions (no.16) to be taken forward in the following 12

months as part of the transformation process. The Workforce Strategy is to cover all aspects of HSC Workforce, including retention and recruitment; opportunities for introducing new job roles; and reskilling and up skilling initiatives. In line with the Minister's vision, the strategy will be developed through co design and co-production.

In addition the AHP Strategy 'Achieving Health and Well-being Through Positive Partnerships' 2012-2017 sets a clear framework for the key strategic directions for AHP's across NI.

Improvements in Technology – As technology evolves, the development of a highly skilled team is crucial to delivering high volumes of imaging in all modalities. Staff competence and training must be developed in line and keep pace with technological developments. Departments must have the capacity to maintain routine service and train radiographers to deliver complex imaging in a variety of modalities.

7 day and 24 hour Working – Radiographers have been at the forefront of genuine 24 hour working for decades as they were required to provide Plain Film Services for trauma patients in Emergency Departments (EDs) and minor injury units. This has expanded to 7 day working over the past number of years with all trusts in NI providing 7 day services for PF, US, CT and MRI.

Recognition of changes in Work Life Balance (WLB) - Radiography Staff are predominately a female workforce who want different working patterns, the impact of WLB arrangements must be factored into workforce planning. Radiography retention suffers as a result of the necessity to provide 24hr 7 day services 365 days per year, unlike most of the other AHP professions. This makes it a less attractive career for many.
Also peripatetic posts should be considered to ensure continuity of service while substantive staff are on maternity leave.

Patient Expectations and Feedback - This will drive changes to the provision of the service i.e. patient choice regarding where they have their imaging and also feedback about the service they have received.

Research – (National and International guidance) – Research provides evidence for safer and more effective imaging, as part of patients' diagnosis and treatment pathways. The introduction of imaging earlier into the diagnostic pathways is considered to be an important feature of modern medicine.

Increase in Complex Imaging - Increasingly complex imaging is required particularly in CT and MRI, which requires significant reporting capacity to be developed. The Imaging Review indicated that scanning capacity, i.e. the ability to capture images far outstripped the capacity to report these examinations.

There are many strategic drivers which support workforce planning and which recommends proactive management to help plan for the wide range and complexity of needs within the population. This is particularly evident in the overarching ambition of Delivering Together 2026 as outlined in diagram 3, below.

Diagram 3. Components involved in achieving the Minister's ambition – Every one of us leading long healthy and active lives.

Within this context, it is essential that this workforce review:

- Provides recognition of the changing nature of HSC needs and the link to demographic changes in local populations;
- Revises service delivery models to meet the needs of patients, clients, carers and health and social care staff in the wide ranging geography of NI;
- Considers the career progression and succession planning requirements of the present and future HSC workforce;
- Enhances patient safety and quality of care;
- Ensures affordability of services given the challenging financial context for all organisations; and;
- Connects workforce issues with the overall strategic direction, e.g. Delivering Together, Programme for Government, Transforming Your Care, Making Life Better, HSC Quality Strategy 2020, AHP Strategy for NI, Strategic Framework for Imaging Services in NI, and the annual Commissioning Plan Direction.

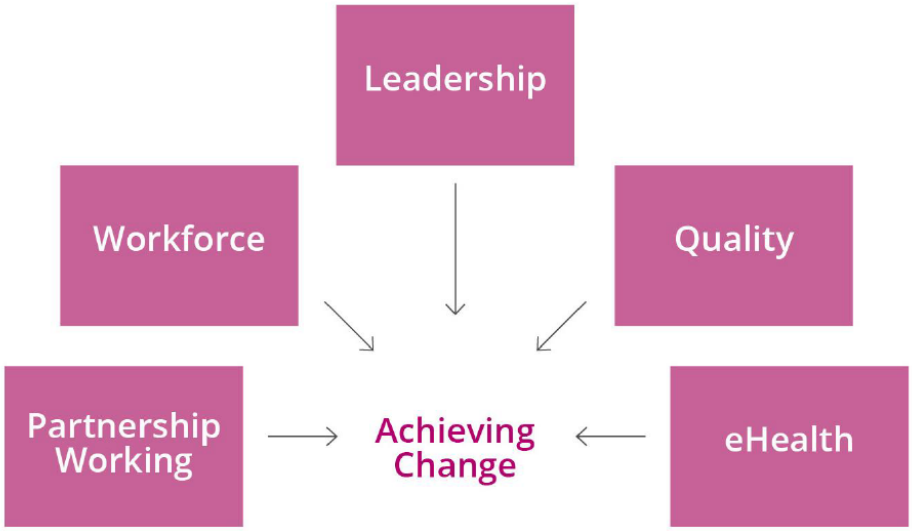


Diagram 4. - 'How we plan, design, support and implement service transformation is as important as the changes we wish to make.'

The Northern Ireland Programme for Government (PFG) contains 14 strategic outcomes, which set a clear direction of travel and enable continuous improvement on the essential components of societal wellbeing. They touch

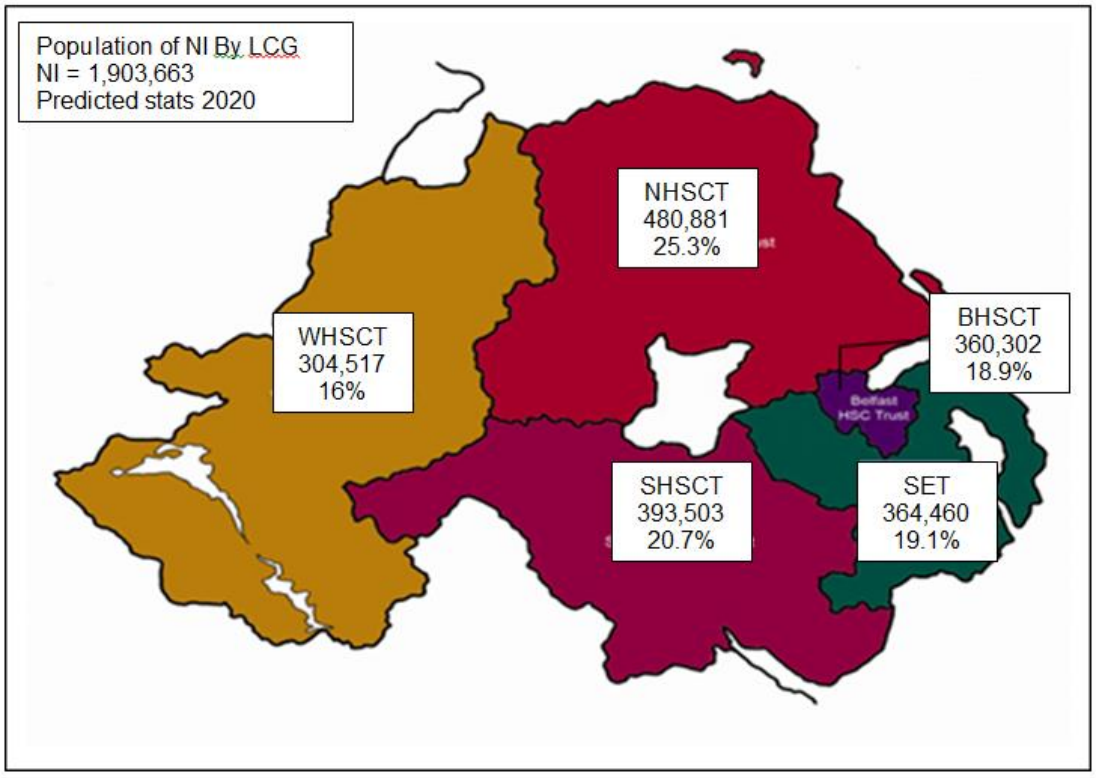
on every aspect of government, including the attainment of good health and education, economic success and confident, peaceful communities.

Mapping the Service - Step 2

Outline of the Radiology Service in NI

Management Arrangements

The radiology service in NI is provided on a trust basis, with each of the five trusts having a radiology Service Manager and one or more Clinical Leads.



All HSC Trusts provide 24/7 emergency radiology to support acute services with all acute hospitals providing access to plain film, ultrasound, fluoroscopy and CT as required. In the last 10 years there has been a significant increase of out of hours CT, reflecting changes in acute attendances, the ageing population, clinical practices, bed clearing and defensive medicine. There is 24 hour radiographer presence on the current acute sites for Plain Film and CT with On Call available for some of other Specialties, e.g. Cardiac Catheterisation or MRI.

Some of the smaller sites provide out of hours cover up to midnight or earlier and provide cover for the Urgent Care and Treatment Centres and minor Injuries Units.

The imaging workforce within radiology departments, includes Radiologists (who are medically qualified), Radiographers, Specialist and Advanced Practice Radiographers (up to Consultant Radiographer level) Assistant Radiography Practitioners, Nurses and Radiology Support Staff. In different settings, it includes staff such as other medical specialists, medical physicists, clinical technologists, vascular technologists and clinical physiologists. Specialised support from medical physics and pharmacy staff is provided in areas such as radiation protection, quality assurance and radiopharmacy, while general support is provided by portering and administrative staff.

A **Modernising Radiology Clinical Network (MRCN)** was established in April 2013. The MRCN has a dedicated Network Manager and membership includes radiology clinical leads and radiology managers, along with other key stakeholders such as representation from Public Health Agency, Dept of Health HSCB, the Business Service Organisation (BSO) who hold and manage the NIPACS contract on behalf of the HSCB, and representatives from other clinical Networks as required.

The Network functions as a clinical advisory and implementation network, with the overarching objective to identify and address key local issues pertaining to radiology services. It is also tasked with identifying key clinical indicators in quality care measurements, ensuring implementation of service improvement opportunities and prioritising practice development needs within specific clinical areas. It provides a solution-focussed approach to the provision of radiology services and promotes a culture of continuous improvement and collaboration to ensure robust and consistent provision of radiological services fit for the future.

Radiography Senior Professional Managers Forum

This group was established to provide a structure through which Radiology Managers (Diagnostic and Therapeutic) can engage in partnership with the PHA to influence strategic and operational plans for the professional development and modernisation of Radiography services in Northern Ireland.

The goals are to

1. promote radiography,
2. provide a high-quality, modern, efficient, effective and responsive service for the population served
3. develop and commit to clear governance and accountability arrangements
4. develop and raise the profile of radiographers

Organisation of Services

Trusts are funded to provide a wide range of radiology services for patients within each geographic area. Due to differences in population numbers and land area covered the models used and services provided do vary, although all trusts provide core services on a number of sites e.g. PF, CT, MRI and Ultrasound. All trusts provide direct access for GPs for PF, US, limited MRI and limited CT, again depending on local arrangements but this is anticipated to change as part of the transformation process with trusts expected to deliver similar access to users in Primary Care regardless of location.

As well as these core services Trusts may also provide higher levels of specialist care and these are considered to be **Secondary Centres**. This would include provision of subspecialty care such as orthopaedics, maxilla-facial surgery, head and neck surgery etc. These centres would also be expected to provide advanced imaging to meet the users' needs.

BHSCT provides **Tertiary Level Care**. These services are highly specialised and include the Trauma Centre, specialist Paediatric radiology, Paediatric surgery, genetics, etc. The tertiary centres would also require high specialised support such as neuroradiology, neuro interventional services and specialist interventional services. Currently vascular intervention is provided in BHSCT but there are plans to roll out "Hub and Spoke" models to provide some vascular services and other tertiary level care on the major acute sites.

Patients largely have their radiology examination at their closest hospital, e.g. patients referred at a specialist clinic in BHSCT can have their examination performed at their host trust.
The guiding principle is to provide services as close to the patient as possible to minimise inconvenience and travel.

There is free movement of patients across trust boundaries which is facilitated by NIPACS which allows easy access to patients' images and reports regardless of the site they were captured on, (RCH and BCH excepted).

Undergraduate Training and Professional Development of the Workforce

The following section outlines the career pathway for radiographers as it is currently established in NI which reflects the practice across the UK.
Four levels of practice are defined within the College of Radiographers' Education and Career Framework for the Radiography Workforce (2013): Assistant Practitioner, Practitioner, Advanced and Consultant Practitioner. This structure matches that proposed in the Advanced Practice AHP Framework (NI).
Individuals who successfully complete the pre-registration programme are recognised as having satisfied Practitioner standards and are subsequently eligible to register with the HCPC as a Diagnostic Radiographer.

> "The indicative curriculum for Practitioners reflects the requirement for a highly professionalised workforce with a clear identity and set of values, that together with the appropriate knowledge and skills, ensure that radiographers are able to operate professionally in uncertain environments. The values of integrity, person-centredness, personal responsibility, respect, trustworthiness, collegiality and reflective practice are embedded. As such, the curriculum aims to prepare newly qualified radiographers to enter the workplace as novice, autonomous professionals able to develop themselves and acquire the level of

professional maturity needed to be full members and leaders of the inter-professional workforce"

(College of Radiographers' Education and Career Framework for the Radiography Workforce, 2013).

Within the pre-registration programme delivered at Ulster University, periods of professional practice placement are the keystone to successful delivery of the programme, enabling development of practitioner skills, including patient care and interpersonal skills under the auspices of qualified Practitioners. Each practice placement site is validated by the College of Radiographers for the clinical education and training of a preset number of students to ensure placement environments provide supportive and high quality clinical learning environments for students. Criteria also stipulate the need to have an identified individual in the role of Practice Educator to oversee and coordinate the students' clinical rotation (College of Radiographers' Guidance on Approval and Accreditation of Practice Placements at all Levels of Pre-Registration Education, 2005). Education. As such, placement capacity is a significant determining factor when considering undergraduate training numbers.

DoHNI has previously commissioned 48 places each year on the pre-registration Diagnostic Radiography programme at Ulster University. With effect from September 2018, the number of undergraduate training places was increased to 58 in a bid to address the current shortages with the diagnostic radiography workforce as a result of continuing service

An undergraduate Student Radiographer completing her assessment with a Practice Educator

development and backfill gaps within the workforce as a result of career progression within the existing workforce. Currently there is no provision for Assistant Practitioner training at Ulster University, but likewise this could be developed, subject to approval of academic standards where sufficient demand is perceived.

Statistics pertaining to undergraduate application data for Diagnostic Radiography show an increase of 20.7% in numbers (n=198 to 239) applying to Ulster University between 2014-15 and 2016-17 academic years (SCoR Approval and Accreditation Board; Annual Report 2016-17, 2018)

Reported attrition rates for the same period at Ulster University (3.4 to 8.0%) are comparatively low when compared with overall national figures (11.96 to 14.69%). (SCoR Approval and Accreditation Board; Annual Report 2016-17, 2018)

It is pleasing to note, the majority of students who successfully exit the pre-registration programme at Ulster gain employment as Practitioners within Northern Ireland's HSCTs. A minority of students will register and apply to work in the Republic of Ireland's HSE, with a few occasionally securing employment in Great Britain.

The following table, summarises returned employment statistics collected in the six-month period for successfully exiting enrolled on the pre-registration programme in 2014-15 to 2016-17 academic years.

Year of Completion	Number in Exiting Cohort	Number of Responses Returned	Number in professional employment in NI HSCT	Number in professional employment HSE	Number in professional employment GB	Number in professional employment elsewhere e.g. Private sector
2014-15	43	35	18	7	7	2
2015-16	36	32	29	1	1	-
2016-17	37	36	35	-	-	-

(Ulster University: DLHE Cohort Return for Diagnostic Radiography & Imaging programme 2014-15 to 2016-17, 2019)

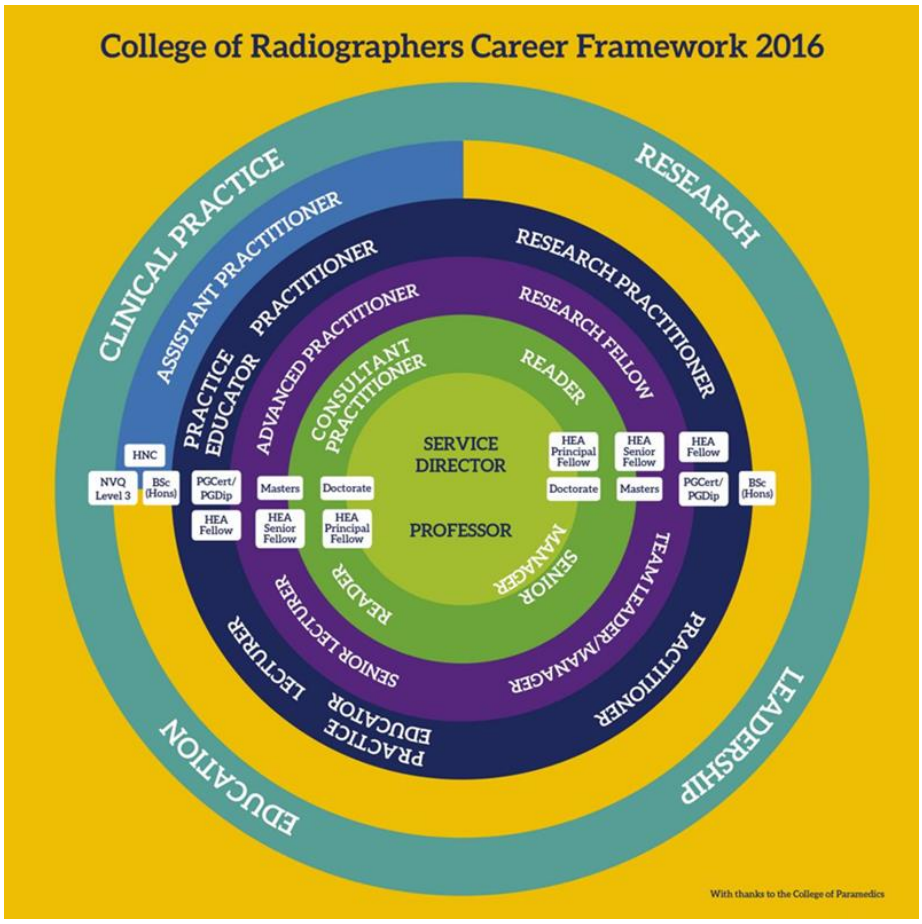
On commencing employment, newly qualified radiographers are further supported in their transition from student to Practitioner through prescribed preceptorship programmes in each of the departments. It is recognised that where preceptorship is well embedded as part of the organisational culture, there are significant benefits for the newly qualified staff, teams, patients and the organisation itself in terms of retention, recruitment and staff engagement, effectively contributing to enhanced patient care and experience and establishing essential foundations for lifelong learning (NHS Employers, 2018).

Registered radiographers at the Practitioner level undertake a broad portfolio of diagnostic examinations within the clinical imaging department, including those pertaining to general radiography in the trauma, theatre and ward environments, as well as fluoroscopic imaging techniques. As an integral member of the clinical imaging, the Practitioner may also participate in more complex imaging, typically associated with the specialist imaging modalities. This is under the supervision of more experienced Specialist or Advanced Practice Radiographers who have higher levels of autonomy, underpinned by Masters level award (or equivalent training) that encompasses the four pillars of clinical practice, management and leadership, education and research, with demonstration of core clinical competence relative to the area of practice. As such, the Advanced Practitioner is an integral member of the radiography team, but also interacts with relevant multidisciplinary teams to ensure delivery of high quality, patient-centred, effective care.

Currently, a limited number of Consultant Radiographers exist within Northern Ireland's Diagnostic Radiography workforce, but with an evolving scope of practice linked to the adoption of more complex tasks previously attributed to the radiologists' role, it is anticipated the number of Consultant Practitioners will dramatically increase. Alongside the national shortage of radiologists, and the exponential growth in diagnostic imaging services, an increased number of Consultant Practitioners in diagnostic imaging has potential to reduce waiting times, generate more timely reports and enhance the efficiency of the

patient pathway, thus assuring future sustainability of the service. As such, research skills are of paramount importance to Consultant Practitioners who are actively involved in promoting research and development within the Diagnostic Radiography profession.

The College of Radiographers' Career Framework, (2016) effectively demonstrates the accredited postgraduate study necessary to inform the four levels of practice associated with provision of diagnostic imaging services : Education, Clinical Practice, Leadership and Research .



A suite of postgraduate modules is currently offered at Ulster University, to inform and support advancing practice and research within the various specialist imaging modalities, enabling registrants to obtain award of Postgraduate Certificate, Diploma, Masters and Doctorate qualifications,

ensuring the necessary knowledge and skills to underpin advancement in their role to Advanced or Consultant Practitioner. These qualifications are also offered at institutions in the Republic of Ireland and on the mainland, some as distance learning modules.

Modules are developed and revised in accordance with identified clinical need through liaison meetings with clinical services managers. On some occasions, where demand is low or local provision is not available, sourcing provision from other Higher Education Institute (HEIs) as above may be deemed necessary. Whilst it is recognised that this may not necessarily be the most cost-effective means, local provision can be enabled at a later date, once a core team of specialist clinicians willing to contribute to academic delivery of subsequent cohorts has been established.

Alternate Entry Routes to the Profession

It is acknowledged that there may be other entry methods in to the radiography profession such as Apprenticeships etc and these are considered outside the scope of this paper but the output of any such change in training can be factored into the undergraduate number prediction at a later stage of the process.

Mapping the Service Change – Step 3

Population demographics, health profile and statistics

NI 2017 mid-year statistics estimate the population to be 1.874million and the population projections anticipate a rise of 4.68% to 1.961m by 2027. Information and population statistics available suggest there will be varied levels of increases by 2027 across each of the Local Commissioning Group (LCG) areas, ranging from 2.5% to 9.8%.

The highest proportion of the population is aged between 40-64 years (31.9%), followed by those aged between 16-39 years (31.1%). It is predicted that the ageing population will continue to rise and by 2027 the over 65 population is expected to increase by 28%, representing 19.9% of the overall population. This will have an impact on service demands and pressures across the health and care system, as people grow older the likelihood of illness and disability is anticipated to also increase.

For a more detailed breakdown of population stats in 2017 and the predicted stats for 2027 see Table 2: **N Ireland Resident Populations by Local Commissioning Group - 2027**

Age Band (Yrs)	Belfast	Northern	South Eastern	Southern	Western	NI
0-15	71,444	94,325	71,608	92,045	63,124	392,546
16-39	119,079	135,866	101,364	125,295	87,591	569,195
40-64	109,928	155,448	117,888	128,516	97,681	609,461
65+	66,201	104,691	85,183	73,207	60,757	390,039
All ages	**366,652**	**490,330**	**376,043**	**419,063**	**309,153**	**1,961,241**
%	**18.7%**	**25.0%**	**19.2%**	**21.4%**	**15.8%**	**100.0%**

Source: NISRA, Based on 2014 Population Mid-Year Estimates *Table 2*

Other demographic population statistics – The following information was reproduced from the NI Imaging Review which was completed in 2017 and reflects the specific issues which are predicted to impact on the radiology service over the coming decade.

The population figures demonstrate that:

- The population is expected to increase due to more births than deaths. Over the next decade, the population is set to increase by 10,000 each year due to natural growth.

- The projections show a large increase in the number of older people. Numbers of those aged 65 and over are projected to increase by 25% in ten years (2012-2022). The oldest old (aged 85 and over) are projected to rise by nearly 50%.

- There is significant variation the projected increase across HSC Trusts and this will impact on demand and capacity planning at Trust level.

- Over the decade (2012-2022), the number of children (aged under 16) is projected to rise by 5%. The population aged 16-64 will remain relatively static.

There are increasing numbers of people with cancers and chronic conditions such as hypertension, diabetes, obesity and asthma.

Currently in Northern Ireland use of the service varies by age band, e.g.

- **around 1 in 3 people** come into contact with imaging services.

- **For the over 65yrs population**, this increases to 1 in 2 and many will have multiple events.

- **The 85yr plus population will experience the greatest increase over the coming years**, and typically presents with a range of conditions, including the following, all of which are reliant upon imaging support:
    - The spectrum of long term conditions
    - Respiratory
    - Rheumatology
    - Cardiology

- Trauma and Orthopaedics, including fractured neck of femurs
- Musculo-skeletal
- Vascular related
- Neurology (inc. TIA / Stroke)
- Disease of old age, e.g. dementia

The combination of increasing population and increase in the number of older people will have significant, predictable and major implications for the provision of imaging services in the future.

b) Mapping the Radiography Workforce

The Funded Establishment i.e. the number of staff funded to deliver a service is expressed in Whole Time Equivalents (WTE). However as with most of the AHP groups many staff work part time. To ensure that the number of staff in post is and the required training etc can be adequately accounted for the following figures refer to headcount.

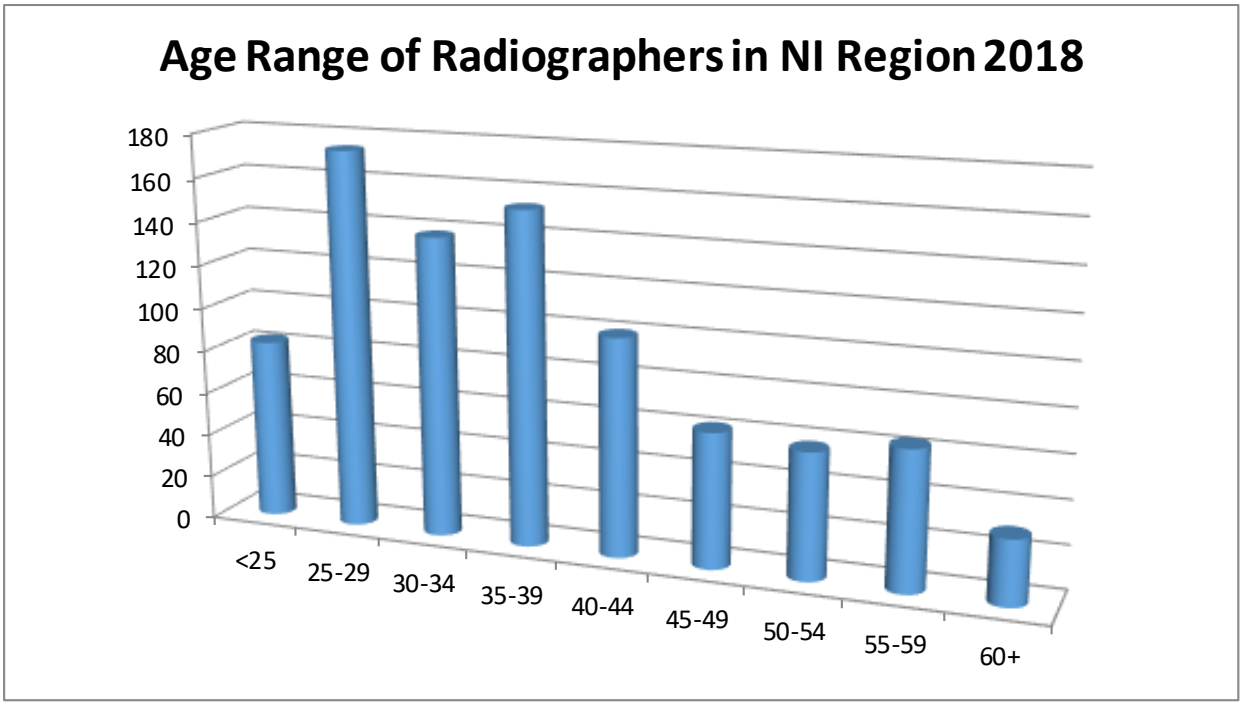
	WTE	Total Number of Registered Radiographers in post	Number of Part time staff	% of radiographers working part time
BHSCT	245	267	82	31%
NHSCT	125	138	58	42%
SET	110	116	31	27%
SHSCT	150	167	64	38%
WHSCT	144	164	38	23%
IS		8	0	0%

This indicates that overall the percentage of part time staff in the profession remains is relatively high at 32%. This is anticipated to increase over time as staff become more prepared to adjust their work life balance

The gender profile shows that just over 90% are female and just under 10% are male. There was no mechanism for identifying staff who do not fit within the traditional binary gender model.

The age profile of the staff WTE figure (2018) showed the following profile

Age Range	<25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+
BHSCT	27	51	39	54	27	23	14	22	10
NHSCT	8	31	21	26	17	9	14	9	3
SET	15	22	23	16	6	13	9	11	1
SHSCT	16	30	33	34	22	7	9	6	12
WHSCT	17	37	21	22	26	10	12	15	4
IS	0	3	1	1	2	0	0	1	0
Region	83	174	138	153	100	62	58	64	30



The graph reflects a relatively young workforce with over 75% of the workforce under 45 years of age. This is considered to be a reflection of the recent increase in demand for radiology and significant investment in radiology over the past 5 years.

Numbers leaving the profession due to ill health or retirement were small i.e. 1.9%. There was a significant degree of mobility in the profession with

radiographers freely moving between trusts, for promotion or family reasons. A very small number are recorded as relocating to ROI or GB. The age profile would indicate that the numbers due to retire from the profession, although experienced and highly skilled, will remain relatively small over the next 10 years.

It is the view of the Workforce Review Group that it is important that workforce planning is based on Headcount and not on older models of WTE as that is no longer the best metric to use for stability of the workforce or workforce pool. This change to headcount is required due to the increase in part time working, job sharing, family friendly working arrangements, seven day working rotas, extended working days etc. The effect of using a headcount also ensures that the impact on training numbers is accounted for. Flexible working will see more staff working part time but the training requirements, mandatory, specialist, CPD etc remains the same regardless of the hours worked, i.e. there is an increase in percentage time required for training and a reduced clinical output as a consequence.

The figures above, i.e. 32% part time workforce would indicate the need for 1.3 WTE radiographers to be employed to facilitate stable cover for each 1 WTE need for radiographers. As such, assuming the number of DOH commissioned places reflects the needs of the services to enable them to adequately meet the needs of the population, there is a need to train 30% more people to cover flexible working arrangements in the future.

Attrition Rates

Maternity Leave and Worklife Balance.

The radiographer workforce is predominantly young, with 63% of staff below the age of 40 years. This figure supports previously mentioned challenges in regard to maternity leave, the need for peripatetic posts and the challenge in increasing Work life Balance Applications. Based on the above in formation it is reasonable to assume high levels of maternity leave as per previous years.

Review of requests for WLB adjustments would show an increasing number of radiographers choosing to work part time to deal with managing a family. Consequently the potential for ongoing maternity leave and the employment of peripatetic radiographers to cover on going vacancies would be appropriate.

Retirements

Although the loss of radiographer due to age related or ill health retirement remains small, it is important to note that these staff are largely those with specialist skills, experience and advanced practice. Consequently this has an immediate impact on the service as it would result in a skills gap which can only be avoided by investing in long term planning to ensure continuity of services. Although the changes in pension arrangements for NHS staff in the 2008 scheme will see staff expected to work longer, the practicalities of staff working into their late 60s and beyond has yet to be fully established. However for the purposes of this review the retirement age is anticipated to be 68. The radiography workforce will, lose approximately 72 radiographers over the next 10 years due largely to retirements

Recommendation 2 - Address gaps in service caused by changes in Work Life Balance as a result of

- **requests for part time working,**
- **maternity leaves and**
- **the potential for peripatetic radiography appointments to deal with these requests**

Independent Sector

Opportunities for work outside the NHS in NI are small due to the high capital costs of radiology equipment required to deliver imaging services. There is a small number independent sector providers in Northern Ireland who do provide imaging. Many of the radiography services provided are done so on a part time basis by staff who's primary role is in the NHS. The IS also employ staff on a permanent basis. The numbers are relatively small. In the absence

of a clear strategy for the use of the IS in NI in the future, it is impossible to predict if this market will increase or decrease. For planning purposes it is assumed that the total number of radiology examinations required in NI will remain as per the predictions regardless of whether they are performed in the IS or NHS trusts. Consequently it is assumed that this sector's need for radiographers can be considered as part of the whole radiology service need and its impact included in the overall projection.

The potential loss of radiographers into the IS considered to be small.

3. Planning for the Future

Mapping the known Radiology demand

Radiology commissioning in NI is undertaken on a Service Budget Agreement (SBA) model. This effectively is a process where the commissioning body, The Health and Social Care Board (HSCB) via the local commissioning groups, and to a lesser extent the Public Health Agency, agree with each trust the volume of work to be undertaken in the coming year. This increase in activity is based on demographic change and new or enhanced services which the commissioner would like introduce. This could include the appointment of new consultants to deliver a new service, see extended opening hours or the development of "out of hospital" radiology service such as PF x rays or US being delivered in Polyclinics or GP surgeries.

The benefit of such a model is that there is a predictable uplift in the expected activity and consequently a predictable uplift in the staffing levels required to deliver the revised volumes. The model described however does not include all modalities, i.e. the uplift is based solely on Non Obstetric US, PF, MRI and CT. Whilst this covers the majority of radiology examinations performed it excludes very high cost, low volume specialties such as Nuclear Medicine, Interventional Radiology, PET/CT which results in a difficulty in establishing a baseline from which to build a model to include staffing and training etc. This commissioning anomaly will be accounted for later in the workforce model and the prediction here reflects the requirements exclusively for the future SBAs. This review provides an opportunity to include the need to plan for the post graduate education of radiographers to ensure new capital equipment is maximised and new service developments, and service reconfigurations can be supported by the necessary diagnostic imaging.

Diagnostic Imaging 10-Year Demand Projections as of January 2019

The table below indicates the predicted increase in activity required across NI to meet the needs of patients referred to radiology for a diagnostic test and

radiology opinion for the next ten years. The methodology used has been shown to be accurate and reliable and has been provided to the Workforce Review by the HSCB.

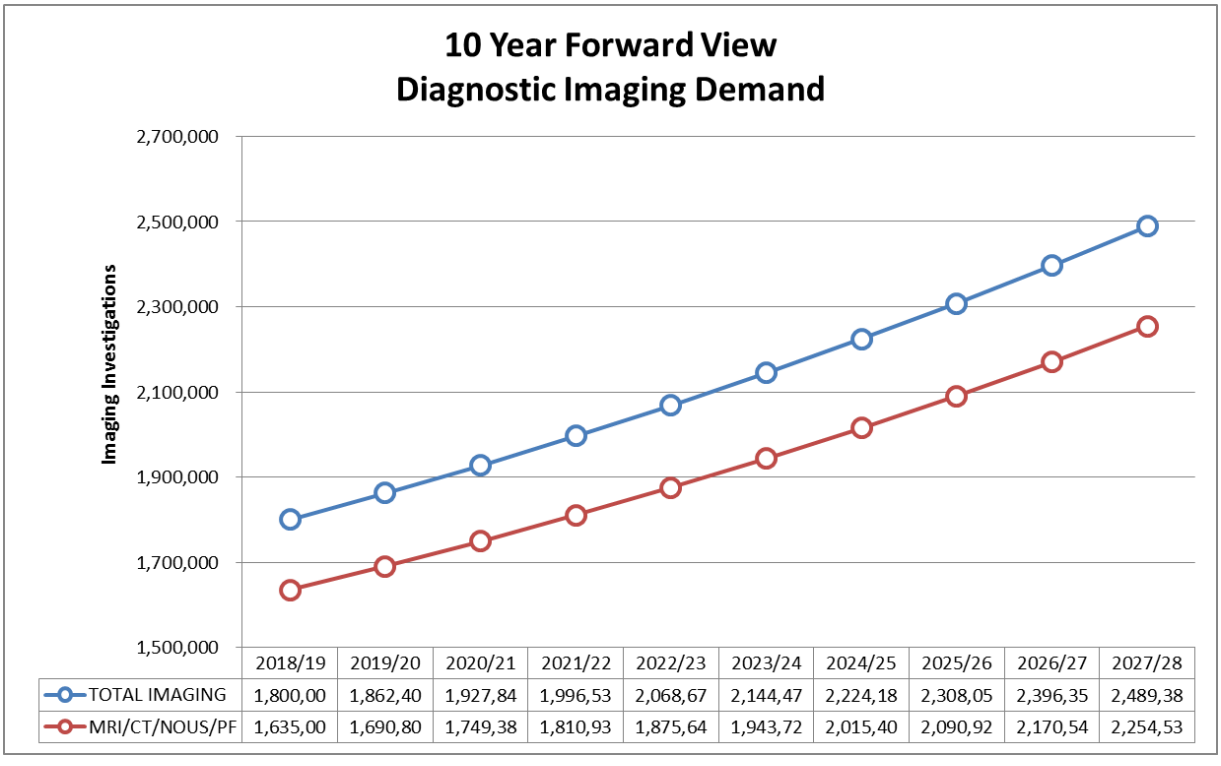
Based on underlying growth trends used to inform service planning, the following annual (compounded) increases are anticipated:

- 8% pa for MRI
- 8% pa for CT.
- 4% for NOUS.

  2% for Plain Film

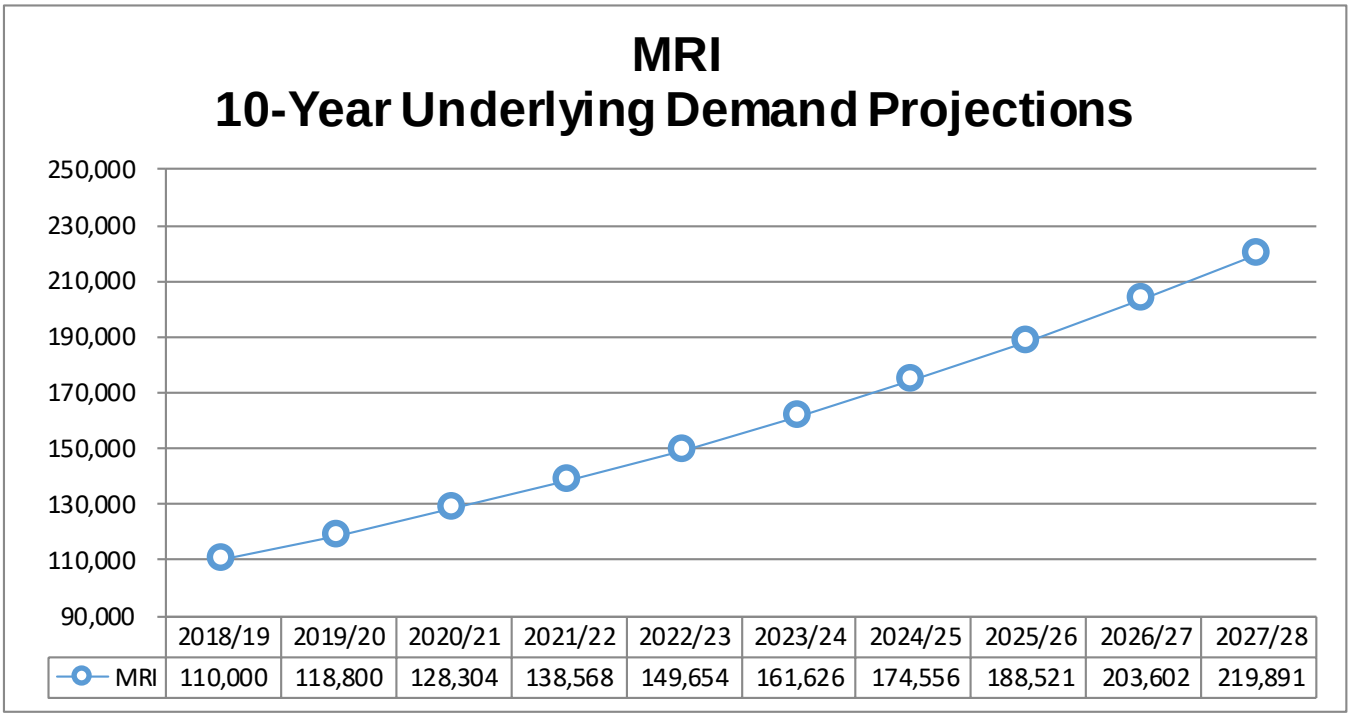
The prediction does not include known demand pressures as a result of NICE or other clinical guidance, nor does it make adjustment for anticipated future increases in demand from future clinical guidance. This aspect of additional demand is covered elsewhere in this document. The predicted trend below will see an anticipated 30% growth in radiology examinations.

It is of note that the largest increases are in those examinations CT, MRI and US which require the greatest input in terms of reporting, i.e. these are complex examinations requiring significant time to report compared to PF examinations, which show only a modest increase per annum



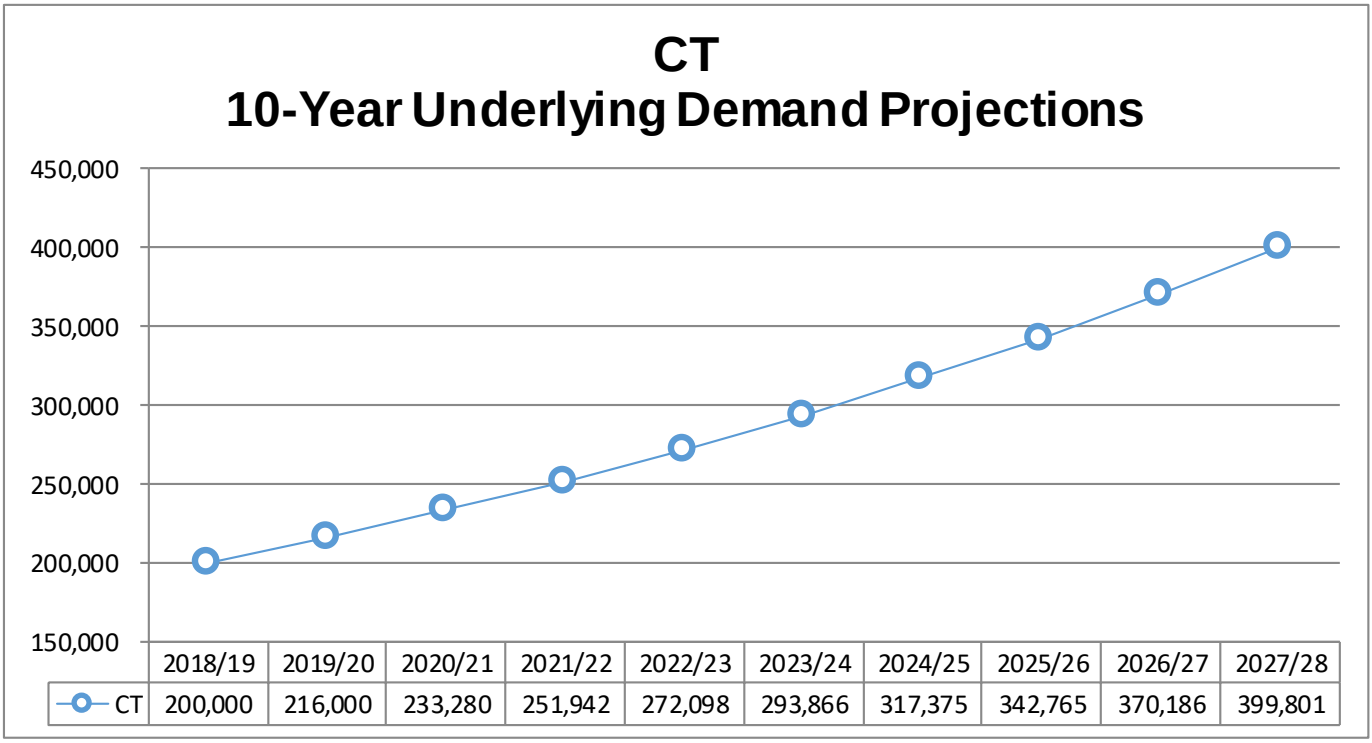
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
TOTAL IMAGING	1,800,00	1,862,40	1,927,84	1,996,53	2,068,67	2,144,47	2,224,18	2,308,05	2,396,35	2,489,38
MRI/CT/NOUS/PF	1,635,00	1,690,80	1,749,38	1,810,93	1,875,64	1,943,72	2,015,40	2,090,92	2,170,54	2,254,53

The following tables show the predicted growth by modality



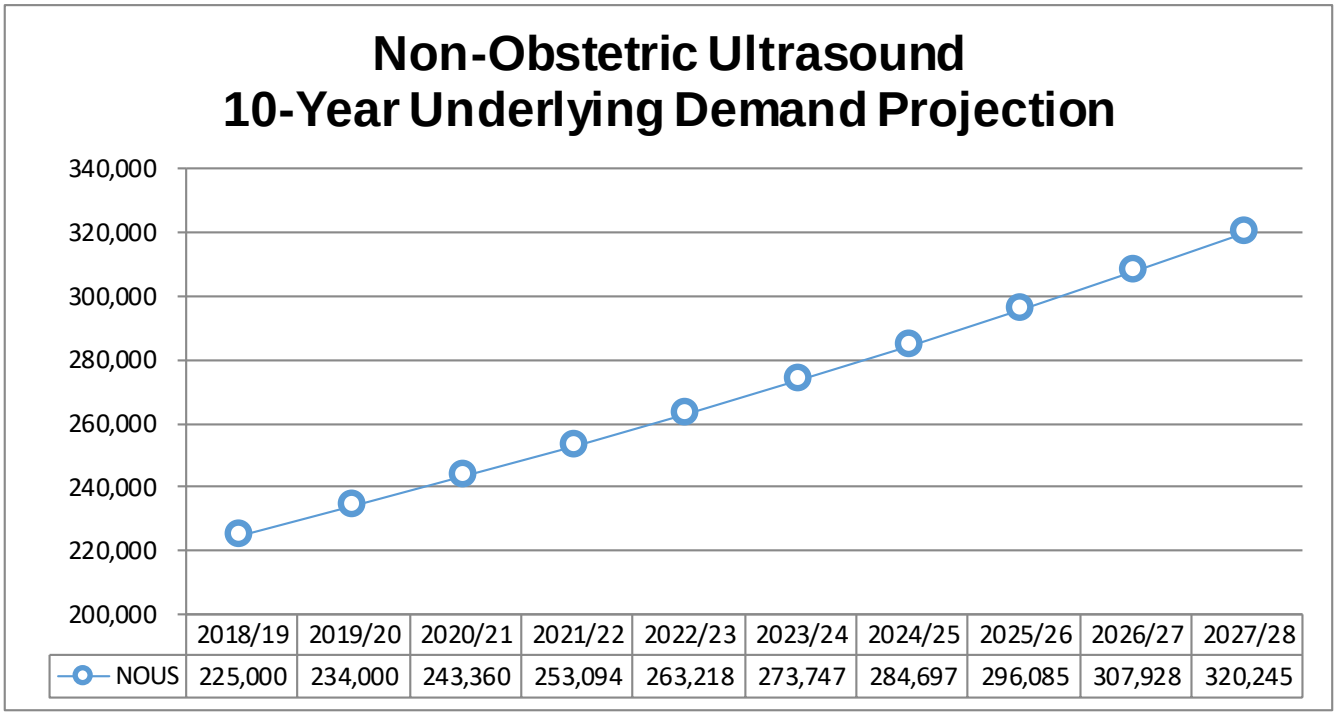
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
MRI	110,000	118,800	128,304	138,568	149,654	161,626	174,556	188,521	203,602	219,891

MRI activity is predicted to increase by 100% over ten years

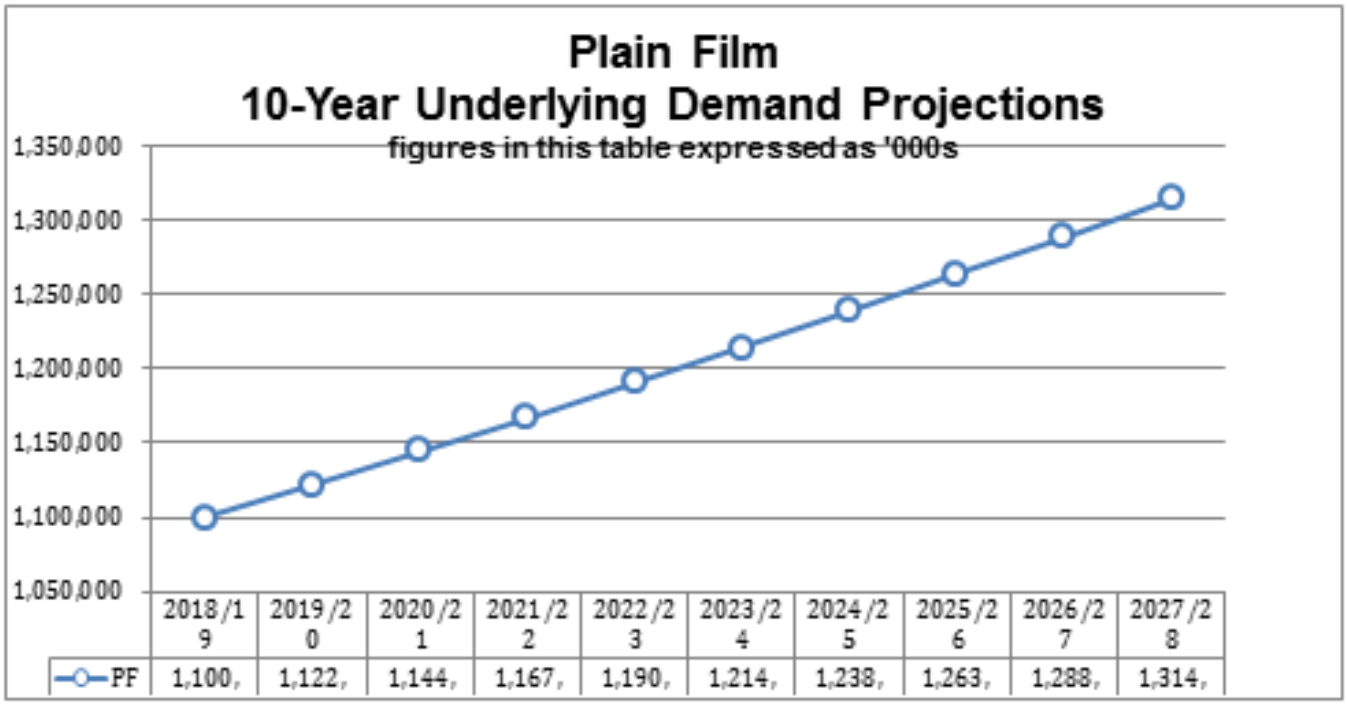


	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
CT	200,000	216,000	233,280	251,942	272,098	293,866	317,375	342,765	370,186	399,801

CT Activity is predicted to increase by 100% over ten years



US is predicted to have a 30% increase over ten years. As this is largely radiographer led service the impact on the radiography workforce is likely to be disproportionately greater when compared to CT and MRI



Plain Film demand is predicted to rise by 17% in 10 years

The benefit of the HSCB means of demand prediction and commissioning is extremely useful as this provides a benchmarked, well-established evidence based methodology for calculating staffing numbers.

For each of the listed modalities the number of examinations which can be performed in a session has been established and used for commissioning purposes for a number of years. Consequently it is reasonably straightforward to calculate the number of radiography staff required to produce the predicted volume of scans.

The assumptions made for the calculation are as follow

1. The number of scans is predictable in a session. The number proposed per session will vary depending on the specialty, .e.g. MRI scanning takes much longer to preform than a CT scan.

2. The staffing requirement is exclusively for professional radiographers, i.e. reporting time and helper and administration staff are excluded. The exception to this would be where the radiographer is expected to report on the scan/examination. For clarity the reporting time is excluded from this calculation of “on table time”.

3. The required capital equipment costs are excluded, i.e.in order to deliver the huge predicated increases in imaging NI would need to invest significantly in CT and MRI scanners to bring NI into line with the rest of the UK and the world. This cost is outside of the scope of this paper. (Ref Dept of Health Imaging review)

4. The time and day of scanning is discounted from this calculation. There is an additional cost incurred if, for example, scans are performed at weekends or out of hours as staff would be paid at a premium rate under Agenda for Change Terms and conditions.

5. These figures are for the staffing numbers for Radiographers required for the known predicted increase in demand, e.g. current practice and demographic uplift. The other pressures on demand will be addressed separately.

6. Any realignment of services which may happen in the future will not change the overall volumes but may change the location at which the scans pre performed.

3.1 Staffing Required to Address the HSCB Predicted Increase

The table overleaf is based on the predicted number of additional radiology examinations required at year 10, based on HSCB predictions.

The number predicted for are for the required Whole Time Equivalent Radiography workforce does not specify the band or grade of staff.

Each modality will require an appropriate skill mix, from Band 5 practitioners through to Consultant Radiographer grade.

The table calculates the numbers radiographers required based on figures used previously by HSCB to calculate capacity.

The number of patients per session is calculated to allow for introduction, preparation, instruction, intravenous line insertion, scan time, quality assurance of images, removal from scanner, aftercare, discharge instructions and advice to the patient on accessing the report and final administration to ensure image is processed onto next stage of the examination i.e. reporting.

A session for AfC staff is calculated as 3.75 hours long minus breaks.

Time for other activities e.g. CPD, mandatory training, etc is excluded from above. However this is calculated by assuming that to have 1 WTE radiographer at the workplace 52 weeks per annum requires 1.4 radiographers.

Therefore to address the HSCB predicted rise in additional imaging volumes over the next ten years a total of 204 additional radiographers will be required to be recruited and trained.

Recommendation 3 Train and recruit an additional 204 radiographers to address the predicted increase in service demand as a result of Demographic changes

Calculation of number of radiographers required to deliver the additional volumes of Imaging as predicted by HSCB

Modality	(a) Total number of additional exams/scans required by yr 10	(b) Number of exams per session*	Number of Additional Sessions required in year to deliver this volume (=a÷b)	Number of Additional Sessions required per week (assume 50 week year)	Number of radio-graphers required per session	Number of radiographer sessions required	Total number of radio-graphers required (Assume 1 radiographer undertakes 10 sessions per week)	Total WTE number of staff required to deliver 50 week service
MRI	**109891**	8	13736	275	**2**	**549**	**55**	**71**
CT	**199801**	14	14272	285	**2**	**571**	**57**	**74**
US	**95245**	8*	11906	238	**1**	**238**	**24**	**31**
Plain Film	**214602**	20	10730	215	**1**	**215**	**21**	**28**
								204

*The number of scans in the US session includes an allowance for reporting as this is an integral part of the scanning process, unlike the other modalities which can be reported at a later time.

3.2 Horizon Scanning - Planning for Proposed Changes in Services

The previous section looked at the predicted rising demand based on information provided by HSCB. This section considers the future of the Radiography Workforce based on a review of all potential impact on service and how this might be reflected in the required radiography numbers, Undergraduate places and post graduate training.

Whilst this can never be an exact science as both economic and political decisions will shape the future of the imaging service, it is essential that a long term view and modest attempt at capturing known pressures is considered as part of this review.

The horizon scanning exercise was undertaken by the Radiography AHP Workforce Review writing group with a view to capturing this information and mapping the required numbers of radiographer needed to deliver all of the known issues raised.

The risk as with all predictions is that we are unable to identify every potentiality, or to paraphrase Donald Rumsfeld US Secretary of Defense 2001-2006

> "We know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns — the ones we don't know we don't know; the unknown unknowns

It is hoped that the wide audience and the benefit of input from the stakeholder event have identified those areas which we know will create demand. It may be that following consultation and an even wider audience there may be areas that have not yet been identified

The table below, extracted from Appendix 4, identifies areas which are predicted to have an impact on the Radiography workforce. The writing group in turn have attempted to quantify the numbers required regionally.

Caveat

In order to quantify the numbers of radiographers required it would be essential to ensure that the risk to "double count" is avoided as some of the proposals will be included in the year on year increases which HSCB have predicted. Others however such as staffing at off site polyclinics will introduce a degree of inefficiency, e.g. if it is anticipated that the polyclinics will require Monday to Friday 9-5 staffing regardless of the number of patients seen, the number of patients seen by a radiographer per session potentially will fall. Consequently this could result in a higher ratio of staff required to manage the same number of patients. The qualitative experience of patients may well be improved, but the inefficiency severely reduces Value For Money in the quantative analysis.

All figures in the table assume 1 WTE in the workplace for a 50 week year will require 1.4 radiographers to allow for training, annual leave CPD etc.

Impact on Post Graduate Requirements

The requirement for Post Graduate training must also be factored into the impact on radiographer numbers. This will also apply to the subsequent section – Horizon Scanning. In order to deliver a high volume of complex scanning radiographers are required to be skilled to Specialist or Advanced practitioner level. In most cases this will require a post graduate qualification in their chosen specialist area, e.g. Ultrasound, MRI, CT etc. Other areas which require a high level of skills will require training and mentorship up to post graduate level but for which there are no post graduate courses available. In those areas requiring Advance Practice e.g. independent reporting radiographers will be required to attain Master's Level qualification. Consequently consideration should be given to the provision of post graduate training to permit the delivery of specialist and Advanced practice as identified in the following section.

Results of horizon scanning and potential impact on radiographer needs

Theme	Change	Number of radiographers required	Educational Requirements/Impact
Polyclinics	A number of new sites across NI were identified. Assume US and PF required on each site 3 per site X 5 sites =	15 WTE	PGD US X 3
Elective Centres	Likely to see cohorting of specific examinations and/or modalities. Potentially neutral if staff are required to move between trusts and or work base	0	
MRI	24 hour on call If all sites = 8 on call rotas If one site per trust = 5 on call rotas Assume 1 site per trust = 0.7 WTE per trust 7 day and extended day scanning on ALL scanners	3.5 WTE neutral as included in HSCB figures	PGD X 4 MSC Adv Practitioners
US	Extended day and 7 day working all acute sites Plus Advanced Practice e.g. Support for ANP and First contact physios	2.4 per trust = 12WTE	PGD All operators Increased costs for this as staff travelling to mainland for training. MSC Adv Practitioners
PF	Consensus is that there will be no major change, rather a steady year on year increase at current rates	neutral as included in HSCB figures	

Theme	Change	Number of radiographers required	Educational Requirements/Impact
CT	Extended day and 7 day working all acute sites All acute sites will require 2 CT scanners if not already in operation. Will need to develop more Advanced Practice	Assume neutral as included in HSCB figures	MSc Adv Practitioners
NICE Guidelines	Known areas causing demand as per Appendix 4 will require immediate investment in CT, e.g. cardiac CT alone requires 14 additional sessions per week to meet predicted requirement. Data from HSCB indicates a total of an additional 66 sessions per week required to meet new demand If including Role extended reporting = 20 sessions or 2.8 WTE	2.8 Radiographers per session = 16.8 WTE Reporting 2.8 WTE	MSC Adv Practitioners For reporting role extended radiographers
GP Access	Changes in access will impact on different trusts at different rates. Overall workload will balance but will need regional input	Assume neutral as included in HSCB figures	
Care Pathways	Changes in access will impact on different trusts at different rates.	neutral as included in HSCB figures	
Role Extension Impacts	Ref Imaging Review, we'll need to consider what areas could potentially see a change in reporting by Advanced Practice Radiographers in CT, MRI, Nuclear Medicine and PF is likely to continue to increase to a saturation point is reached due to	45 WTE reporting Radiographers across all modalities in	

Theme	Change	Number of radiographers required	Educational Requirements/Impact
	radiology manpower issues. A modest projection would see progression from a zero positon at present to a. 3 CT reporters per trust b. 2 PF (additional) per trust c. Nuclear Medicine 1 per trust d. MRI 3 per trust	addition to current levels	
Breast Imaging	Breast Consultants Impact of Breast Assessment Review Assume 3 additional in total as numbers in breast remain fairly constant. However widening of screening age to match mainland UK will require an additional radiography workforce. Assume 1.4 per screening centre (currently 4)	4.2 WTE 5.6 WTE	
Lung Cancer Screening	Impact on CT. New Service potentially Potentially not professional radiographers therefore not included in projection	0	
RT Planning	Still relatively new in NI. Realistically at the two RT centres. Will these be diagnostic or therapeutic staff	0	PGD All operators inc RT radiographers
Research	We are currently research light in all areas. Require 1 per trust	7.0 WTE	
Demographics	Assume steady demographic growth compounded by aging population creating higher demand – stroke, cancer, co morbidities vascular disease etc	neutral as included in HSCB figures	

Theme	Change	Number of radiographers required	Educational Requirements/Impact
Safety and Governance	Impact of more transparency and reporting. Will require clear gov leads and accountable person per trust at professional level. Assume 1 per trust	7.0WTE	PGD management Risk Governance
Practice Educators	Increasing numbers of undergraduates 1WTE per trust and requirements for CPD and support for post grad students Assume 0.4 WTE per trust	7.0WTE 2.0WTE	
Support for Training institute	Need to release professional staff to support UU to deliver local post grad courses Plus recruitment to UU X 2 lecturers Assume 1 per trust	7.0WTE	7 X PGCE
Management and Leadership	Needs of managers who are taking on this adv practice role must be considered as per the AHP Framework.	0	5 X AHP leadership course and MSc level management qualification
NIPACS and Management	Increasingly item is required to manage and support other users e.g. many superusers are trainers and support for clinicians Assume 1 per trust	7.0WTE	
Interventional Radiology	Development of Hub and Spoke Model as per the Interventional Radiology Review. Not part of current SBAs therefore will require 1 per new site.	5.6 WTE	6 X PGD for Radiographers and Nurses
		148 WTE	

Recommendation 4 train an additional 148 radiographers at undergraduate level to ensure succession planning to meet the known demand for extended and enhanced services to be delivered in NI over the next 10 years

3.3 Recruitment Process and Plan

NI has for the past 5 years used a Regional recruitment approach, which was widely advertised in both ROI and the UK. Almost all UUJ undergraduates applied for posts. A number of radiographers already in post in NI used the opportunity to relocate for personal or work reasons. The number of non NI trained radiographers applying for posts was extremely small (in single percentage figures). Consequently it is assumed that in order to meet the demand for radiographers a local training solution will be required. The following table details a phased approach to delivering an additional 400 radiographers in NI over the next 10 years. The baseline is taken as 2017 where there were 48 undergraduate places. This was uplifted in 2018 to 58 due to recognition of the need for additional places.

	No of "funded training places required	No of Additional places required per annum
2017 Baseline	48	0
2018	58	10
2019	68	20
2020	75	27
2021	80	27
2022	80	32
2023	90	32
2024	90	42
2025	90	42
2026	90	42
2027	90	42
2028	90	42
2029	90	42
		400

In the event that the demand for radiographers rose more quickly than the prediction, the numbers in training per annum would be revisited

3.4 Post Graduate Training Needs

In order to deliver the above advanced and specialist practice to address the demographic and service expansions proposed the following post graduate courses/support would be required

	PGC	PGD	MSc Level
CT	**50**		
MRI	**60**		
US		**30**	
Reporting • **Plain Film** • **CT** • **MRI** • **Nuclear Medicine** • **DEXA**	**5**		**10** **15** **15** **5**
Research			**7**
Safety and Governance	**7**		
Practice Educator			**7**
Management			**7**
Breast Screening Cert	**7**		
Interventional	**7**		
	136	**30**	**66**

Recommendation 5 Plan for, and invest in, an Education Commissioning Process to address the requirement for Specialist and Advanced practice training at PGC, PGD, and MSc level to deliver the new and enhanced services required over the next ten years to ensure a skilled workforce is available

4. Stakeholder Engagement

In order to ensure that the review was fully informed it was essential to engage with stakeholders in a number of different fora. This includes one to one discussions, service Improvement and Quality Initiatives, Local Commissioning Groups and clinical pathway design. Senior Managers liaised and consulted with staff. There was Staff side representation throughout the process and discussion with various radiography staff groups and regular liaison with the University of Ulster ensured a wide range of opinion was sought and used to inform the recommendations of the review.

A regional engagement strategy was agreed at Steering Group level and applied to the Radiography Workforce Review. It was agreed a collective communications effort regionally would be important to encourage service user and carer involvement. This input to the review process would ensure solutions were coproduced appropriately. In addition a Stakeholder Engagement event was hosted on Friday 22nd March 2019 in the Ulster University at Jordanstown. The purpose of the event was to consult on the development of the draft Diagnostic Radiography Workforce Review.

The event took the format of an interactive e-participation 'Engage' session and discussions were divided up into five main topics:

Icebreaker: What is the best thing about the service you provide or the service you receive?

Question 1: Recruitment – What needs to be done to attract the right people with the right skills into this profession?

Question 2: Retention – What needs to be done to make the HSC a **brand that people aspire to work for?**

Question 3: The future of the service you provide or the service you receive – How should it develop and be delivered in the future?

Reflection: Having discussed all of this today, what would you now suggest as the top priority for the AHP workforce review to deliver?

The ‘Engage’ method combines the live aspect of small-scale discussion with information and communication technologies; on one hand it allows rapid transmission of work-group results to a plenary assembly; while on the other it permits surveys of individual participants’ opinions through a polling system. Information gathered at the engage event has been reflected in the review. All HSC Hospital Trusts were represented as well as HSC, NICS, professional bodies, staff side, UUJ and others.

Each of the round table groupings at the event were asked to prioritise their responses in each topic and the top responses captured.

Top responses from the Ice breaker “What is best thing about the service you provide or the service you receive?”

Attendees hard at work

A full copy of the Stakeholder Engagement report is available in the appendices (Appendix 5).

In addition to the commentary provided on the day a number of written responses were received and these were included in the final report in full. The output from the engage event has helped formulate the recommendations made by the writing group who provided this report.

5. Conclusion

This review has considered the changes facing the radiography profession over the next 5 to 10 years with a view to identifying recommendations which will ensure a sustainable, resilient, motivated and appropriately qualified workforce. A short workforce review had previously been undertaken as part of the Imaging Review in 2017, however the scope of this exercise was limited and looked at overall imaging service needs.

The review is aligned to the outcomes and recommendations of the Imaging Review to ensure that it aligns with the strategic direction for imaging in NI.

In order to ensure parity with the other AHP groups this Radiography Workforce review applied similar Terms of Reference to the other AHPs and focused exclusively on the issues facing the radiography profession. The review was structured to follow the methodology used by the other AHP groups resulting in a review which assessed the known demand for service, identified pressures which are on the horizon and also considered other issues will, over time, create a demand

for services or increase the number of radiographers required in NI. The review was limited to the radiography profession and did not include other support workers such as Radiographer Helpers and Assistant Practitioners who are central to the delivery of radiography services. The review considered the numbers needed to deliver clinical services, management and education of radiographers. Users and other stakeholders were invited to input to the review and work was undertaken with the University of Ulster as the primary provider of graduates to the radiography profession in NI.

Seven recommendations were made which have been grouped into three themed areas and these have been tabled overleaf. It is the view of the working group that the recommendations are solid, evidence-based and have widespread support within the profession and amongst the Stakeholders.

6. Recommendations of the Radiography Workforce Review

Based on the findings of the Radiography workforce review the key recommendations are set out below, these have been structured under key themes and will inform the Action Plan.

Theme	Number	RECOMMENDATIONS
Strategic	**1**	This paper proposes that the recommendations made are incorporated into the Strategic Framework for Imaging Services to ensure a balanced approach to the redesign and delivery of a modern Imaging Service in NI
Education Needs (Under and post graduate)	**2**	Address gaps in service caused by changes in Work Life Balance as a result of • requests for part time working, • maternity leaves and • the potential for peripatetic radiography appointments to deal with these requests

	3	Train and recruit an additional 204 radiographers to address the predicted increase in service demand as a result of Demographic changes
	4	Train an additional 148 radiographers at undergraduate level to ensure succession planning to meet the known demand for extended and enhanced services to be delivered in NI over the next 10 years
		Combining recommendations 2, 3 and 4 results in a predicted requirement for an additional 400 radiographers over the next 10 years.
	5	Plan for and invest in a robust ECG to address the requirement for Specialist and Advanced practice training at PGC, PGD, and MSC level to deliver the new and enhanced services required over the next ten years to ensure a skilled workforce is available.
Recruitment and Retention	**6**	Improve the profile of and promote the Profession by • Increasing awareness in Schools • Improve career advice provided to schools
	7	Improve recruitment and retention by • Make HSC an employer of Choice • Addressing pay parity issues with rest of UK • Improve Career Progression opportunities in line with other AHP professions • Progress development of Consultant Radiographer opportunities

Appendices

Appendix 1

What do Radiographers do?

Diagnostic radiographers work in areas that include X-ray (Plain Film and DEXA – Bone Densitometry), Ultrasound, Fluoroscopy, Computerised Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Fluoroscopy, Interventional and Mammography. Following qualification many radiographers undertake additional specialist and advance practice which require training and qualification equivalent to Master's Level

Radiographers work as part of a large multidisciplinary team including (Radiologists, Advanced and Specialist Radiography Practitioners, Nurses, Helpers, Assistant Practitioners, Porters, Clerical and Administrative staff), all of whom contribute to a safe efficient patient journey.

Most imaging is undertaken on hospital sites, largely due to the high capital cost of radiology equipment which requires the service to be delivered with maximum efficiency. Many of the services, e.g. CT and Digital Radiography (DR) operate on a 24 hour seven day basis to support the work in the Emergency Departments and acute wards. Other services operate on a 7 day basis to ensure access to scanning in a timely way e.g. MRI and Ultrasound.

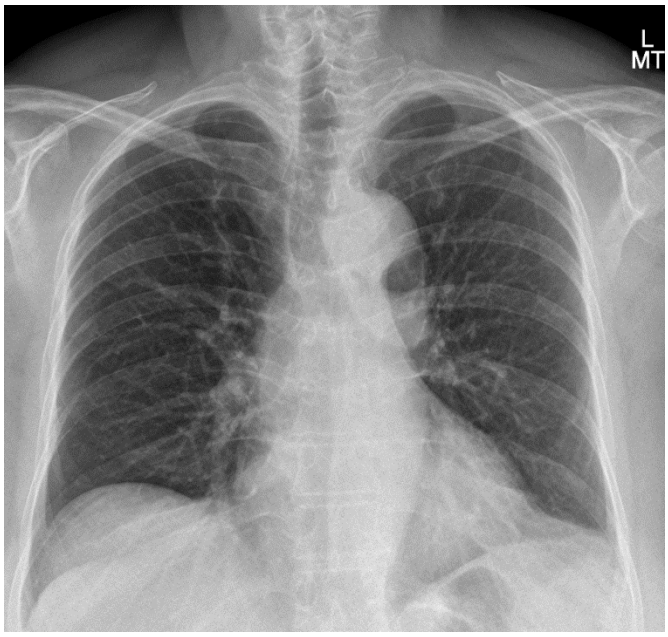
A description of the modalities (types of imaging examinations) is given on the following pages.

What is Diagnostic Radiography?

The following sections give a brief explanation of the different types of radiology examinations (modalities) provided in a modern radiology service

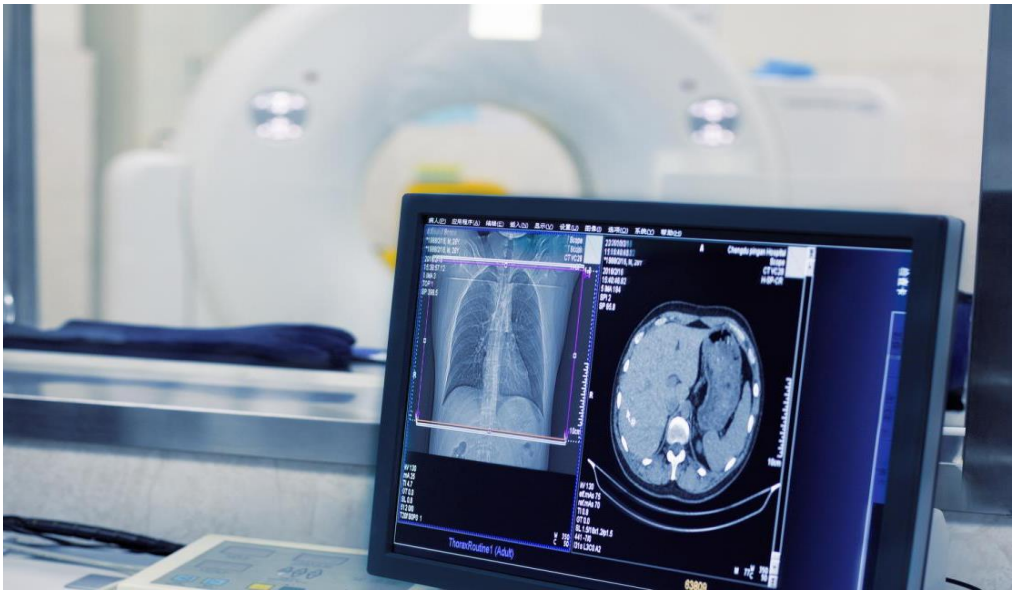
Plain film X-Ray or Digital Radiography (DR)

An x-ray (radiograph) is a non-invasive medical test that helps in the diagnosis and treatment of medical conditions. Imaging with x-rays involves exposing a part of the body to a small dose of ionising radiation to produce pictures of the inside of the body.



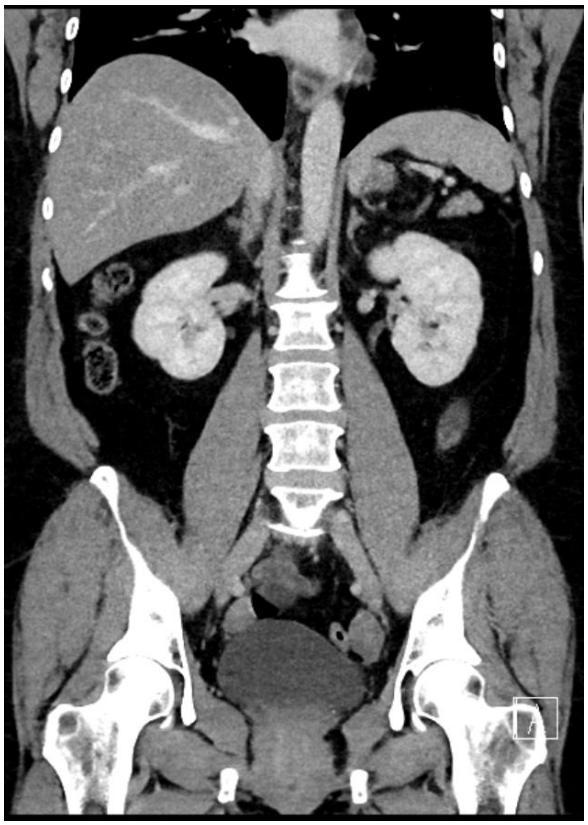
X-rays are the oldest and most frequently used form of medical imaging. An x-ray image is produced when a small amount of radiation passes through the body and strikes an image receptor placed on the other side of the body. X-rays are absorbed into tissues and bones at varying degrees, and the result is the classic x ray image, as shown above.

CT- Computerised Tomography



A computerised tomography (CT) scan combines a series of X-ray images taken from different angles around the body and uses computer processing to create cross-sectional images (slices) of the bones, blood vessels and soft tissues inside the body. A CT scan images provide more-detailed information than plain X-rays

do. CT scans can be converted into 3 D images or viewed in various reconstructed plains.

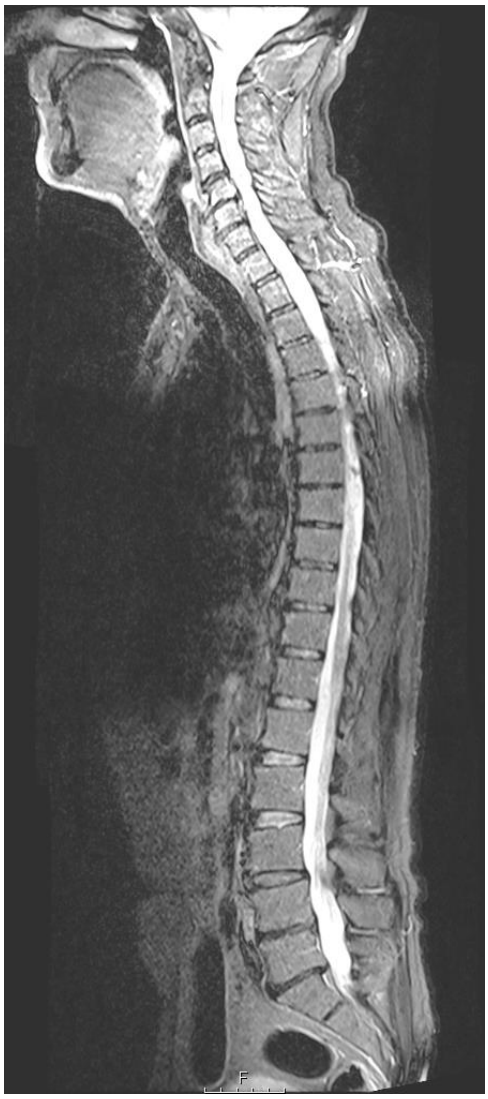


Some CT scans require the patient to have contrast which is either administered by mouth, injected or by enema before the scan is commenced. CT scans are utilised for a variety of reasons in patients examples are following trauma to detect internal injury or bleeding, detection of stroke, following surgery, biopsy or radiotherapy. CT is often the preferred way of diagnosing many cancers, such as liver, lung, and pancreatic cancers.

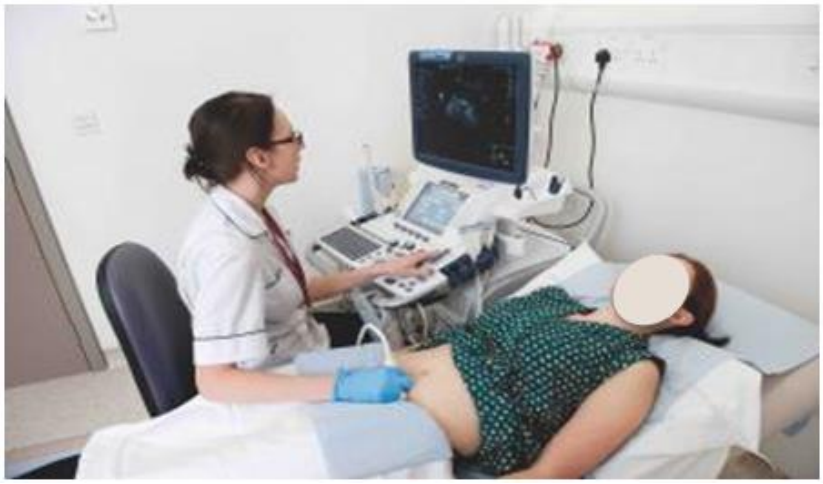
MRI – Magnetic Resonance Imaging

MRI is a non-invasive diagnostic method which uses a high magnetic field, radio waves and a computer to produce detailed images of internal body structures. MRI provides much greater soft tissue contrast than CT, making it especially useful in neurological, musculoskeletal, cardiovascular and oncological diseases. Images are directly acquired in any plane and no ionising radiation is used.

One of the most recent developments with MRI is the use of magnets of high strengths e.g. 3T machines, which can give markedly, increased quality images of certain parts of the body. The magnetic field system means that care must be taken for patients who have metal containing implants such as pacemakers, cochlear implants, medication pumps or other hardware, however many of these limitations are being overcome with modern design. MRI is widely used in hospitals and clinics for medical diagnosis, staging of disease and follow-up without exposing the body to radiation.



Ultrasound (US)



Ultrasound imaging, also called ultrasound scanning or sonography, is a method of obtaining pictures or images from inside the human body. It involves sending very high frequency sound waves through the body. These sound waves are reflected off the internal organs. The reflections are then processed by special instruments and powerful computers that subsequently measure and create a visual image of the organs. Ultrasound images are captured in real time and displayed on a television monitor. US is now widely used in the diagnosis of abdominal disease, e.g. gall stones, soft tissues such as the thyroid gland or breast, joints and for guidance during drainage or biopsy procedures as well as accurate visualisation of the arteries and veins (vascular imaging).

Obstetric Ultrasound (OUS)

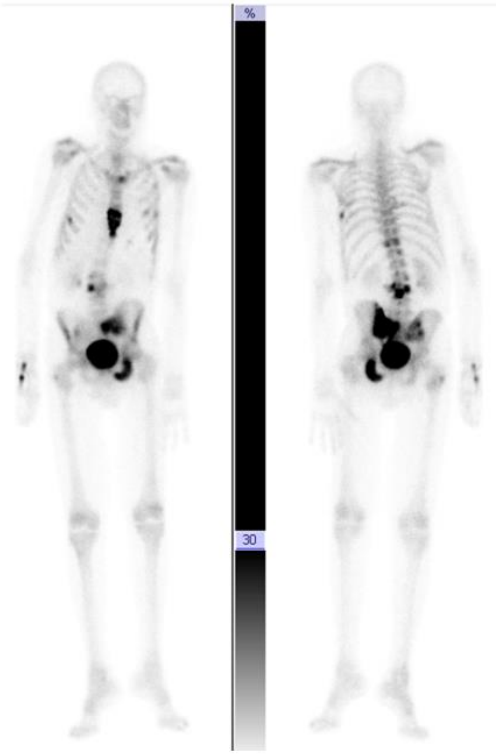
Currently obstetric scanning is not part of the Trusts' Service Budget Agreements for Ultrasound. However expanding service needs as well as recommendations made in the Imaging review would indicate this is a growing area which will need considered in the workforce plan as well as consideration of increased post graduate training.

Nuclear Medicine (NM)

A Nuclear medicine scan is a medical speciality which is used to diagnose and sometimes treat diseases in a safe and painless way.

A Specialist Radiographer undertaking daily QA testing of a Gamma camera

NM refers to a medicine (a pharmaceutical) which is attached to a small quantity of radioactive material (a radioisotope).
The combination is called a Radiopharmaceutical. There are many different Radiopharmaceuticals available to study different parts of the body, and which one is used depends on the condition to be diagnosed or treated. The radiopharmaceutical is designed to go to a specific place in the body where there could be a disease or abnormality. The amount of the radiopharmaceutical given to a patient is very low and is just sufficient to obtain the information needed before it begins to break down and decay. The radiation dose received is medically insignificant. The patient experiences no discomfort during the test and the radioactivity of the pharmaceutical diminishes (decays) rapidly over time so that there is very little radiation exposure once the examination is complete. The non-invasive nature of a NM scan, together with being able to view an organ functioning from outside the body, makes this imaging technique a great diagnostic tool.



An image of a whole body bone scan showing "hotspots" – potential sign of disease

A specialist Radiographer preparing radioactive isotope for injection into a patient

Positron Emission Tomography – PET/CT

Positron emission tomography, also called PET imaging or a PET scan, is a type of nuclear medicine imaging. A PET scan measures important body functions, such as blood flow, oxygen use, and sugar (glucose) metabolism, to help doctors evaluate how well organs and tissues are functioning.

Radiotracers are molecules linked to, or "labelled" with, a small amount of radioactive material that can be detected on the PET scan. They are designed to accumulate in cancerous tumours or regions of inflammation. They can also be made to bind to specific proteins in the body. The PET element of the scan is usually performed at the same time as a CT scan which allows correlation of the PET images with the CT scan and this improves the accuracy of the test. The most commonly used radiotracer is F-18 fluoro-deoxyglucose, or FDG, a molecule similar to glucose. Cancer cells may absorb glucose at a higher rate, being more metabolically active. This higher activity can be seen on PET scans, and that allows the doctor to identify disease before it may be seen on other imaging tests. FDG is just one of many radiotracers in use or in development for a variety of conditions throughout the body.

Bone Density Scanning - DXA

Bone density scanning, also called dual-energy x-ray absorptiometry (DXA – previously DEXA) or bone densitometry, is an enhanced form of x-ray technology that is used to measure bone loss. DXA is today's established standard for measuring bone mineral density (BMD). This is useful to measure/predict the likelihood of a future fracture or the effect of some medications on the density of the bones

A patient undergoing a DEXA scan to assess his bone density

Interventional Radiology (IR)

Interventional radiology is a medical sub-specialty of radiology utilizing minimally invasive image guided procedures to diagnose and treat diseases in nearly every organ system. Interventional Radiology (IR) originated within diagnostic radiology as an invasive diagnostic subspecialty. IR is now a therapeutic and diagnostic specialty that comprises a wide range of minimally invasive image-guided therapeutic procedures. The range of diseases and organs amenable to image-guided therapeutic and diagnostic procedures is extensive and constantly evolving, and includes, but is not limited to, diseases and elements of the vascular, gastrointestinal, hepatobiliary, genitourinary, pulmonary, musculoskeletal, and, the central nervous system.

IR uses medical imaging exams such as MRI, CT and ultrasound to guide minimally invasive treatments and procedures to nearly every organ system in the body. Using the vascular system as a guide, experts can treat a variety of conditions such as cancer, uterine fibroids, infertility, chronic pain and vascular malformations.

Cardiology

A Cardiac Catheterisation lab (Cath Lab) uses diagnostic imaging equipment similar to that used in IR to visualize and treat disease of the coronary arteries and the heart. These procedures are often done by cardiologists supported by an interventional radiographer in a room that has high-resolution imaging equipment.

Mammography

Mammography is an x-ray imaging method used to examine the breast for the early detection of cancer and other breast diseases. It is used as both a diagnostic and screening tool. During a mammogram, a patient's breast is placed on a flat support plate and compressed with a parallel plate called a paddle. The images produced are called mammograms. Three-dimensional (3-D) mammography and digital breast tomosynthesis (DBT), is an advanced form of breast imaging where multiple images of the breast from different angles are captured and reconstructed ("synthesized") into a three-dimensional image set.

Subspecialty Radiography

There are a range of other services provided, including Forensic Radiography, Dental Radiography and paediatrics, which will require consideration in the development of a fully trained workforce.

NIPACS

This central element of the radiology service across NI is included here for completeness. N Ireland is the first country in the British Isles to have a region wide PACS (NIPACS - Northern Ireland Picture Archive and Communication system.) This allows for every patient in N Ireland to have their reports instantly available on any NI NHS PC which has the appropriate permissions to access the database. NIPACS is the primary Radiology Information System used across NI to generate or store referrals, make and track appointments and store images and reports of all radiology examinations with just two exceptions - Belfast City Hospital (BCH) and the Royal Victoria Hospital (RVH). BCH and RVH have legacy systems which are

not yet fully integrated. This is being addressed as part of the wider NI Imaging review.

Appendix	Title	Notes	Link
1	**Description of Modalities**	A brief description of each of the Modalities including NIPACS	the_role_of_the_radiographer_in_dxa_and_c The Role of the Radiographer in Com
2	**Allied Health Professions (AHP) Workforce Review** **Radiography (Diagnostic) Subgroup** **Terms Of Reference**	Agreed Terms Of Reference as agreed by DoH and Writing Group	DR TOR.docx
3	**Society of Radiographers Publication "Principles of Safe Staffing for**	Outlines principles for consideration in establishing appropriate numbers of radiographers to provide services. NB there is no indicative figures or benchmarking data included in the publication.	principles_of_safe_staffing_for_radiography

	Radiography Leaders"		
4	**Horizon Scanning**	The Writing Group and Senior Managers were asked to undertake a Horizon Scanning exercise which asked **What Impacts/Changes can we foresee which will result in an impact on the delivery of services over the next ten years?** The group collated the responses and identified potential changes by modality and also looked at wider issues for inclusion in the prediction for the workforce requirements.	Consultation on a draft "Strategic Framework for Imaging Services in Health and Social Care" | Department of Health (health-ni.gov.uk) Review of Imaging Services Radiology W
5	**Stake Holder Event**	Report from Stakeholder Event held in University of Ulster on 22 March 2019	DoH HSC AHP Workforce Strategy Er

6	**Membership of the Writing Group**		Dan McLoughlin, former Radiotherapy Services Manager, WHSCT Leandre Archer, National Officer for Northern Ireland, Society and College of Radiographers Tracey McIvor, Radiotherapy Services Manager, WHSCT Peter McAuley, Principal, CAHPO Catherine Donnelly, Deputy Principal, Workforce Planning Directorate Elizabeth Greer, Head of Diagnostic imaging, Ulster Ann Tate, Site lead, CAH Matt Mallon, RSM, Northern Trust Sean O'Connaire, RSM, Belfast Trust Jeanette Robinson, RSM, Southern Trust