

DHSSPS Review of Imaging Services

Radiology Workstream



Paper 1 of 4: Current Context

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1.0 Context and Background

- 1.1 In March 2011, the Regulation and Quality Improvement Authority (RQIA) completed its Phase 1 report following their investigation into the handling and reporting of radiological requests in all Health and Social Care Trusts in Northern Ireland. Recommendation 1 of the Phase 1 Report outlined:

“DHSSPS should develop a strategy for the future provision of imaging services in Northern Ireland which incorporates a new workforce plan for radiology”.

- 1.2 In the second half of 2012, the Minister approved the establishment of a review of imaging services with associated Terms of Reference (ToR). In June 2013, the Department undertook a scoping exercise with colleagues across the HSC to determine how best the review might be progressed following its initial delay.
- 1.3 The scoping exercise identified a range of issues which necessitated amendments to the original ToR, including developments in local commissioning and service configuration in response to the RQIA reports on plain-film x-ray, recognition of the developing policy in other UK jurisdictions (particularly England and Wales).
- 1.4 It was also recognised that the imaging review needed to be strategically considered alongside the evolving policy, financial and strategic position in the HSC. Revised ToR were formally adopted by the Project Board of the Review and approved by the Minister in April 2014. These are attached in **Appendix 1**. The aim of review is to develop recommendations for service development and configuration which will form the basis of a 10-year strategy for imaging services in Northern Ireland.
- 1.5 The Review will consider the full spectrum of imaging services provided by Health and Social Care, including radiological imaging, ultrasound imaging and nuclear medicine and has established a number of Workstreams to take forward the substantive work in each of the core areas.
- 1.6 The Project Board has requested each Workstream to produce a series of four papers (listed below), the first of which is to be tabled for discussion at its meeting on 11th September 2014.
- **Current service:** *where we are* – report/analysis of the current service configuration, demand/capacity, capital resource, workforce etc.
 - **Optimal service:** *where we would like to be* - paper outlining what an optimised service would look like, including taking account of regional approach, professional role expansion etc.
 - **Gap analysis:** *what we need to get us there*.
 - **Blue sky/horizon planning:** future proofing and strategic planning.

- 1.7 This paper is prepared by the Radiology Workstream, which is chaired by Dr Ronan McNally and Mrs Jeanette Robinson. Membership is detailed in **Appendix 2**.
- 1.8 The Terms of Reference for the Radiology Workstream were developed and approved by members at its first meeting on 2nd July 2014 and are attached in **Appendix 3**. The key areas to be addressed are as follows:

In Scope	Out of Scope
Trust-based medical imaging for adults on: <ul style="list-style-type: none"> • Plain Film X-ray • Fluoroscopy • CT • MRI • Non-Obstetric Ultrasound • Radio Nuclide Imaging • PET • Oral and Maxillo Facial Imaging • Dexa • Breast Imaging • Activity in respect of above in HSC and Trust procured services in Independent Sector facilities • Interaction with ICT to include use of PACS and ECR 	It was decided that the following would be out of scope for this paper: <ul style="list-style-type: none"> • Paediatric Imaging • Interventional radiology • Obstetric imaging • Cardiac imaging • Non-NHS procured imaging • General Dental Practice imaging • Non-radiology based physiological testing (e.g. respiratory function, neurophysiology etc.)
It is recognised that for operational reasons there will be significant areas of overlap between the Workstreams and these will be discussed within and outside of the Project Board.	

- 1.9 As part of the information gathering for the imaging review, a questionnaire was developed by the Workstream Leads and disseminated widely across the imaging community, including clinical directors of services, to seek their views on a range of imaging related issues. The questions posed are listed in **Appendix 4** and feedback reflects personal / collective opinion on these issues and has and will be used where relevant to inform this and subsequent papers.
- 1.10 This is the first in the series of papers produced by the Radiology Workstream of the Imaging Review and outlines the current provision of adult radiology imaging services in Northern Ireland. It endeavours to describe some of the contributing factors where the current state is under challenge or pressure, but was not tasked with offering solutions to these as these will be the focus of the next papers in the series.

1.11 However, there are three key issues which the Radiology Workstream believes are of such critical importance that they warrant specific and early attention by the Imaging Review Project Board. These are:

- The need to increase the number of training places to enable recruitment of consultant radiologists to funded vacant posts in the first instance
- The need for accreditation of imaging services
- The need for a single, integrated image and radiology management system for Northern Ireland, with the current Northern Ireland Picture Archive and Communication System (NIPACS) being the obvious solution

The Workstream would ask that the Imaging Review strongly considers making early recommendations in light of the issues raised in respect of these areas throughout the report.

2.0 Introduction to Imaging Services in Northern Ireland

- 2.1 Diagnostic imaging can be defined as the production of images of the internal structure of the human body that enable the diagnosis and staging of disease and monitoring of the effectiveness of treatment. The diagnostic imaging service encompasses all steps from the request for a diagnostic test to the use of the test result by a clinician or patient to directly inform and influence patient care.
- 2.2 Diagnostic imaging is an integral part of modern healthcare. By providing diagnostic information at critical points in the patient journey, imaging services free up healthcare resources by rationalising the need for intervention and targeting it where it will have the greatest benefit.
- 2.3 Diagnostic imaging is not a technical service, but a clinical service that interprets information and requires the clinical expertise of imaging clinicians, who are increasingly making decisions about the clinical management of patient care. Discussion with clinical colleagues is fundamental, as opinions in respect of imaging are critical and are in increasing demand to support clinical decision making.
- 2.4 Imaging services play a role in diagnosing and screening for virtually all major illnesses and contribute to the planning of treatment. There is increasing recognition of the need to place imaging early in care pathways to reduce the time to diagnosis and treatment and to improve efficiency and effectiveness.
- 2.5 Most diagnostic imaging is carried out in radiology departments, which deliver a range of services including imaging used purely for diagnostic purposes and interventional radiology (minimally invasive treatments performed while imaging the patient). Interventional radiology requires particularly strong integrated links to clinicians in other specialities. Diagnostic imaging services are also provided in other settings such as cardiology, medical physics and obstetrics.
- 2.6 In addition to the work carried out in radiology departments, imaging services are also provided at the point of care. This predominately relates to mobile ultrasound scanning (both obstetric and non-obstetric) and within the hospital environment includes work undertaken at ward level, outpatient departments, operating theatres and in the emergency department. Ultrasound activity undertaken at point of care is not recorded on NIPACS and is therefore not reflected in commissioning arrangements or in performance data. More importantly, there is no record of the image for future reference. Outside of the hospital environment, ultrasound scanning is also undertaken in GP surgeries and in general dental practices. There may also be provision of bone densitometry scanning by independent practitioners / providers. Increasingly, there is a demand to deliver plain film services in non-acute settings such as polyclinics.
- 2.7 The HSC currently commissions additional imaging activity from Trusts which is provided by the Independent Sector to support delivery of maximum waiting time guarantees for

patients. Where treatment is procured for patients in specialties such as ENT or Orthopaedics, this can include imaging as part of the episode of care. This imaging activity is not administered by the Trust and work is ongoing to review processes with the IS to ensure that all relevant clinical and administrative information is appropriately captured and recorded onto NIPACS.

- 2.8 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, flow management and defensive medicine. In particular, the reliance on imaging by acute hospitals is such that there is a strong argument that CT must always be available and this has implications for acute hospitals with single CT scanners. The on-call position for consultant radiologists needs to be better understood with consideration of regional on call arrangements where these can be facilitated. Increasingly, the need to consider more shift / extended day cover arrangements is required.
- 2.9 The imaging workforce is both the most important and most valuable asset of the service. Within radiology departments, it includes Radiologists (who are medically qualified), Radiographers, 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.
- 2.10 The promotion and enhancement of skill mix opportunities within clinical teams in radiology services is a key to ensuring imaging services are responsive to the needs of the service and to provide resilience for the future. In light of the significant challenges with recruitment of consultant medical staff, advanced practitioners have a key role to play to safely and appropriately undertake clinical work such as reporting and / investigations to allow consultant expertise to be directed to tasks which only they can do.
- 2.11 Diagnostic imaging teams work together to deliver services that are technically sophisticated and increasingly dependent on Information Technology. The service is reliant on the availability of imaging equipment, which can be expensive, complex and subject to rapid development.
- 2.12 A Modernising Radiology Clinical Network (MRCN) was established in April 2013 and was initially tasked with driving forward the recommendations outlined in the RQIA Review (Phases 1 & 2) and to address the Phase 2 recommendation that *“all relevant HSC organisations should consider the establishment of a Northern Ireland Managed Clinical Network for Radiology”*.

The MRCN has a dedicated Network Manager and membership includes radiology clinical leads and radiology managers, along with other key stakeholders such as the Public Health Agency and representation from the Business Service Organisation (BSO) (who manage the

NIPACS contract on behalf of the HSCB) other Clinical Networks and colleagues from Integrated Care, as outlined in **Appendix 5**.

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-focused 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.

3.0 Description of Imaging Services

3.1 Computed Tomography (CT)

CT provides a cross-sectional (or slice) view of the internal body structures, thus overcoming the problem of superimposed structures that is inherent in plain film radiography and fluoroscopy. During a CT scan, x-rays are passed through the body from multiple directions and high-speed computing is used to produce a series of transverse slices in the sagittal (side to side) or coronal (front to back) planes or to display the data as a three-dimensional image. Although CT was first developed over thirty years ago, significant advances continue to be made in this imaging modality with modern multi-slice scanners being fast enough to “freeze” the motion of the beating heart. The constantly improving capability of CT provides opportunities to explore new imaging techniques and to improve patient care.

CT is the preferred option for urgent and emerging conditions such as cerebral haemorrhage, pulmonary embolism, coronary calcium scores and angiography, aortic dissection, appendicitis, diverticulitis and obstructing kidney stones. It should be noted that although CT is more sensitive to variation and can produce more detailed images in a short time, patients are exposed to more ionising radiation with CT than radiographs.

3.2 Dual Energy X-Ray Absorptiometry (DEXA)

DEXA is a specialised low radiation dose form of planar digital radiography used for measuring bone mineral density. It is used primarily for diagnosis of osteoporosis, estimating fracture risk and monitoring the effect of some treatments. Modern DEXA scanners incorporate the ability to acquire digital radiographic images of the spine in order to indicate the presence of vertebral fractures.

3.3 Fluoroscopy

Fluoroscopy is a special application of x-ray where radio-contrast agents are administered orally or by injection to demonstrate dynamic processes such as blood vessel anatomy and function, the genito-urinary system and the gastrointestinal tract. It provides real time (live) images of the internal body structures and the position of inserted medical instruments. Like radiography, it is a planar (or projection) method in which body structures are superimposed upon each other in the images.

3.4 Interventional Radiology (IR)

IR is a minimally invasive technique commonly used for diagnosis and treatment of vascular disease, tube replacement, stents, biopsies etc. where imaging techniques are used to guide needles and catheters to the site. Sometimes diagnosis and treatment is simultaneous and IR is known to reduce infection, maximise recovery and reduce bed stays, with many patients attending day procedure units. NICE produces interventional guidance based on safety and efficacy, however cost or cost effectiveness is not considered.

3.5 Mammography

Mammography is the technique for imaging breast tissue and has been undertaken on dedicated equipment since 1969. It is low energy x-ray of the breast, often used to screen for breast cancer and for other diagnostic or follow-up studies. The application of computers has revolutionised diagnostic imaging equipment and techniques. As part of a regional programme, historical plain film is being replaced by full field digital imaging (FFDM) with the result that new imaging modalities have been developed, including breast MRI and breast tomosynthesis examination. A description of the delivery of symptomatic and screening services in Northern Ireland is attached in **Appendix 6**.

3.6 Magnetic Resonance Imaging (MRI)

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.

3.7 Nuclear Medicine (Radio Nuclide Imaging RNI)

In RNI, the gamma radiation emitted by the target body organ or system, following the injection of radioactive pharmaceutical, is detected using a gamma camera which shows the distribution of the radiopharmaceutical within the body. This information is processed to produce an image.

The radiation doses used are usually relatively modest. RNI is used to heart, lungs, thyroid, liver, gallbladder and bone physiological function. It is part of the speciality of Nuclear Medicine which also encompasses the use of radioactive substances for treatment.

3.8 Pharmaceutical Contrast Agents / Media and Radiopharmaceuticals

The application of pharmaceutical contrast agents or contrast media helps help visualise organs and blood vessels with more clarity and greater image contrast. They are often referred to as “dyes” and are administered orally or via intravenous injection. Pharmaceutical contrast agents are now very much part of many diagnostic imaging investigations, particularly fluoroscopic, CT and MRI procedures. Physical contrast agents have also been developed for ultrasound imaging.

Another group of imaging techniques involves the administration of short lived radioactive materials (called radiopharmaceuticals) in order to demonstrate the function of an organ or

system. The radiopharmaceutical is chosen so as to be appropriate to the clinical condition of the patient and is usually administered by intravenous injection. It accumulates in the organ or body system of interest and emits gamma rays (which are similar in nature to x-rays). Radiopharmaceuticals require specialised facilities for their production.

3.9 SPECT (Single Photon Emission Computed Tomography)

SPECT is a sophisticated type of nuclear medicine imaging commonly used to assist diagnosis in nuclear medicine. It uses a combination of CT scans and 3D nuclear medicine images to provide composite images giving great functional and structure information of various body parts.

3.10 Positron Emission Tomography (PET)

PET is a more sophisticated type of nuclear medicine slice imaging technique. It uses very short-lived radioactive materials attached to biological molecules to allow the visualisation of metabolic processes in the body by producing images of the distribution of radiopharmaceutical. The patient is injected with a radioactive, biological substance which concentrates in metabolically active tissue such as cancer tumours and the detected radiation emitted is collected to produce multi-planar and 3-D images.

Like other nuclear medicine imaging techniques, PET gives functional information about the biological behaviour of tissues and the activity of disease processes. However, PET scanners utilise a ring of gamma radiation detectors and are dedicated for this purpose. As with SPECT, when combined with an x-ray CT scanner (PET/CT), as is now generally the case, functional and anatomical images can be acquired at the same time and fused to display the anatomical site of functional abnormality. Fusion technology has also led to PET/MRI fusion which is currently used in academic and research settings, but has the potential to play a vital role in medical imaging for brain, breast cancer screening and small joint imaging of the foot.

3.11 Tele-radiology

Tele-radiology is the transmission of (digital) medical images for interpretation and reporting via internet connections and is often used for 24 hour cover of emergency departments, intensive care units and expert speciality interpretation of complicated or unusual cases. It is also used to permit radiologists to provide reporting cover from home or other remote sites where required. Currently, used extensively across Northern Ireland to provide cover for CT and also Plain Film reporting by NHS and IS partners. It requires access to high quality NIPACS workstations to be truly effective.

3.12 Ultrasound Imaging

Ultrasonography is the application of echoes from high frequency sound waves to visualise internal organs of the body. It produces cross-sectional (live) images which can be used for diagnosis or to guide the positioning of inserted medical instruments e.g. for taking tissue biopsies. By utilising the Doppler-effect (the change in frequency of sound waves when they are reflected by moving structures) it is possible to measure the flow rate of blood in arteries

and veins. Ultrasound imaging is considered a relatively safe procedure compared with methods that use ionising radiation (such as x-rays) and is the modality of choice for monitoring foetal development. It is increasingly used for musculoskeletal examinations of joints. It is also commonly used for cardiology examination, however the modality has limitations. The physique of the patient is an important factor in image quality, with obesity reducing quality because of the action of fatty tissue in absorbing sound waves, and the inability to image through bone and air, e.g. lung and bowel loops.

3.13 X-Ray

Plain film or film-screen (radiograph) uses ionising radiation and is the most commonly known imaging technique; for most of the 20th century, it was the only imaging technique available. Film-screen radiography is being replaced by digital radiography (DR) with an image displayed on a computer screen rather than plain film. X-ray is still considered the best option for diagnosing some forms of arthritis, pneumonia, bone tumours and fractures and skeletal anomalies.

4.0 Demographic Growth

4.1 Northern Ireland has a population of approximately 1.8m people. It has the fastest growing population in the UK and it continues to grow by approximately 10,000 people each year, as illustrated in Figure 1, 2 and 3 below.

Figure 1: Population of Northern Ireland, actual and projected, 1981-2037.

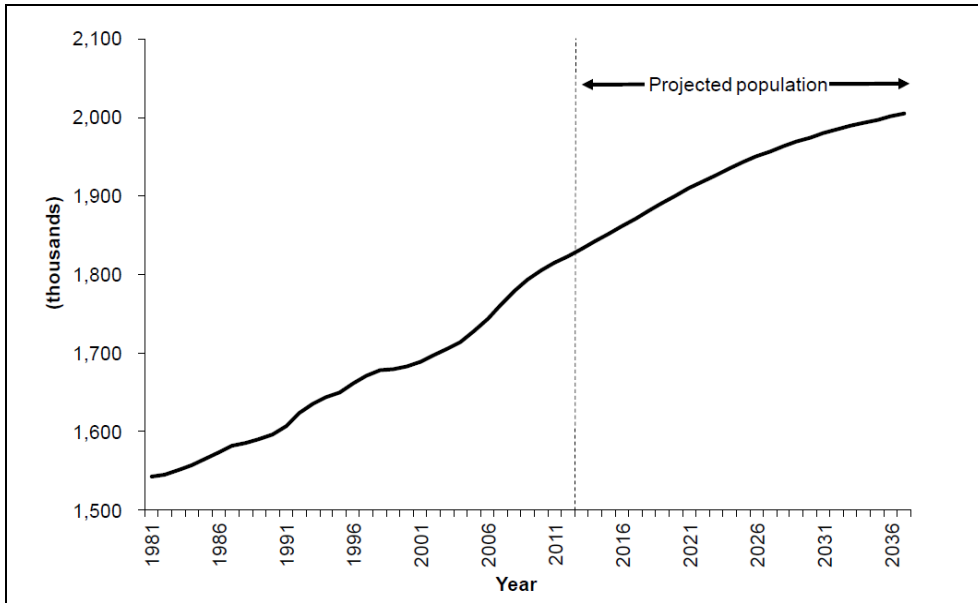


Figure 2: Demographic Growth 2008 - 2015

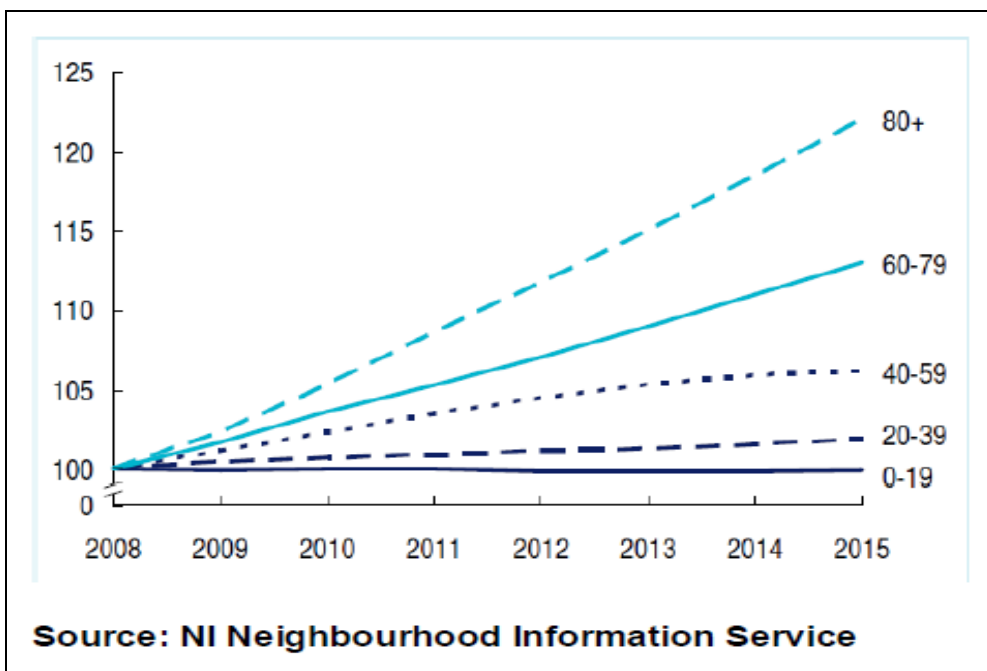
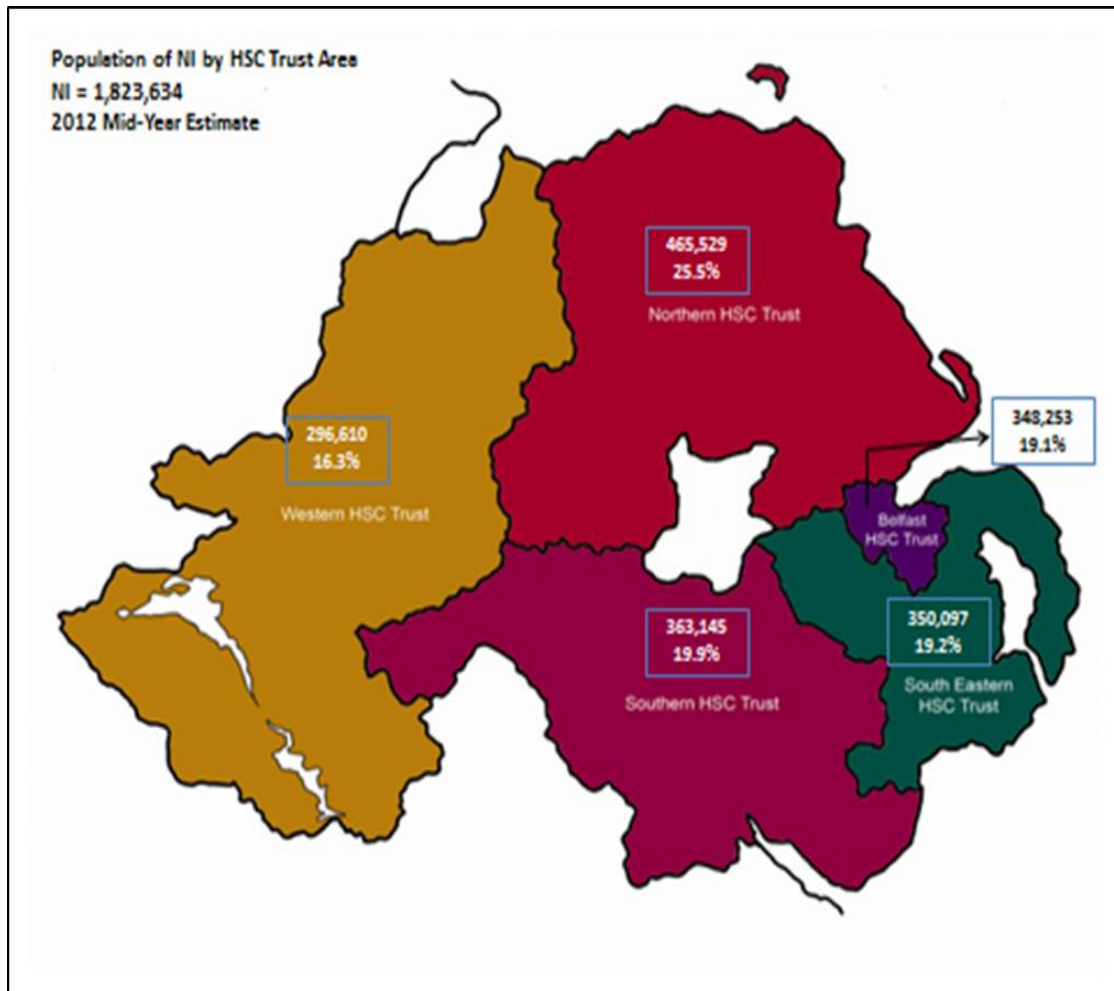


Figure 3: Population of Northern Ireland by HSC Trust area



4.2 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.
- In the next five years, migration is expected to remove 3,000 people from the population. This is in contrast to 2004-8 when migration added 32,000 people to the population, however since then emigration has risen and immigration fallen.
- 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.

4.3 There are increasing numbers of people with cancers and chronic conditions such as hypertension, diabetes, obesity and asthma. Currently in Northern Ireland, 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 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

4.4 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.

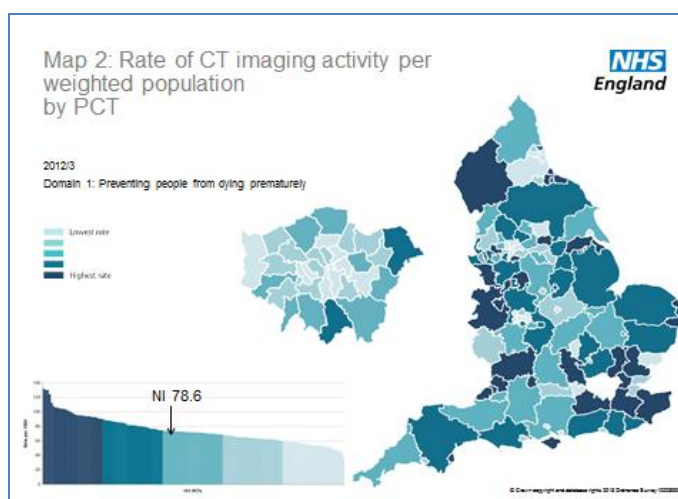
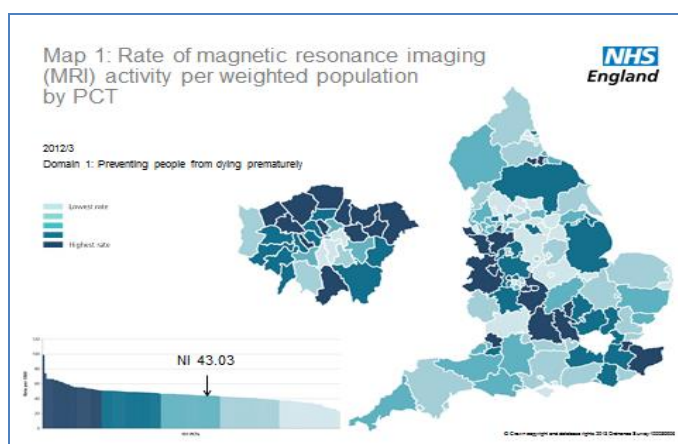
5.0 Current Provision of Imaging Service

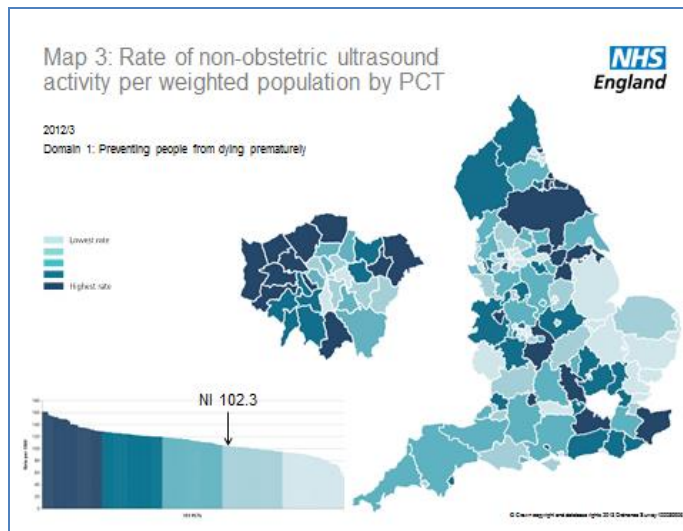
Utilisation

5.1 At June 2014, there are a total of 1 PET, 13 MRI and 24 CT scanners in the HSC system in Northern Ireland. These are located at the main imaging sites, as illustrated in **Appendix 7**.

- The 13 MRI scanners serve a NI population of 1.8m people, equating to 7.2 scanners per million population
- The 24 CT scanners serve a NI population of 1.8m, equating to 13.3 scanners per million population
- The UK average in 2010 was approximately 6 MRI scanners and 9 CT scanners per million population. It is reasonable to assume that the UK capital equipment base will have increased by approximately 20% in the last four years. It is therefore also reasonable to assume NI is by now on a par with the UK average.

5.2 The graphs below illustrate the performance of scanning rates per 1000 population for MRI, CT and Non-Obstetric Ultrasound as detailed in the Atlas of Variation. The Atlas compares the performance of 151 PCTs across England, but does not include NI. For illustration purposes, the scanning rate per thousand population for NI has been added to the graphs:





- 5.3 The table in **Appendix 7** highlights a number of hospital sites operating with single scanners. Plans are in place for 2nd MRI scanners at Antrim and Craigavon Hospitals in 2015/16, leaving Altnagelvin and SWAH as the only major acute hospitals with single MRI scanners. A second CT scanner for Craigavon Hospital is also planned for 2015/16. A business case is also being prepared for a second CT scanner in SWAH, subject to identification of the required revenue stream.
- 5.4 There are 12 hospital sites with single CT scanners, of which 6 currently provide ED services. These are highlighted in the location map in **Appendix 7**. Trusts with single scanners have highlighted this on corporate risk registers. The reliance on CT by acute hospitals is such that there is a strong argument that CT must always be available and by implication, acute hospitals should have at least 2 CT scanners to ensure business continuity. It is recognised that there are serious implications for the ability of a hospital to deliver ED services in the event a CT scanner loses operational function. This may mean that 2nd scanners are needed for resilience purposes only, even though they may not be indicated in terms of demand. A CT scanner must remain operational to maintain its functionality and therefore would need to be used as part of a two-scanner model with activity flowing through both scanners
- 5.5 Options to address the issue of resilience are being considered and will be subject to prioritisation of available capital investment and delivery of value for money.
- 5.6 *“Transforming Your Care – A Review of Health and Social Care in Northern Ireland”* anticipates a major restructuring of how acute services are delivered by our current hospitals. For NI, this is likely to mean between five and seven major acute hospital facilities or networks. The outcome of this will better inform the level to which resilience is required, given the significant capital implications of providing resilience to the current configuration.

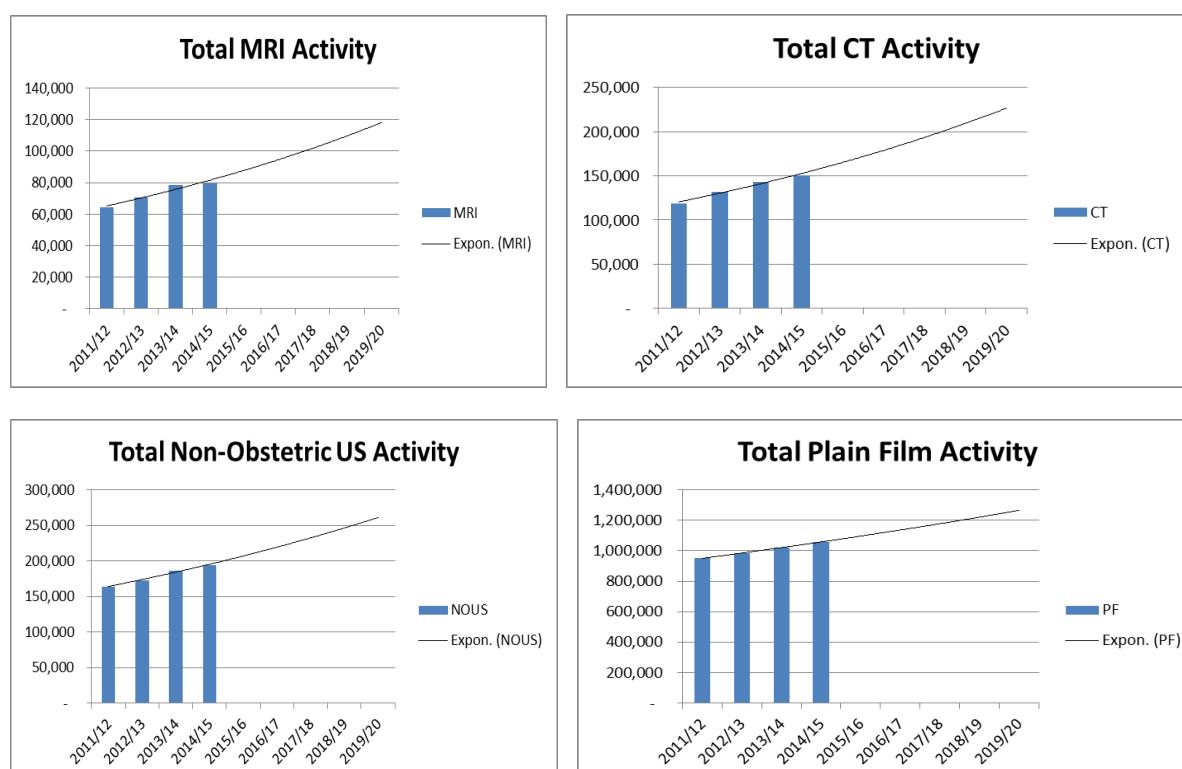
Activity

- 5.7 Data collation in respect of imaging activity is largely extracted from NIPACS since its introduction in 2010/11. Separate and in some cases manual data has to be collated from the Belfast Trust due to the different systems. Although there is still a degree of inconsistency in recording, attempting to compare recent information with data prior to

NIPACS is considerably more challenging due to the range of information systems used. For this reason, it was agreed that activity from 2011/12 (the first full year of NIPACS) onwards would be used.

Figure 4 below shows the level of activity in the four key modalities from 2011/12 to 2014/15 (full year estimate of performance at July 2014). Further detailed information by modality is provided in **Appendix 8**.

Figure 4: Activity Trends



5.8 If a scanner operates on the basis of 3 sessions Monday-Friday and 2 sessions on Saturday and Sunday, this provides indicative capacity of 19 sessions per week. Across the 13 MRI scanners this equates to approximately 243 sessions available per week. Currently, there are 145.5 funded sessions, which equates to 59% utilisation. Plans are in place for 2nd scanners in the Southern and Northern Trusts, along with additional weekend sessions in Western and South Eastern Trusts. Belfast Trust is currently preparing an Investment Proposal Template (IPT) for the Board’s consideration to fund vacant sessions. Collectively, this will increase utilisation and reduce reliance on in-year additionality. However, it also illustrates that there is capacity available within the existing scanners to address demand before further capital investment is required and this will require recurrent funding. It is also recognised that scanning sessions could run in excess of 19 per week if the working day was further extended. It is recognised however that increasing the load on a single scanner creates an increased risk in terms of resilience in the event of breakdown.

- 5.9 Across the 24 CT scanners, optimally there are approximately 437 sessions available per week. Currently, there are 214.5 funded sessions, which equates to 49% utilisation. Plans are in place for a 2nd CT scanner in the Southern Trust. Other Trusts have been asked to submit proposals to fund vacant sessions. There has been a consistent and significant increase in demand for CT scanning, particularly out of hours. In some Trusts, unscheduled CT activity accounts for more than 50% of total activity undertaken. As CT is one of the areas of rising demand, it is imperative that the current estate is optimised prior to further investment in additional scanners. However, the discussion outlined in Section 2 in relation to the future profile of acute hospitals and operational challenges with single scanners is also relevant.
- 5.10 The key current constraint to utilisation to optimum levels is the ability to recruit radiologist and radiographer staff. Shortages in key areas such as consultant radiologists and advanced practitioner staff are contributors to this and is explored in further detail in Section 7.
- 5.11 The increasing use of imaging to support diagnosis and treatment has meant that services are under increasing and sustained pressure. Despite this, imaging services in Northern Ireland are making significant progress in improving and developing services. This has been achieved through hard work and commitment of staff, combined with investment in services. Continued improvement and development is needed to enable further progress to be made.

Waiting Times

- 5.12 Waiting times for access to imaging services are growing, despite concerted efforts. The maximum waiting time guarantee for imaging services is 9 weeks, however the needs of clinically urgent patients including suspected cancer and red flag pathway patients, can impact on the ability to see routine patients. Furthermore, pressure from unscheduled care services means that ability to treat patients from the waiting list can be compromised. At times, management of the inpatient flow can lead to inpatients having scans ahead of more clinically urgent outpatients. The current numbers of patients waiting in excess of 9 weeks at the end of June 2014 for imaging services is presented in **Appendix 9**.

Reporting

- 5.13 The activity and waiting time information presented above is in respect of scanning only. All images are required to be read and reported on. Mostly, this is done by radiologists but some images are viewed by other medical practitioners by formal local arrangement, and some are reported by advanced practitioner radiographers, particularly in Ultrasound and breast screening.
- 5.14 The RCR document *Standards for the Reporting and Interpretation of Imaging Investigations (4)* sets out the essential steps in the production of an imaging report, as follows:
- Understanding the clinical information
 - Technical knowledge
 - Observation

- Analysis
- Medical interpretation
- Advice
- Communication with the referrer
- Taking appropriate action
- Communication with the patient

5.15 Once a patient has their scan, a new waiting time commences to monitor the time taken until the report is authorised, this is known as the Diagnostic Reporting Turnaround Time (DRTT). Turnaround times are monitored by the HSCB on the following basis:

- Urgent scans – Standard 100% within 2 days
- Routine scans – % within 2 weeks and % within 4 weeks

5.16 The Figures 5 and 6 show performance against the DRTT for the tests that were undertaken and include performance on Plain Film which is not subject to PFA target.

Figure 5: % Urgent referrals reported within 2 days at July 2014

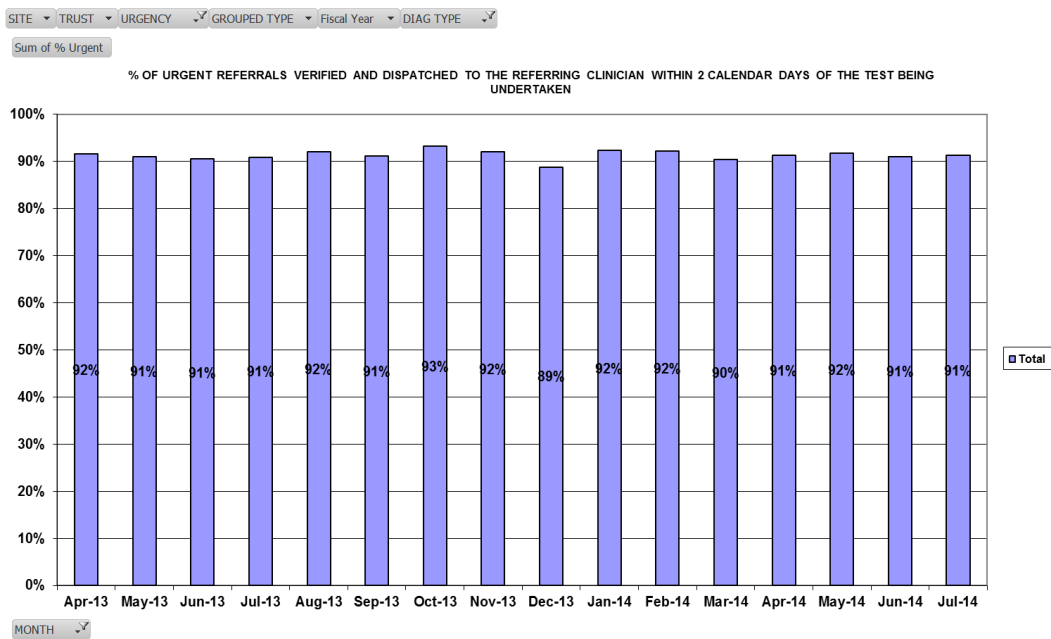
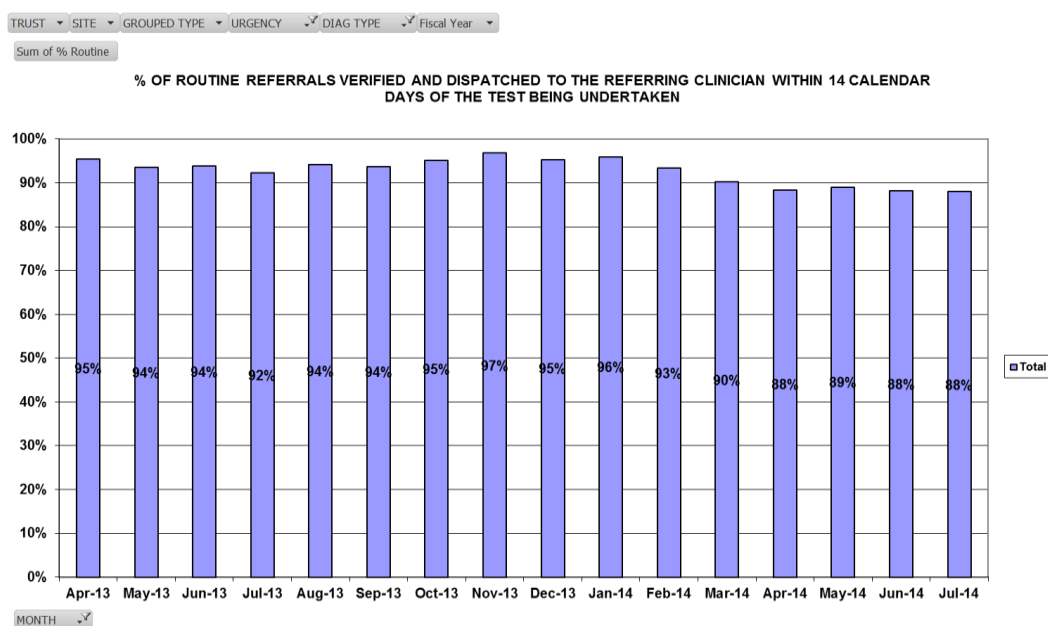


Figure 6: % routine tests reported within 2 weeks at July 14



5.17 The number of tests which are un-reported is also closely monitored. It is important to note that not all scans are currently being reported and there are significant differences between Trusts in terms of the arrangements for images to be read, results acknowledged and reports authorised / signed off. At 1st September 2014, there in the region of 143,000 examinations waiting > 28 days to be reported. This does not include the number of tests which are assigned an IRMER report, which stops the DRTT clock and are not represented in this figure. The MRCN is planning to commence work to provide regional agreement on data definitions to support more robust monitoring of reporting turnaround times. This will include agreement on which tests require a report and which do not.

5.18 Following the RQIA investigations into plain film, all chest x-rays are now formally reported by a radiologist. However, there is variation across the region in the percentage of plain films that receive a formal radiology report, with ED being the area of significant variation. Increasingly, this pattern is evident for inpatient plain film. The level of vacant consultant posts and lack of sufficient numbers of advanced practitioners are key contributors. The Radiology Network is in the process of developing a regional programme to optimise the skills of advanced practitioner reporting radiographers to help address reporting pressures.

Direct Access

5.19 There has been significant progress across all Trusts in relation to increasing the level of direct access to imaging services for GPs. Current provision has been scoped and is presented in Table 1 below:

Table 1: Direct Access Arrangements

Trust	Direct Access Arrangements
Belfast HSC	Direct Access on all sites to: MRI CT Non Obstetric Ultrasound Plain Film
Northern HSC	Rapid plain film reporting MRI knees Echo Audiology fitting and testing CT brain, chest and abdomen, l-spine Dexa DVT Ultrasound MSK Ultrasound
South Eastern HSC	Plain film on all sites except Bangor (by appointment) Ultrasound CT Fluoroscopy Spinal MRI
Southern HSC	Plain film Ultrasound CT Brain
Western HSC	Open access to Plain film on all sites Wide range of US services Drop in service for DVT on all sites Testes US and general abdominal US Pelvic scanning inc.TV on all sites Limited access to CT on all sites, but can be arranged further to discussion with radiologist MRI available for a pre-defined range of exams including knees and spines in Altnagelvin and SWAH.

6.0 Commissioning arrangements

- 6.1 Currently, imaging services are provided via a combination of core delivery by Trusts and additional activity, either through in-house additional sessions or by Independent Sector Providers, in order to meet demand. Funding for imaging services is on the basis of a recurrent annual allocation to HSC Trusts, and supplemented by in-year, non-recurrent funding to address gaps and/or pressures in key areas. Over the next 5 years, additional recurrent and capital investment, alongside improved productivity, is required to ensure that the majority of projected demand will be delivered via core services, with significantly reduced reliance on Independent Sector Providers.
- 6.2 Commissioning priorities are determined by the Minister, and the HSCB responds to these through a process of local commission with regional planning. The process for identifying commissioning priorities is two-way, with local commissioning informing regional priorities providing a frame of reference for local commissioners to work from.
- 6.3 In 2012/13, following a detailed modelling exercise, Service and Budget agreements (SBAs) were established for what were considered to be the four main modalities of MRI, CT, Non-Obstetric Ultrasound and Plain Film X-Ray. For these four modalities, an annual agreement is in place for the level of scanning and reporting activity expected to be delivered for the recurrent investment made. During 2013/14, an SBA was developed for PET CT and by 1st April 2015, an SBA will be place for Cardiac MRI following innovative service redesign to create a hub and spoke model supported by recurrent funding to provide CMR imaging on 3 sites.
- 6.4 SBAs will be developed for the remaining imaging services, although pressures to meet maximum waiting time guarantees for patients continue to be addressed with in-year non-recurrent funding, where available.
- 6.5 In conjunction with the Modernising Radiology Clinical Network (MRCN), the HSCB is engaged in a population based capacity planning approach to the commissioning of imaging services to address current and future demand for imaging services, as well as to facilitate increased access for patients and referrers as part of the strategy to deliver 7-day access to services. For imaging, this is focusing both on increasing access at weekends as well as extended working weekdays. The programme aims to incrementally reduce reliance on the Independent Sector and involves modelling capacity and demand at agreed productivity levels to ensure consistent and optimum utilisation of clinical session time. This is being supported by revenue and capital investment plans.
- 6.6 However, demand is increasing at in excess of predicted levels although the rate varies across the five Trusts. The number of people waiting for access to three main imaging modalities (MRI / CT / Non-Obstetric Ultrasound) also continues to rise. Plain Film X-Ray has remained relatively stable over the same period and this has managed to facilitate enhanced levels of GP access with faster turn-around times for plain film reports.

- 6.7 Feedback from the Workstream questionnaire indicated that there is a need for more responsiveness in the commissioning process and that consideration of a move towards payment by results type models would better meet the needs of the service.

7.0 Imaging Workforce Position

- 7.1 The MRCN has undertaken a stocktake with regard to staffing levels of Consultant Radiologists and Radiographers and the position at August 2014 is summarised in Table 2 below:

Table 2: Staffing Position at August 2014

Consultant Radiologists				Radiographers			
	Funded Staffing Level (FSL)	Staff In Post (SIP)	Variance		Funded Staffing Level (FSL)	Staff In Post (SIP)	Variance
SHSCT	20	17	-3	SHSCT	101	113	12
BHSCT	52.45	43.61	-8.84	BHSCT	209.28	192.51	-16.77
NHSCT	20.32	19.35	-0.97	NHSCT	113.37	103.2	-10.17
SEHSCT	20.6	17.8	-2.8	SEHSCT	95.38	95.38	0
WHSCT	22.9	16.8	-6.1	WHSCT	113.425	114.425	1
REGION	136.27	114.56	-21.71	REGION	632.455	618.515	-13.94

7.2 Radiologist Workforce

- 7.2.1 As can be seen from Table 2, there are 136.27 WTE consultant radiologists in Northern Ireland. There are approved and funded, unfilled posts in all Trusts, with long term vacancies in most. At August 2014, this equates to 21.71 WTE funded vacant posts. All Trusts are utilising internal waiting list initiatives to bridge part of the reporting gap and some are using external reporting services; however it is clear that the deficit is also leading to reduction in capacity and subsequently, an increase in waiting times and responsiveness from imaging departments.
- 7.2.2 The radiologist is a key component of modern medicine and their presence is vital to the functioning of acute hospitals and elective services. The role of the clinical radiologist was described by the Royal College of Radiologists in response to the Tooke Report in 2008 as follows:
- 7.2.3 A clinical radiologist (CR)¹ is a medical practitioner who diagnoses diseases using imaging and who treats disease under imaging guidance. Although some CRs specialise in diagnostic radiology and others in interventional radiology, a large proportion of diagnostic radiologists undertake at least some interventional procedures and almost all interventional radiologists undertake diagnostic procedures.
- 7.2.4 As interventional radiologists treat patients directly, the clinical nature of interventional radiology is similar to that of other practical medical disciplines, such as surgery or gynaecology. Diagnostic radiologists issue formal reports on the basis of imaging interpretation backed by broad and in-depth medical knowledge taking into account likely diagnoses in particular clinical circumstances. It is the radiologist who synthesizes all clinical

¹ Role of the clinical radiologists as described by the Royal College of Radiologists in response to The Tooke Report 2008.

information, including both imaging and non-imaging investigations, to give the overall diagnosis.

- 7.2.5 The role of the radiologist also extends to overseeing and advising on appropriate investigations, ensuring that they are justified and likely to yield the right results. They are knowledgeable about the balance of benefits and risks which are involved in the use of ionising radiation. Justification of exposure includes full consideration of alternative techniques which do not involve radiation.
- 7.2.6 The role of the clinical radiologists has evolved significantly in response to new and improved imaging techniques and progress in acute and elective medicine. The widespread availability and use of CT and MRI in our hospitals has greatly increased the numbers and complexity of imaging examinations. The huge increase in reporting time required for complex studies has resulted in significant changes to job plans and seen plan film reporting being increasingly undertaken as additional core work.
- 7.2.7 Improvement in imaging quality due to advances in acquisition and processing and demand from specialist clinicians in all HSC Trusts has allowed for earlier, more complex and more accurate diagnoses to be made, particularly in specialist areas. This has resulted in all Trusts needing to employ radiologists with higher training in diverse specialty areas to support their specialist clinicians. It would be expected and required in most acute Trusts to find radiologists with special interests in paediatric radiology neuroradiology, specialist body imaging, musculoskeletal radiology, breast radiology, nuclear medicine, interventional radiology and others depending on local needs. The need for radiologists with specific special experience is a further challenge for radiology departments. At present paediatric radiology and interventional radiology are most pressured areas, with growing pressure in breast imaging predicted to become more acute within the next 18-24 months due to declared retirements. This requires explicit guidance on the core competencies expected to be undertaken from consultant radiologists in order to further understand gaps in both the general and specialist workforce.
- 7.2.8 It takes 5-6 years to train a consultant radiologist depending on area of expertise and the number of local trainees has been insufficient for a number of years, the last review being undertaken in 2000. Currently, there are 37 trainees in the Northern Ireland scheme, limited by the number of training numbers available. The radiology departments have indicated that they have capacity to train more radiologists. Of those in training, it is estimated that approximately 80% will remain in Northern Ireland. The HSCB agreed in principle that an additional 5 trainee would be beneficial, however it is recognised that the DHSSPS has responsibility for funding medical workforce in training via NIMDTA. There has been no change in training numbers for five years despite it being clear that present numbers are insufficient to maintain status quo never mind address the shortfall.
- 7.2.9 Increasing training numbers should be considered as a high priority action for the DHSSPS Imaging Review.**
- 7.2.10 Clinical radiologists have been increasingly taking a central role in and often leading, multidisciplinary team discussions (MDTMs) on individual care pathways of particular

patients. Although the need for such meetings was formalised by the Cancer Plan, similar interactions with clinical teams were already occurring and has meant that this has now become commonplace outside the field of cancer as well as within cancer pathways.

- 7.2.11 The time committed to MDTMs has increased greatly over the last decade, with 15-20% of radiologists clinical time now spent preparing for and attending these crucial meetings. Communication and case discussion between clinicians and radiologists outside of the MDTMs is also of great value in patient diagnosis and treatment and these relationships are paramount in patient care.
- 7.3.12 A fully trained radiologist combines the attributes of having 7-8 years of extensive general medical training with 5 years in depth specialist radiological training ensuring that they are ideally prepared to provide expert analysis of imaging examinations but with the increase in demand for key modalities such as MRI, CT and Non-Obstetric Ultrasound, and lack of available radiologists, it is increasingly important to ensure that consultant expertise is directed to those clinical areas which only they can do. Utilising the skills of all members of the imaging team is necessary and as such, accessing the skills of advanced practitioner radiographers to undertake functions such as selected plain film reporting and performance of advanced techniques is being supported and promoted but only where it is clinically safe and appropriate to do so.

7.3 Radiography Workforce

- 7.3.1 As can be seen from Table 2 there are 632.45 WTE funded radiographer posts in Northern Ireland. Approximately, 27 WTE temporary staff are in place to cover sickness, maternity and other leave. At August 2014, there were 13.94 WTE funded vacant posts, with key areas of deficit in the Belfast and Northern Trusts. There is not the same challenge to recruitment of registered radiographers as there is for radiologists, and vacancies are largely due to delays in recruitment as a result of the recruitment processes and staff turnover. Recruitment and training are more challenging for advanced practitioner radiographers.
- 7.3.2 A pathway for career progression within radiography has been in place for some time. In 2000, the College of Radiographers published a Strategy for Education and Professional Development for Education and Professional Development for radiographers and due to increased demands for imaging services and the shortage of radiologists it has become imperative to drive skill mix and radiographer role development. The Framework was re-published by the Department of Health in 2003 and outlined four tiers of progress to be implemented for radiography throughout the NHSS. These are:
- **Assistant Practitioner:** an assistant practitioner performs protocol-limited clinical radiography tasks under the direction and supervision of a State-Registered practitioner
 - **Practitioner:** a radiographer practitioner autonomously performs a wide-ranging and complex clinical role and is accountable for his/her own actions and for the actions of those they direct
 - **Advanced Practitioner:** an advanced practitioner is autonomous in clinical practice, defines the scope of practice of others and continuously develops

clinical practices within a defined field, e.g. a specialised radiographer with a post-graduate diploma in Ultrasound, CT or MRI reporting

- **Consultant Practitioner:** a consultant practitioner provides clinical leadership within a specialty, bringing strategic direction, innovation and influence through practice research and education

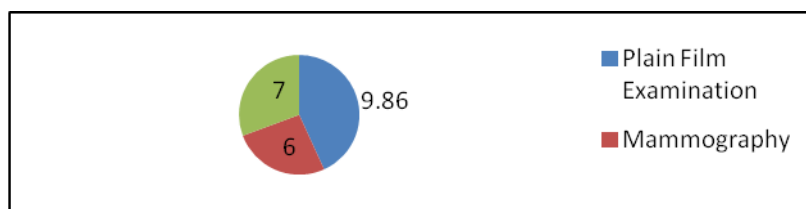
7.3.3 Radiography services managers, in conjunction with clinical radiologists, are responsible for the day to day running of radiology departments. Radiologists interpret the images obtained by radiographers and have a responsibility to educate healthcare professionals in diagnostic imaging. In general, radiologists have been supportive of skill-mix radiography and career progression. Despite commitment for medical training and development, they have agreed to provide mentorship to radiographers and to pass on skills and expertise where possible.

7.3.4 In radiography, there are a number of Assistant Practitioners who carry out duties in various modalities under the supervision of radiographers. Table 3 below illustrates how many Assistant Practitioners are currently employed per Trust / modality. This is also illustrated graphically in Figure 7.

Table 3:

	HSC Trust					Total per Modality
	Northern	Southern	Belfast	Western	South Eastern	
Plain Film X-Ray	1	4	0	3	1.9	9.86
Mammography	2	2	0	2	0	6
IV Cannulation	0	0	7	0	0	7

Figure 7: Assistant Practitioners Trained per Modality

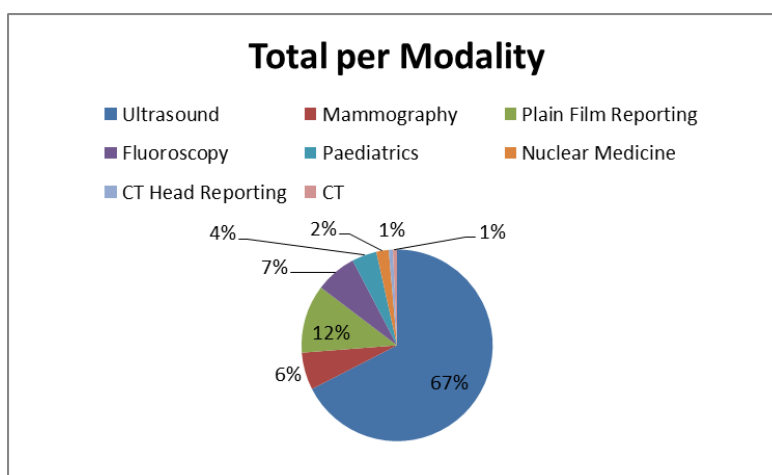


7.3.5 Many of the radiographers currently employed in Northern Ireland are continuing along career progression pathways or have been fully trained as Advanced Practitioners in specific modalities, as detailed in Table 4. It should be noted that the majority of advanced practitioner work in Ultrasound, and the majority of these in the obstetric field and not Non-Obstetric Ultrasound which is an area of key pressure. However, it is recognised that this varies across the region.

Table 4: Advanced Practitioners by Modality

	HSC Trust					Total per Modality
	Northern	Southern	Belfast	Western	South Eastern	
Ultrasound	16	25	28	20	7.5	96.5
Mammography	3	2	3	0	1	9
Plain Film Reporting	4.5	6	4	0	2	16.5
Fluoroscopy	1	4	4	0	1	10
Paediatrics	0	0	6	0	0	6
Nuclear Medicine	2	0	0	1	0	3
CT Head Reporting	0	1	0	0	0	1
CT	0	0	0	1	0	1

Figure 8: Advanced Practitioners Trained per Modality



7.3.6 A total of 137 radiographers out of 632 WTE (22%) have completed development courses and are employed as advanced practitioners. Whilst this is commendable, there needs to be further progression to advanced practice to keep up with technological advances and the increasing demand for imaging services. The MRCN is committed to continuous improvement and promotion of skill mix opportunities and sessions are earmarked to present areas of good practice for advanced practitioners which will help identify the areas in which the service can be developed for the future.

7.3.7 In response to increased demand, radiology departments have reviewed their operational hours and introduced shift systems, extended day and 7-day working. It is imperative that sufficient numbers of Band 5 and 6 radiography staff are employed to facilitate extended scope practitioners to train and specialist in areas such as CT, MRI, Ultrasound and in reporting functions, to ensure sure that the service can address the challenges of the future. There have been recent moves towards backfilling to release trained staff to operate in skilled areas, and this is being driven as part of a region-wide drive and commitment towards recognition of the role advanced radiographer practitioners have within the imaging service, not least in view of the challenges with radiologist recruitment / retention.

- 7.3.8 There are a small number of Consultant Practitioners in therapeutic radiography in Northern Ireland, but there are no consultant practitioners in diagnostic radiography. Consultant practitioners are a feature in diagnostic radiography in the rest of the UK and Northern Ireland is clearly an outlier. Good progress has been made in the UK although these posts tend to be limited to the Breast Screening Service. Consultant practitioner posts are typically part-funded by the DHSSPS and practitioners are required to spend a proportion of their time at University. Although the consultant nurse role has been promoted in NI, this career development has not materialised for diagnostic radiographers.

Summary

- 7.4 In light of the issues highlighted above, it is of fundamental importance that the radiology workforce optimises the skills of its consultant staff as well as the skill mix of radiography staff. More training numbers are required to maximise the number of consultant radiologists in the future but retention of consultants presently in post and recruitment from outside the region are important issues in the short term.

The use of assistant practitioners and radiographers should be optimised to facilitate advanced radiographers to apply their extended role skills. Advanced practitioners must be optimised, particularly for reporting functions, to enable consultant radiologists to focus on the more complex expert tasks that only they can perform. This will require targeted backfill as well as clinical agreement to utilise skills and expertise more effectively within imaging services whilst not impairing the safety and quality of the service presently provided.

8. ICT and Radiology in Northern Ireland

8.1 All of the imaging departments in Northern Ireland rely on digital imaging equipment and utilise electronic RIS (Radiology Information Systems) and PACS (Picture Archiving and Communication Systems). These systems are essential for safe and effective administration, reporting and archiving of imaging examinations. The collective name for these is NIPACS, which is the unified RIS/PACS system for most of Northern Ireland (exc. RVH/BCH).

8.2 PACS

PACS is an electronic solution for image and report storage providing comprehensive archiving of studies with convenient and immediate access to images. Imaging examinations and the associated reports are available as soon as they are completed on PACS and can be viewed on trust PCs and workstations instantly. Previous examinations and reports are also available to healthcare staff with the complete PACS imaging history linked to patients' Health and Care numbers. This is an invaluable resource which not only supports decision making but also reduces the need for repeat examinations.

8.3 RIS

RIS systems are radiology department databases which administer the handling, scheduling, recording and reporting of examinations along with the distribution of reports. Ideally they should also be linked to HIS (Hospital Information Systems), ECR (Electronic Care Record), Electronic Request and Report Acknowledgement Systems.

8.4 Home Reporting

At present, each Trust has a solution which allows for review and reporting of examinations from consultants homes. This supports out of hours services in the acute Trusts and also allows for second opinions in sub-speciality areas from local and regional experts. The functions of these home units are limited compared to workstations in the imaging departments and do not allow for effective working from home which would be useful given present issues with radiology staffing.

8.5 RIS/PACS

The South Eastern HSC Trust, Northern HSC Trust, Southern HSC Trust, Western HSC Trust and parts of the Belfast Trust (Musgrave Park, RBHSC, Mater) are linked by NIPACS. As patient identities are linked by the region wide Health and Care number, patients have a single identity on NIPACS and full access to the patients' imaging history is available across nearly all sites in Northern Ireland. This integration across numerous organisations using the same identifier has been of great benefit to the Northern Ireland public and envied by radiologists in other regions.

However, the Royal Victoria Hospital and Belfast City Hospital have standalone PACS systems which are linked to Private Finance Initiative (PFI) contracts providing alternative PACS solutions, which were put in place prior to the introduction of NIPACS.

This means that not only is there lack of integration with the rest of the region but that there are 3 RIS systems and 3 PACS in use within a single trust which do not communicate or integrate with each other. Attempts to allow image retrieval across the different PACS platforms have to date been unsuccessful. Web based viewers do exist which can allow access to other PACS from outside of the sites but these links have proved to be unsatisfactory to most users. This is not only a source of frustration to radiologists and referrers in Northern Ireland who now recognise the advantages of an integrated system, but also impacts on patient care particularly for those being referred to and back from regional centres.

8.6 NIPACS and Clinical Networks

Clinical radiology has, as previously stated, become a specialty where there is a requirement to have specialty trained radiologists available in multiple clinical fields in each of the hospital Trusts. Due to present staffing levels, this is not always possible but there is the opportunity to use NIPACS to facilitate intra-Trust and cross-Trust clinical support. There are a number of examples of this, particularly by paediatric radiologists for non-accidental injury (NAI) cases and cross-cover of gaps in rotas due to vacant posts, sickness and annual leave. The MRCN group is interested in progressing these arrangements in multiple areas.

The RQIA reports suggested that NIPACS could be used as part of the escalation process to avert an unreported examinations crisis. NIPACS has proved useful in monitoring unreported examinations and giving early warning to individual Trusts, however as all of the Trusts are using waiting list initiatives to support their own services, there has not been the opportunity to institute formal cross-Trust reporting processes.

NIPACS allows examinations to be performed at hospitals convenient to the patient's locality with the images and report automatically available at the referring hospital. This has been of great advantage to patients living at a distance from tertiary referral units. This would happen more frequently if there was full integration between PACS.

8.7 Within the Belfast Trust the following issues have been highlighted

- **Workflow:** Standardising workflows across the Belfast sites to mirror each other is very difficult with 3 RIS/PACS as no one application has the same capability as the other. Workflow has to be set 3 times over, with workarounds on some sites that are manual due to the limitations of that RIS or PACS.
- **Incomplete full patient Radiological history with 3 RIS/PACS:** There is a risk of re-imaging of patients transferred between sites in Belfast. In the busy Emergency Departments, with 3 sources of where Radiology reports/images can be stored, it is time consuming and unrealistic in stressed departments for referrers to check all three. The Northern Ireland ECR has helped in this area. The project to integrate

the 3 PACS for sharing of images and reports (XDSi) has to date proved difficult with many issues postponing the system being put into clinical use.

- **Unavailability of comparison images:** Access to all previous studies on a diagnostic workstation is an important resource which improves the accuracy and usefulness of radiology reports particularly in oncology and trauma. This is an important patient safety issue.
- **Duplicate requests for imaging:** With 3 RIS systems it is difficult to filter out duplicate requests. For example, a GP may refer a patient for imaging to their local Belfast Hospital. However, the patient may also be under the care of a Trust Consultant who refers them to another site for the same exam. This can lead to unnecessary exposure to radiation. There are indications that referrers will submit duplicate requests in the hope that one will be done faster than the other, but assumes that the system is intelligent to know not to perform the unnecessary one.
- **MDT Preparation and Display:** It is common for patients being presented at the MDTMs to have relevant imaging on all three systems and there is no way of knowing short of checking / access to all three.
- **Central Appointment:** Imaging Services within Belfast have established a central appointment office based in Musgrave Park Hospital. This office accommodates the appointing of Outpatients for CT, US, and Fluoroscopic procedures. One benefit we have not yet realised is to standardise the waiting times across Belfast and to move patients to ensure they are offered the next available appointment regardless of site (if deemed clinically appropriate). To move patients/requests between 3 RIS systems carries a high risk as referrals have to be deleted off one system and created on another, this is a manual process and open to risk. From a clinical perspective, clinical teams do not know where imaging is going to be performed as central booking can send the request to any site/system within the Trust.
- **Introduction of Cross Site Consultant On call Rotas:** Trust plans to introduce cross site on call rotas are complicated with 3 RIS/PACS systems. All consultants partaking in the rota will need to be competent to report on all 3 RIS/PACS, this carries a risk as many will only use 2 of the 3 systems during their period of on-call, and this is out of hours so there is no support from PACS Admin for any application issues.
- **Order Comms and Results Acknowledgement:** Any introduction of these systems requires 3 integrations (one for each provider). The capabilities of each system is different, for example, what one RIS can transfer in data, another RIS may not be able to the same. This could lead to inconsistencies on the Radiology orders that can be placed to one site, and also on the information from reports that can be sent to a Results Acknowledgement system (for example; to have a HL7 tag to flag Urgent Findings). Whilst Belfast Trust has purchased an Electronic Order Comms with results acknowledgement, this has not been deployed for Radiology use due to

Patient Demographic risks which Trust ICT is addressing. However, all staff are aware of the steps and policies in place.

- The Belfast Trust is investigating different options with regards to its association with NIPACS. The imaging review body consider that the ideal situation would be complete integration into NIPACS however there are significant difficulties related to the time remaining on the PFI contracts.
 - RVH Philips Contract Expires 2022
 - BCH GE Contract Expires 2022
 - NIPACS /Sectra Contract Expires 2018 (revenue only extension to be sought to 2023)

8.8 NIPACS is integrated with an electronic request system and this is the predominate method of referral in NIPACS sites. Electronic requesting is being extended to Primary Care and it is expected that written requests on paper forms will be phased out following an upgrade to a more user friendly request system at the end of this year. The Belfast Trust, partly due its multiple systems has elected not to pursue electronic requesting at this time.

8.9 **There are a number of advantages to an electronic request system which include** reduction of error due to pre-population of demographic fields, integration with Electronic Case Records and reduction of clerical costs with regards to request handling. Most importantly, an electronic request system can be linked to an order management and results acknowledgement system, which will ensure that all requests can be followed from the referral being made to the report of the completed examination being read and acknowledged by the requesting team. This is the safest solution to recommendations made in National Patient Safety Agency Notice 16 –“Early identification of failure to act on radiological imaging reports” and has also been recommended with reference to previous SAIs in Northern Ireland.

8.10 **Breast Imaging Picture and Archive Communication System (BIPACS).** BIPACS is the most recent extension of NIPACS providing display, storage and sharing of digital mammography on both screening and symptomatic breast imaging services. It is recognised that the NBSS (National Breast Screening Service) computer system does not provide the functions required of a modern RIS and does not readily facilitate the delivery of the complex breast imaging work flow. The review group would encourage efforts to enable the management and report functions of NBSS to continue in the background while allowing imaging professionals access to the RIS / PACS functionality they require to deliver a complex, high quality and efficient service in both screening and symptomatic environments.

8.11 **PACS and ECR** are partially integrated via common use of the Health and Care number with reports from each of the PACS systems fed directly to the correct electronic record. It is hoped that hot links from ECR will be available shortly to allow direct access to PACS images. It has been suggested that Order Comms software associated with ECR will be able to integrate with Sectra (NIPACS) Order Management and other systems to allow referrals to be made and results acknowledged within ECR.

The potential for a single portal access to all medical images from all sources (not just radiology) from the ECR screen is a realistic and attractive opportunity, leveraging the NIPACS infrastructure already in place. This would afford the same robust reporting, sharing and storage of non-medical images that NIPACS provides for imaging and would yield benefits in terms of quality of service and clinical risk reduction. The imaging review body would strongly support this development.

- 8.12 **Global Image Storage.** NIPACS was originally planned as a global imaging storage solution for Northern Ireland. In addition to the other RIS/PACS systems in place in parts of the Belfast HSC Trust, there are many other archives that could be included usefully in the NIPACS archive in order to ensure easy access to a complete image history. For example, echocardiography, cardiac catheterisation laboratory, obstetric and gynaecology images and reports are not available in NIPACS but would be valuable if they were. NIPACS could also be used as an image store for ED, OPD and ward based ultrasound examinations or for dermatology, endoscopy and dental photo records, amongst others.
- 8.13 **Business Continuity – ICT.** Our healthcare facilities are now highly dependent on PACS and other IT systems and the occasional unavailability of these systems causes major issues which can lead to crisis. All departments have processes in place to allow emergency working when systems fail. Data is duplicated in mirrored data centres safe-guarding the medical record.

9. Safeguarding / clinical governance

- 9.1 It is important for patients to be assured that the services they receive are safe and effective and performed to agreed standards.

Legislation

- 9.2 Many imaging investigations use ionising radiation and for this reason there are a number of quality and safety requirements and legal obligations which directly apply to imaging. It is vital to ensure that patients across Northern Ireland continue to be imaged as safely as possible and to consistently high standards.
- 9.3 All ionising radiation examinations (exc. Ultrasound and MRI) are regulated by the Ionising Radiation Regulations for Medical Exposure (IRRME). Imaging departments are subject to scrutiny from the regulating body (RQIA). RQIA inspect departments to ensure that working procedures are established, safe and understood, particularly in reference to Ionising Radiation Regulations
- 9.4 Every examination which uses ionising radiation must therefore be clinically justified by a designated referrer.

Audit

- 9.5 Each trust produces an annual audit plan to assess important services and potential problem areas. There is some guidance from RCR and SCOR regarding which audits should be carried out but there is no overall audit strategy in place to evaluate the total safety and effectiveness of departments. Audits tend to be departmental or trust based with only a few national or regional audits to appraise the relative safety and performance of organisations.

Training and Professional Development

- 9.6 All clinical and non-clinical staff working in imaging departments undergo annual appraisal.
- 9.7 It is required that Consultant Radiologists are on the specialist register for Clinical Radiology and are subject to 5 yearly revalidation by the GMC. Consultant Radiologists therefore need to demonstrate that they remain active and committed to Continued Professional and Personal development, personal audit (including attendance at discrepancy meetings) and undertake colleague and patient feedback.
- 9.8 Trainee radiologists are supervised by their speciality trainers, in terms of their educational needs and service responsibilities. Trainees initially work under direct supervision with the level of supervision reducing as they progress through training.
- 9.9 Radiographers in working in the NHS are registered with the 'Health and Care Professions Council' (HCPC). This regulatory body ensures that all Radiographers meet the standards required to practice and maintain levels of training, professional skills, behaviour and health.

Continuous Professional Development (CPD) is an important part of radiographers continuing registration with the HCPC. With registrants expected to continue to develop their knowledge and skills while they are registered to maintain confidence that they are able to practise safely and effectively.

9.10 Standards for CPD say that a radiographer must:

- maintain a continuous, up-to-date and accurate record of their CPD activities
- demonstrate that their CPD activities are a mixture of learning activities relevant to current or future practice
- seek to ensure that their CPD has contributed to the quality of their practice and service delivery
- seek to ensure that their CPD benefits the service user
- upon request, present a written profile (which must be their own work and supported by evidence) explaining how they have met the standards for CPD.

9.11 Radiographers usually spend the equivalent of 5 days per annum on CPD through profession specific study days, professional development programs and trust provided training. In Northern Ireland radiographers are frequently required to provide evidence to support both activity and learning. This information is currently held in both manual and electronic forms the provision of the Imaging Services Accreditation Standard (ISAS) would standardise the evidence recording of CPD and enable the sharing of learning across the profession.

9.12 It would be hoped that introducing accreditation with ISAS would identify if there were areas of patient risk that required action. ISAS should lead either to public assurance that our imaging departments are safe for patients and staff or indicate areas for improvement.

9.13 Patients and clinicians should expect that imaging services and the mechanism for providing them will be delivered to consistently high standards. The accreditation of imaging services will help to ensure safer and more efficient services that are committed to continuous improvement. Such is the feeling within the imaging community at this time, that Section 10 of this paper is dedicated to outlining the need for introduction of the Imaging Services Accreditation Standard (ISAS) to Northern Ireland for consideration by the Imaging Review Project Board.

10. Imaging Services Accreditation Standard (ISAS)

- 10.1 This section of the Radiology Workstream report provides information and background to the Imaging Services Accreditation Standard (ISAS) and presents the case for a region-wide ISAS programme as an early recommendation from the DHSSPS Review of Imaging Services.
- 10.2 The Radiology Workstream of the DHSSPS Review of Imaging Services has been tasked with developing four papers to support the Review. The first paper presents the current service position, taking account of service configuration, demand and capacity, capital resources, workforce and other relevant issues. Subsequent papers will outline what an optimal imaging service looks like, what is needed to achieve this and consider future measures for resilience / future proofing.
- 10.3 Over the past few months, the Modernising Radiology Clinical Network (MRCN) has been actively exploring the potential for accreditation of imaging services in Northern Ireland and has highlighted ISAS to the Radiology Workstream as a key priority for the service as part of the development of the first and subsequent papers of the Review. The MRCN considers ISAS to be fundamentally important for the future safe, effective provision of quality imaging services for the people of Northern Ireland.
- 10.4 The Radiology Workstream and the MRCN jointly consider an early recommendation regarding ISAS for Northern Ireland as a key and important deliverable from the DHSSPS Imaging Review.
- Imaging is not a technical service, but a clinical service that interprets information and requires the clinical expertise of imaging clinicians, who are increasingly making decisions about the management of patient care. Furthermore, interventional techniques are at the forefront of management of many life-threatening emergencies.
 - Ministerial and DHSSPS support for ISAS accreditation would send a clear message to the imaging community of the vital role it plays in the diagnosis, treatment and ongoing monitoring of disease.
 - The RQIA investigations focussed primarily on the arrangements around plain film X-ray. There are clear and demonstrable benefits for the imaging service as a whole undergoing a rigorous and independent review.
 - Northern Ireland would join other health communities across the UK who have become accredited.
 - All five HSC Trusts are ready and willing to commit to the process of accreditation.
- 10.5 ISAS can enable the HSC to assure the people of Northern Ireland that their imaging services deliver high quality, safe and effective care, and play their proper part in meeting the

demands of regional strategy and local quality delivery plans. It is a recognised tool by which to standardise imaging services regionally and eliminate non-value adding variation in the system. As such, an early recommendation regarding a region-wide programme of ISAS accreditation is requested for urgent consideration.

Background to Accreditation

- 10.6 Healthcare is a vital and emotive issue and it has medical, social, political, ethical, business and financial ramifications. Due to the near universal desire for safe and good quality healthcare, people are expressing ever-greater expectations of healthcare services and there is a growing interest in accreditation for healthcare in general as well as for individual service areas.
- 10.7 Accreditation is about improving how care is delivered to patients and the quality of care they receive and can be defined as: *“A self-assessment and external peer assessment process used by healthcare organisations to accurately assess their level of performance in relation to established standards and to implement ways to continually improve”*.
- 10.8 In the USA, in the early part of the 20th century, there was concern over how best to create an appropriate environment in which clinicians could work. Standards to improve control of the hospital environment were generated and these subsequently grew into accreditation schemes with the remit to facilitate and improve organisational development. The accreditation process is not solely about assessing quality, but also about promoting and improving quality. Similar accreditation schemes were soon developed elsewhere in the world.
- 10.9 In the UK, USA, Australia, New Zealand and Canada, sophisticated accreditation groups have grown up to survey hospitals and in addition, accreditation groups have been set up with openly declared remits to look after just one particular area of healthcare, such as laboratory and more recently, imaging services.
- 10.10 Accreditation schemes are structured to provide objective measures for the external evaluation of quality and quality management and focus primarily on the patient and their pathway through the healthcare system. This includes how they access care, how they are cared for after their discharge and the quality of the services provided for them. Achieving a set of standards is not the only factor involved in quality accreditation – there is also the significant matter of incorporating systems of self-examination, problem solving and self-improvement and as such there is more to accreditation than following a standardization process.

Imaging Services Accreditation Standard (ISAS) in the UK

- 10.11 The College of Radiographers (SCoR) and Royal College of Radiologists (RCR) have worked together to develop ISAS to provide assurance that diagnostic imaging services offer patients consistently high quality services, delivered by competent staff, working in safe environments. ISAS is based on current professional guidance updated annually and is independently assessed by the UK government designated United Kingdom Accreditation Service (UKAS).

10.12 Across the UK, the *Francis Report* is seen as a key driver for organisations to elect to undergo a rigorous accreditation process.

“Standards need to be formulated to promote the likelihood of the service being delivered safely and effectively, to be clear about what has to be done to comply, to be informed by an evidence base and to be effectively measurable.” Robert Francis QC, Chairman, Mid-Staffordshire NHS Foundation Trust Public Inquiry

10.13 Accreditation encompasses the entire performance of an imaging service. Services can choose a direct or flexible staged approach allowing public recognition of progress along the path to achieve final accreditation. This is examined through four quality domains, covering:

- Patient experience
- Facilities, resources, workforce
- Safety
- Clinical Services

10.14 To date, 16 services have achieved ISAS accreditation across England, a further 10 have signed UKAS contracts, and over 70 more are involved in various stages of engagement. NHS Wales are at an advanced stage of negotiations with ISAS and announcement of an all-Wales approach to ISAS Accreditation is expected within the next few weeks. NHS Scotland has referenced ISAS as part of their national network programme and individual Scottish organisations have initiated discussions. Those services that have already achieved ISAS Accreditation report significant service benefits, such as:

- Strengthened focus on patient safety and quality of the care experience
- Raised governance standards, supporting continuous improvement
- Leverage for change, enhanced staff motivation and the sharing of good practice
- Enhanced efficiency and value for money
- Increased confidence in the service by patients and referring clinicians

10.15 At present, there are no accredited imaging services in Northern Ireland.

Modernising Radiology Clinical Network (MRCN)

10.16 As referenced earlier in the report, the MRCN functions as a clinical advisory and implementation network, with the overarching objective to identify and address those key local issues pertaining to radiology services as identified in recent RQIA reviews. The Network is 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.

10.17 The MRCN is the key driver for accreditation of imaging services in Northern Ireland. The accreditation standards are clearly co-aligned with the underpinning principles and strategic objectives of the Modernising Radiology Clinical Network. This is embodied in its vision statement and strategic objectives:

“To plan and deliver high quality, safe and sustainable imaging services for the people of Northern Ireland”

Strategic objectives:

- Excellence, quality and control
- Safe, evidence based care with good use of benchmarking
- Patient focussed care, working in partnership
- Equity, consistency, sustainability
- Realistic, flexible, responsive services
- Innovative and creative care
- Province-wide approach to planning and delivery

10.18 In November 2013, the Network collectively discussed the need for a system-wide and region-wide programme of evaluation and accreditation for imaging services. Following presentations from the ISAS Project Officer and due consideration of the challenges of undertaking this rigorous process, the MRCN, on behalf of its members has indicated:

- The role of imaging is fundamental to the delivery of high quality, accessible and safe services for patients and staff. ISAS accreditation is considered a key and fundamental priority for future development of imaging services in Northern Ireland.
- Each HSC Trust has confirmed that they are interested in and willing to undergo ISAS accreditation and have the support of their Senior Management Team
- That NI should pursue ISAS accreditation as a region as there is clear merit in shared learning and increased potential to deliver NI-wide improvements
- The MRCN is well-placed to act as a conduit and focal point for the co-ordination of learning throughout the pathway to accreditation and there are a number of benefits to this. There would be more efficient cascading of learning and opportunity to agree regional consensus as part of the process, but also the potential to reduce the timeframe and therefore associated costs as the programme progresses
- Dedicated and recurrent funding is essential for Trusts to enable both the time and resource required to achieve and maintain ISAS accreditation status

10.19 The MRCN believes that ISAS would be a valuable tool to support its regional work, particularly as imaging services strive to develop cross-organisational working to enhance efficiency whilst maintaining the focus on quality and continuous improvement.

Northern Ireland

- 10.20 At referenced in paragraph 3.5, none of the five Trust's imaging services has been accredited by ISAS. Services such as laboratory and pathology which have undergone similar accreditation processes have demonstrated clear improvement in service provision, reduced risk, enhanced patient safety and enhanced governance arrangements as a result of undergoing accreditation. There is a clear need for similar independent accreditation of imaging services.
- 10.21 Key regional strategies, such as *Transforming Your Care*, highlight the importance of collaboration and of setting aside local interests to achieve better quality services across Northern Ireland.
- 10.22 The RQIA investigation focused on the arrangements for plain film x-ray only and whilst there are governance arrangements in place to monitor achievement of its recommendations, there has been no other formal or independent review of the extensive range of the other imaging modalities.
- 10.23 The four quality domains contained within the ISAS standard relate directly to the current Ministerial priorities, values and plans; for example:
- The **patient experience domain** covers the core values that support good governance across the HSC system in Northern Ireland, most specifically putting quality and safety above all else, providing high value evidence based care for patients at all times. ISAS ensures that service delivery is patient focused and respectful of individuals and their specific requirements.
 - The Ministerial priorities of quality improvement and quality assurance are addressed in the **facilities, resources and workforce domain**, where ISAS ensure that adequate resources are provided and used effectively to offer a safe, efficient, comfortable and accessible service.
 - In the **safety domain**, ISAS ensures that services provide the highest level of safety for patients, staff and others who come into contact with the service.
 - The **clinical domain** promotes the imaging service's role in rapid and accurate diagnosis and treatment. This aligns with the current health outcomes driven delivery plans such as those for cancer care, cardiac care and stroke care, where accurate diagnostics and early detection is essential.
- 10.24 The need for accreditation is visible when imaging related SAIs are considered.
- 10.25 Accreditation for imaging services directly complements the **Quality 2020 strategy**, which the Minister for Health has backed to improve health services in Northern Ireland. Quality 2020 aims to improve safety and effectiveness of services and make health and social care more patient-centred. A central theme is to ensure the patient receives the right care, at

the right time, in the right place with the best outcome. Among its fourteen key tasks is reducing variation across the system. This recognises not only the risks caused by uncontrolled variation in process and practice and the benefits to be gained by reducing unwarranted variation and focussing on consistent achievement of high standards.

- 10.26 ISAS represents a rounded response to the expectations for the delivery of safe and patient-centred imaging services on an ongoing basis. Most significantly, ISAS puts patients first within a developmental accreditation scheme based on an integrated hierarchy of standards of service, which are formulated and reviewed by the professional bodies, and independently and rigorously checked for quality and outcomes.

Resource Requirements

- 10.27 The resource requirements for ISAS Accreditation in Northern Ireland comprise of two elements:

- Non-Recurrent
 - Traffic Light Ready Diagnostic Tool (refundable when application for accreditation is made)
 - Fees per Trust per annum to undergo and achieve accreditation
 - 2 x Consultant PAs per Trust per annum during Pathway to Accreditation
- Recurrent
 - Dedicated Project Manager.
 - MRCN consensus is that dedicated and recurrently funded project management support is necessary to undertake the portfolio of work associated with accreditation. This commences with the preparation phase, application and award of accreditation and annual maintenance of accredited status.
 - It is the MRCN's view that an experienced Band 7 Radiographer would be best placed to undertake this role, in light of their knowledge of the service and their ability to engage with and influence staff at all levels.

- 10.28 Timescales

- Preparation
 - Traffic Light Ready (TLR). It should take approximately 6mths (no longer than 12) to complete this preparation phase.
 - Ideally, an organisation should be Amber or Green to complete within the usual timescales. An organisation with a TLR of red would either require significant ground work to be undertaken before application, or a lengthy time to achieve accreditation.
- Application for Accreditation
- Contract with UKAS
- Pathway to Accreditation is estimated to be in the region of 1-2 years per Trust depending on size / readiness etc.

10.29 A detailed template has been completed by each Trust and forwarded to ISAS who have agreed to provide indicative costs for Northern Ireland to undergo accreditation as a region. However, whilst there is widespread agreement in principle to the need for accreditation, the HSC is not able to offer assurance of funding in the absence of confirmation by DHSSPS of a central allocation.

In order to progress this further, the Radiology Workstream of the Imaging Review would ask that the DHSSPS considers an early recommendation for the introduction and funding of ISAS accreditation in Northern Ireland.

11.0 Regional Medical Physics Services support for HSC Imaging Services

Introduction

11.1 The Regional Medical Physics Service (RMPS) provides scientific and technical support services for medical imaging services across the HSC Trusts. These services include:

- Medical Physics Expert in Diagnostic Radiology and Nuclear Medicine to ensure the optimisation and safety of patient exposures
- Scientific and safety advice for the range of imaging modalities
- Radiation Protection services to assist HSC organisations to meet statutory requirements related to the use of ionising radiations
- Quality assurance services across all imaging modalities
- Management of the Cyclotron and Regional Radiopharmacy facility used for the production of radiopharmaceuticals for Nuclear Medicine departments across N Ireland

11.2 The requirement for many of the services provided is set out in statutory legislation [1-6] and guidance [7-10] and Trusts are subject to inspection by relevant enforcing bodies HSE(NI), RQIA, NIEA and MHRA. The extent and resource required to deliver these services is heavily dependent upon a number of factors including

- The size and complexity of the installed user equipment base
- The complexity of diagnostic procedures delivered using the associated equipment and
- The encompassing legislative requirements

Developments in Imaging equipment and Services in HSC Trusts and impact on RMPS

11.3 On-going technological developments in imaging have resulted in an increasing use of imaging equipment in the clinical arena and the development of new imaging techniques. Over the last 14 years the amount of imaging equipment in use in the HSC Trusts has increased significantly. This has been particularly evident in areas such as CT, digital X-ray imaging and MRI as illustrated in Table 4 below.

Table 4: Trends in Medical Imaging Equipment in HSC Trusts

Equipment	2000	2006	2008	2010	2011	2013/14
CR/DR	4	41	72	99	108	178
CT	12	24	28	28	30	37
Image Intensifiers	N/A	N/A	N/A	95	96	98
MRI	2	9	11	11	11	13
Mammography (digital)	16	18	19 (2)	19 (3)	19 (5)	19 (5)
Dental (digital)	N/A	N/A	N/A	N/A	137 (56)	137 (90)
X-ray tube	N/A	N/A	N/A	N/A	235	232
Gamma Camera (SPECT)						

11.4 Key points indicated in table 1 include

- The computed radiography/digital radiography and MRI equipment base has increased from a negligible level in 2000 to being in widespread use across HSC in N Ireland
- The number of CT systems has increased by a factor of > 2
- The use of digital imaging has increased substantially and will eventually encompass all modalities including mammography and dental.

11.5 As well as an increase in the imaging equipment base, technological developments in imaging have resulted in the increased complexity and capability of the systems deployed. An example of this is the increase in complexity is CT scanners. In 2000 all CT scanners were single slice, in 2011 most scanners (28 out of 30) are multi-slice with the most prevalent being 64 slice. Also, most of these systems employ advanced features to allow the control and optimisation of exposures such as some form of automatic exposure control for image acquisition and iterative image reconstruction techniques. The expanded features of these systems make the quality control and optimisation of these systems much more complex, time consuming and resource intensive than for previous generations of CT scanners.

11.6 The increase in the number of imaging facilities using ionising radiation has also had an impact on the demands for Radiation Protection services. Also recent changes in legislation associated with the requirement for Radioactive Waste Advisers has required the resources to develop staff to provide this role.

11.7 Although the quality assurance of imaging equipment using ionising radiation is a statutory requirement there is no similar legal requirement applying to non-ionising radiation imaging equipment such as Ultrasound and MRI. However to ensure safety, quality and effectiveness of these techniques an effective governance process is essential. As part of an

effective governance system professional and other interested scientific bodies recommend the implementation of quality assurance programmes and the availability of scientific advice relating to the safe use of this type of equipment [11-14].

RMPS Workforce Plan

- 11.8 Medical Physics staff fall into two main professional categories, namely Clinical Scientists and Clinical Technologists. Clinical Scientists enter a graduate training programme. Modernising Scientific Careers (MSC) has recently introduced a 3 year Scientist Training Programme (STP). Following completion of training Clinical Scientists are state registered with the Health and Care Professions Council (HCPC) and undertake a combination of routine and development work and gain experience and further training leading onto professional independent roles in specialised areas of Medical Physics such as Medical Physics Expert (MPE), Radiation Protection Advisor (RPA).
- 11.9 Clinical Technologists usually enter as graduates and undertake specialised training. Under MSC a training programme for Clinical Technologists similar in structure to the STP is being introduced. Clinical Technologists undertake routine protocol driven work or a combination of routine and more specialist duties
- 11.10 During 2011/12 the Regional Medical Physics Service developed a Workforce Plan the objectives of which was
- to ensure the continuity and future delivery of Medical Physics services to HSC bodies
 - to ensure a suitably trained and qualified workforce is enabled to exploit and respond to changes in medical technology for the benefit of the population of N. Ireland
 - to ensure the optimum number and skill mix of staff to meet the challenges and deliver medical physics services.
- 11.11 This work identified an increasing gap between the staff resource available to the RMPS and that required to provide and develop the service to meet the increasing demand for imaging services. It was projected that the equipment base and the demand for services would continue to grow throughout and beyond the timeframe covered by the Workforce Plan (2011-16). An action from this Workforce Plan was to identify, in conjunction with stakeholders, resources to meet the increasing demands on the Service. With the support of the HSC Trusts the Regional Medical Physics Service during 2012 submitted Investment Protocol Templates (IPT) to the Health and Social Care Board outlining resources required to address the shortfall and planning for future increasing demand. This was updated with the submission of a Revenue Business Case during 2014.
- 11.12 At present the RMPS is only funded to provide a scientific and quality assurance programme to ultrasound imaging units used in the Breast Screening Programme [15] in Northern Ireland. This only covers a small fraction (8 out of approximately 350 units) of the ultrasound imaging units in the HSC Trusts. Following on from requests for support from HSC Trusts the Workforce Plan also identified the need to develop a scientific support and quality assurance service for all HSC Ultrasound imaging systems. A case for this new service was developed and submitted as an IPT to the HSC Board in 2012.

11.13 At present most of the Medical Physics services provided to Imaging Services are commissioned by Service Level Agreements with the HSC Trusts. Service developments and changes in demand should be included within business cases for recurrent capital investment, although this is not always the case.

References

1. Ionising Radiations Regulations (NI) 2000.
2. Ionising Radiation (Medical Exposure) Regulations (NI) 2000 (and 2010 amendment)
3. Radioactive Substances Act 1993
4. Medicines (Administration of Radioactive Substances) Regulations 1978 (and 1995 amendment)
5. Approved Code of Practice - The Ionising Radiations Regulations (Northern Ireland) 2000
6. HSE guidance note PM77. Fitness of equipment used for medical exposure to ionising radiation (2nd Edition 1998)
7. Safety guidelines for Magnetic Resonance Imaging Equipment in Clinical Use DB2007(03). MHRA 2007.
8. Medical and Dental Guidance Notes – IPEM 2002
9. Recommended Standards for the Routine Performance Testing of Diagnostic X-ray Imaging Systems – IPEM Report 91
10. Consolidated Guidance on standards for the NHS Breast Screening Programme. NHSBSP Publication 60 (2005)
11. Quality Control in Magnetic Resonance Imaging IPEM report No 80 (1998)
12. Quality Assurance of Ultrasound Imaging systems. IPEM 2010, IPEM Report 102.
13. Standards for Ultrasound Equipment, RCR 2005, RCR Ref No BFCR(05)1
14. Guidelines for professional working standards: Ultrasound practice, UK Association of Sonographers 2008
15. Guidance notes for the acquisition and testing of ultrasound scanners for use in the NHS Breast Screening Programme. NHSBSP 70 2011

Appendix 1

DHSSPS Review of Imaging Services

Revised Project Brief April 2014,

incorporating Terms of Reference

REVIEW OF IMAGING SERVICES IN NORTHERN IRELAND

Project Brief

1. This paper provides an introduction to the Review of HSC Imaging Services in Northern Ireland. It sets out the key areas to be considered within the scope of the review, how the project will be structured and the membership of the project board. The key next actions are also considered.
2. It is important to state at the outset that the Department is aware of substantive work which has, or is being, undertaken in relation to service development, workforce planning, and the underpinning capital and ICT infrastructure in imaging services. A key plank of our approach is that this work should inform the review and it is not intended that it be duplicated.

Background

3. In the second half of 2012 the Minister approved the establishment of a review of imaging services with associated Terms of Reference. In June 2013 the Department undertook a scoping exercise with colleagues across the HSC to determine how best the review might be progressed following its initial delay. This included a consideration of the scope and extent of services to be reviewed.
4. The scoping exercise identified a range of issues which necessitated amendments to the original ToR. These included developments in local commissioning and service configuration in response to the RQIA reports on plain x-rays, (such as the establishment of the Managed Clinical Radiology Network) recognition of developing policy in other UK jurisdictions, particularly in Wales and England. It was also recognised that the imaging review, needed to be strategically

considered alongside the evolving policy, financial and strategic position in the HSC.

5. The review will be informed, for example, by the planned medical workforce review, the Strategic Asset Management of Medical Devices policy, and strategic capital investment priorities including in Hub and Spoke models. It will both influence and be influenced by the wider TYC and Connected Health agenda e.g. direct GP access/community based imaging, etc. It will also provide us an opportunity to plan for future demands for diagnostic imaging to facilitate patient throughput. Horizon scanning can also help us anticipate any service shift or increased demand.
6. Following this scoping exercise the main thrust of our revised approach is to extend the strategic framework to a 10 year basis, make explicit that the spectrum of imaging services will be considered, that horizon scanning will be a key component to this as well as to ensure that the review explicitly links with core strategic developments. This will be in addition to considering the RQIA reports/local and national best practice etc.
7. Revised Terms of Reference have been developed and are attached at **Annex 1**. These ToR were formally adopted by the Project Board of the Review and approved by the Minister in early April 2014.

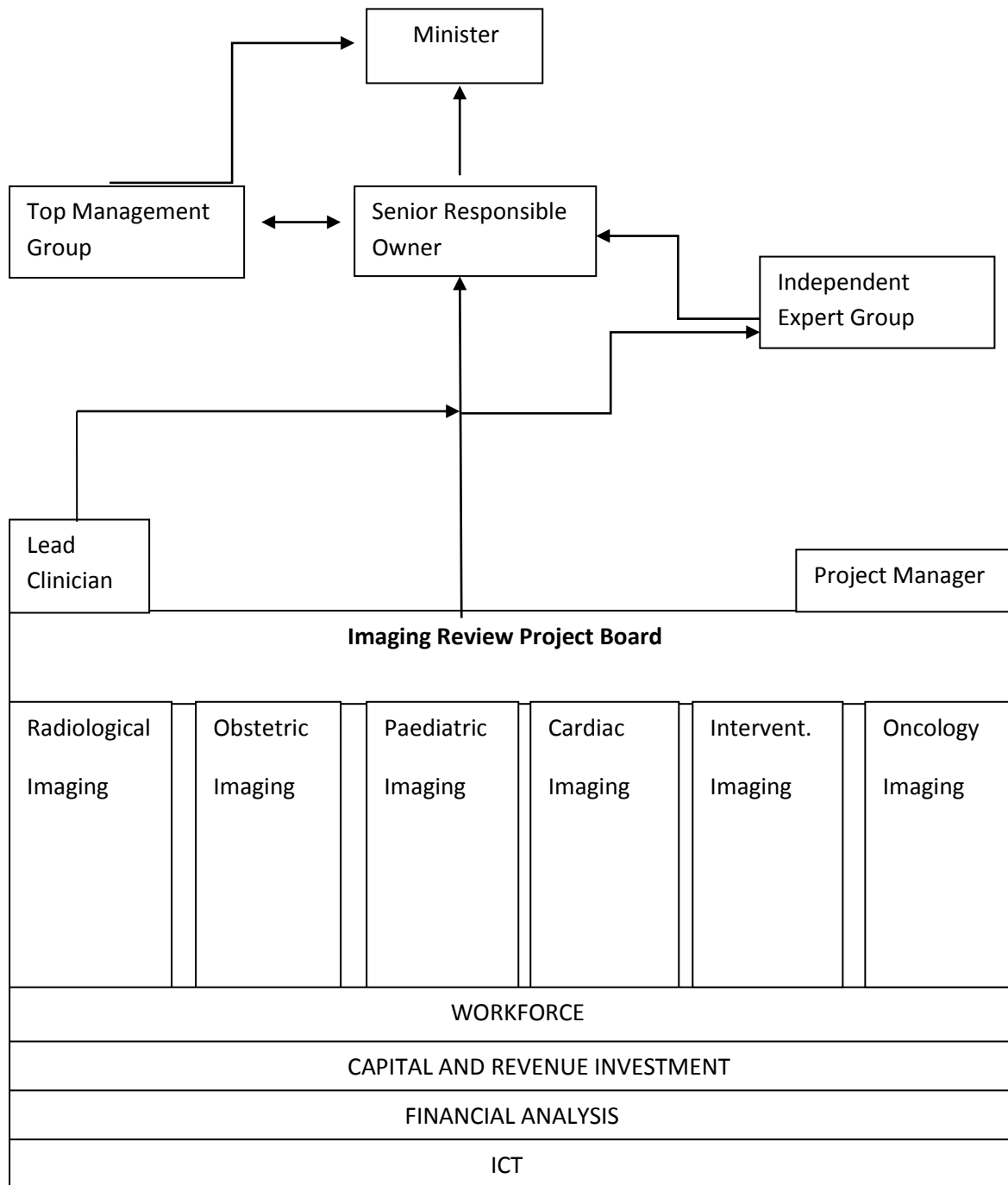
Governance, Workstreams and Membership of the Imaging Review

8. The review will follow a commensurately adapted PRINCE model of project governance. A Project Board has been established, chaired by Catherine Daly as SRO, with representation from commissioners, providers, professional experts, academics and officials. A 'lead clinician' Dr John Lawson has been appointed to ensure that the review benefits from expert clinical and professional advice in determining recommendations for the Minister. Jackie Johnson will be Project Director and the project management, administration and finance will be managed

within SCD with Sean Ferrin as Project Manager. A full membership of the Project Board is included at **Annex 2**.

9. In addition to the Project Board structure the review will establish workstreams to take forward the substantive work in each of the core areas. Further details of these are provided later.
10. The review will also benefit significantly from both patient input as well as the advice of an expert independent advisory body. In the latter case we have secured the agreement of the President of the Society and College of Radiographers, the Vice-President of the Royal College of Radiologists and other leading clinicians from Wales and Northern Ireland to participate in a 'virtual' independent expert advisory group. We are currently finalising patient/public involvement.

Project Management Structure of the Imaging Review



Workstreams of the Review

11. As illustrated diagrammatically above, the review will have a series of vertical workstreams which equate to specific services and specialties. Each of those will be led by an expert clinician(s) from the HSC. The horizontal workstreams are those which cross-cut and support the work and recommendations of the review and will be applicable to all of the workstreams. It is anticipated that these will be led by the Department. The service workstreams are:

Radiological Imaging

This will include consideration of the service/workforce configuration etc across multiple modalities such as Plain x-ray, CT, MRI, PET, Fluoroscopy, mammography, Ultrasonography etc. The workstream is co-led by Dr Ronan McNally, SE Trust and Jeanette Robinson, SHSCT.

Cardiac Imaging

This will include consideration of the service/workforce configuration etc across multiple modalities such as Coronary Catheterisation, Echocardiography, PET CT/MRI and Intravascular Ultrasound etc. The workstream is led by Dr Mark Harbinson, BHSCT/QUB

Interventional Radiology

This will include consideration of the service/workforce configuration etc across multiple IR modalities such as CT, MRI, PET etc. The workstream will be led by Dr Anton Collins, BHSCT.

Paediatric Imaging

This will include consideration of the service/workforce configuration etc across all the relevant modalities above. The workstream will be led by Dr Annie Patterson, BHSCT.

Oncology Imaging

This will include consideration of the service/workforce configuration etc across relevant modalities. The workstream will be led by Dr Seamus McAleer.

Obstetric Imaging

This will include consideration of the service/workforce configuration etc. The primary modality will be ultrasonography. The workstream lead has yet to be agreed.

NEXT STEPS

12. At the last meeting of the Project Board it was agreed that the key next steps for the review were to quickly populate each of the workstreams and for these groups to meet and agree draft Terms of Reference. Workstream leads were asked to ensure that the membership of each of the workstreams was representative of the requisite skills and interests, professions and of Trusts across the region.
13. The next meeting of the Project Board has been scheduled for late May and will consider and approve the draft ToR/membership of each of the workstreams.

Four Paper approach

14. Going forward each of the workstream groups will be tasked to prepare four papers for consideration by the Project Board. These papers will form the basis of the reviews findings and recommendations. They will be:
 - **current service:** where we are – report/analysis of the current service configuration, demand/capacity, capital resource, workforce etc.
 - **optimal service:** where we would like to be - paper outlining what an optimised service would look like, including taking account of regional approach, professional role expansion etc
 - **gap analysis;** what we need to get us there

- **blue sky/horizon planning;** future proofing and strategic planning

Policy Framework

15. The final output of the review will be a suite of policy documents which will be taken forward within an implementation framework. The scope is too large for a single report to be practical or helpful.
16. The Department will also work closely with the HSC to ensure that where an early consensus is reached and early action may be taken within the commissioning cycle that this is actioned. It is important that any work does not stop pending outcomes of the review.

Annex 1

Terms of Reference for the Imaging Review

Objectives/Terms of reference

- To evaluate and make recommendations on the configuration of imaging services over next 10 years; taking account of advancements in technology, demographics and demand, and developments in clinical and professional practice and national and international best practice.
- To make recommendations to ensure that patients receive timely radiological investigation with prompt reporting to enable accurate diagnosis and treatment.
- To make recommendations to decrease inappropriate patient investigations thereby reducing unnecessary exposure to radiation.
- To make recommendations regarding the workforce needs of future service models having regard to:
 - extant professional, clinical and Departmental guidance;
 - clinical roles and limits of professional competence;
 - building effective working relationships between imaging services and the wider clinical community;
 - ensuring region wide service resilience with appropriate escalation arrangements.
- To make recommendations regarding the most efficient and effective use of available resources.

- To consider the potential for joint initiatives nationally and internationally including on a cross-border basis.
- To make recommendations regarding the necessary investment in imaging technologies to meet service configuration including:
 - the replacement of existing imaging technologies and the introduction of new technologies;
 - the Information and Communication technology platform underpinning imaging services (PACS and other storage systems)
- Ensure services are underpinned by effective governance and quality assurance mechanisms, with particular reference to tele-radiology, and reporting in the independent sector.
- To consider the role of imaging services in support of clinical research

Annex 2: Membership of the Imaging Review Project Board

Senior Responsible Officer (SRO) – Catherine Daly

HSC representation

- **Lead Clinician** - Dr John Lawson
- **Royal College of Radiologists** - Dr Ronan McNally
- **Cardiac Imaging** – Dr Mark Harbinson (BHSCT and QUB)/cardiology network
- **Interventional Radiology** – Dr Anton Collins
- **Radiography** – Jeannette Robinson, Head of Diagnostics in SEHSCT and representative of radiography
- **RQIA** – Hall Graham re: regulation of Ionising Radiation arising from medical treatment **IR(ME)R**
- **NIMDTA** – Dr Anton Collins, NIMDTA Deputy Head of School and Consultant Radiologist
- **Regional Medical Physics** – Dr Adam Workman, Head of Radiological Sciences and Imaging
- **HSCB** – Integrated Care will be represented by Dr Margaret O'Brien.
- Beth Malloy will represent Commissioning Directorate.
- **PHA** – Dr Muhammad Sartaj – Public Health Medicine
- Jackie McGeagh
- **Oncology** – Dr Seamus McAleer
- **Paediatric** – Dr Annie Patterson
- **ICT Programme Board** – Brian McKeown

DHSSPS representation

- **HEIG** – Michael McGinley will represent Investment Directorate
- Brian Godfrey will represent Estates in terms of the **SAMMD** policy – Strategic Asset Management of Medical Devices.
- **CMO Group** – Dr Martin Donnelly will represent CMO group
- **Nursing Group** – Jemima Keyes, Nursing Officer

- **AHP** – Hazel Winning will represent allied health professions
- **Workforce Planning** –Paula Smyth will represent HRD
- **Secondary Care** – Jackie Johnston will act as Project Director and Sean Ferrin will act as Project Manager
- **IAD** – Jennifer McCrea

Patient representation

To be determined

Appendix 2

Membership of Radiology

Workstream of DHSSPS Imaging

Review

NAME	JOB TITLE	AREA / BASE
Dr Ronan McNally	Consultant Radiologist Joint Lead Radiology Workstream	SEHSCT
Mrs Jeanette Robinson	Radiology Services Manager Joint Lead Radiology Workstream	SHSCT
Dr Peter Flynn	Clinical Director and Consultant Neuroradiologist	BHSCT
Dr Martin Donnelly	Representing Chief Medical Officer	DHSSPS
Mr David Wallace	Radiology Services Manager	NHSCT
Mrs Maria Wright	Service Improvement Programme Manager / MRCN Network Manager	HSCB
Mr Dan McLaughlin	Radiology Services Manager	WHsCT
Dr Niall McKenzie	Consultant Radiologist	WHsCT
Dr Hall Graham	Head of IR(ME)R RQIA	RQIA
Dr Adam Workman	Head of Radiological Sciences and Imaging, Regional Medical Physics Service.	BHSCT
Dr John Lawson	Consultant Radiologist and Clinical Lead of DHSSPS Imaging Review	BHSCT
Mrs Nicky Harvey	Regional NIPACS Service Manager	BSO IT
Dr Muhammad Sartaj	Consultant Public Health Medicine	PHA
Dr James Clarke	Consultant Radiologist Nuclear Medicine / PET	BHSCT
Eddie Gibson	NI Breast QA Lead	NHSCT
Dr Anton Collins	Consultant Radiologist – ad hoc member to inform on training and manpower issues	BHSCT

Appendix 3

Radiology Workstream Terms of Reference

DHSSPS Review of Imaging Services

Maria Wright
HSC



OBJECTIVES & TERMS

- To evaluate and make recommendations on the configuration of imaging services over the next 10 years; taking account of advancements in technology, demographics and demand, and developments in clinical and professional practice and national and international best practice.
- To make recommendations to ensure that patients receive timely radiological investigation with prompt reporting to enable accurate diagnosis and treatment.
- To make recommendations to decrease inappropriate patient investigations thereby reducing unnecessary exposure to radiation.
- To make recommendations regarding the workforce needs of future service models having regard to:
 - extant professional, clinical and Departmental guidance;
 - clinical roles and limits of professional competence;
 - building effective working relationships between imaging services and the wider clinical community;
 - ensuring region wide service resilience with appropriate escalation arrangements.
- To make recommendations regarding the most efficient and effective use of available resources.
- Agree a strategic approach to the replacement of existing imaging technologies/equipment and the introduction of new technologies.
- Ensure services are underpinned by effective governance and quality assurance mechanisms, with particular reference to teleradiology, and in the independent sector.

FOUR PAPER APPROACH

1. **Current service:** *where we are* – report/analysis of the current service configuration, demand/capacity, capital resource, workforce etc.

2. **Optimal service:** *where we would like to be* - paper outlining what an optimised service would look like, including taking account of regional approach, professional role expansion etc.
3. **Gap analysis:** *what we need to get us there.*
4. **Blue sky/horizon planning:** future proofing and strategic planning.

RADIOLOGY WORKSTREAM - AREAS OF INTEREST

Included:

- Terms of reference as detailed above for Trust based medical imaging on adults including:
 - X-ray
 - Fluoroscopy
 - CT
 - MRI
 - Ultrasound
 - Nuclear Medicine
 - PET
 - Oral and maxillo-facial imaging
 - DEXA (*to be discussed*)
 - Breast Imaging (*to be discussed*)
- Terms of reference as detailed above for Northern Ireland NHS contracted Independent Sector imaging.
- Interaction with ICT to include use of PACS and ECR

Excluded:

- Terms of reference as detailed above for paediatric imaging including:
 - Interventional radiology
 - Obstetric imaging
 - Cardiac imaging
 - Non-NHS imaging,
 - General Dental Practice imaging,
 - Non radiology based physiological testing (respiratory function, neurophysiology etc.)
- It is recognised that for operational reasons there will be significant areas of overlap between the workstreams and these will be discussed within and outside of the Project Board

The Radiology Workstream will assess the following areas:

Current Service
What is the total demand at point of request per modality by modality?
What is the commissioned capacity and how does this compare to actual productivity?
Is commissioned capacity/baseline realistic?
Is the current method of commissioning fit for purpose?
Should tariff / or cost & volume based methods be considered?
What is the current level of internal WLI activity?
What is the current level of external WLI activity?
How many radiographer vacancies do we have?
Do we have specialist radiographer vacancies?

Reporting
Are all the examinations that need to be reported being reported?
Are we reporting examinations that do not require a report?

Who is reporting?
How many radiologist vacancies are there?
If vacancies exist, where are they?
What is the present use of radiographer reporting in NI?
Can someone else report without impact in quality and safety?
What is the role of external reporting services?
How do we quality assure trust and external reporting?
How are trusts dealing with sub-specialist radiology?
Are support specialist networks in place?

Growth
What is the rate of growth for each modality?
Why is it growth continuing?
Are there examples of referral control through education of referrers?
Are we performing too many examinations and can it be controlled?
Are we not performing enough examinations or not performing them quickly enough?
Are targets being met? If not, why not and does it matter regarding outcome?
If targets are not being met, which ones are consistently missed?
Are the time based targets correct and do they reflect what a quality service would deliver?
What will be the level of demand in 2 years, 5 years and 10 years?

Unplanned Care
How does radiology support unplanned care?

Timeliness of emergency work, urgent work, bed clearing work

Do we need to better and can we do better?

Out of hours provision / emergency work

Is a full service available or are there gaps which have consequences for patient safety?

Are external services being used for OOH reporting?

Intervention and specialist areas OOH

What examples of extended day and weekend working are in place?

Governance

What processes of governance are in place in the NHS trusts?

What audits are being performed?

Is there a need for planned audit across the region?

Are there processes of peer review in place?

Are all radiographers and radiologists being appraised satisfactorily?

Is there sharing of learning between trusts?

Are we sure we have safe systems and processes?

ICT

How are we using PACS? Locally, across trusts and regionally?

Is PACS working optimally? What are the frustrations and opportunities for improvement?

Are there issues specific to having different PACS systems?

Are there examples of cross trust co-operation?

Results acknowledgement processes and integration with NIECR

Future of the ECR within the region

Transforming Your Care

What has changed to accommodate TYC?

What has been the impact of TYC?

Present level of direct access for GP?

RQIA

Have RQIA recommendations been satisfied?

What remains to be done?

Miscellaneous

Radiographer training

Radiologist training

Job Planning - MDT Recognition

Dental Imaging

Cross border work

2. Optimal Service - to follow

3. Gap Analysis - to follow

4. Blue Sky Thinking - to follow

MEMBERSHIP OF RADIOLOGY WORKSTREAM

Ronan McNally- Consultant Radiologist, SEHSCT (Co-Chairperson)

Jeanette Robinson, Head of Diagnostics, SHSCT (Co-Chairperson)

Maria Wright – PMSID

Martin Donnelly – for CMO

Peter Flynn, Clinical Director and Consultant Radiologist Belfast Trust

David Wallace, Radiology Services Manager, Northern Trust /

Danny McLaughlin, Radiology Services Manager, Western Trust

Hall Graham, RQIA

Niall MacKenzie, Consultant Radiologist, Western Trust

Adam Workman, Medical Physics

Nicky Harvey, NIPACS

John Lawson, Co-Chair of Radiology Review

Dr Muhammad Sartaj - PHA

GP/TYC representative

James Clarke Nuclear Med / PET

Eddie Gibson NI Breast QA Lead

Anton Collins – ad-hoc member to inform on training and manpower issues

- At least four members must be present for the meeting to proceed. If apologies have been sent, someone can be nominated to attend on behalf of the absentee.
- Internal or external persons may be invited to attend the meetings at the request of the Chairperson/s on behalf of the committee to provide advice and assistance where necessary.
- Decisions will be made by consensus or voting.

Appendix 4

Radiology Workstream Questionnaire

- Question 1:** Is the current method of commissioning fit for purpose?
- Question 2:** Should tariff / cost & volume based methods be considered?
- Question 3:** Are we reporting examinations that do not need a report?
- Question 4:** How do we quality-assure Trust and external reporting?
- Question 5:** How are Trusts dealing with sub-specialist radiology?
- Question 6:** Are support specialist networks in place?
- Question 7:** Can someone else report without impact in quality and safety?
- Question 8:** Why is growth continuing? Are there examples of referral control through education of referrers?
- Question 9:** Are we performing too many examinations and can it be controlled?
- Question 10:** Are we not performing enough examinations or not performing them quickly enough?
- Question 11:** Are the time-based targets correct and do they reflect what a quality service would deliver?
- Question 12:** What will be the level of demand in 2 years, 5 years and 10 years?
- Question 13:** Is there sharing of learning between Trusts?
- Question 14:** Are we sure we have safe systems and processes?
- Question 15:** Is there a need for planned audit across the region?
- Question 16:** How are we using PACS? Locally, across Trusts and regionally?
- Question 17:** Is PACS working optimally? What are the frustrations and opportunities for improvement?
- Question 18:** Are there specific issues to having different PACS systems?
- Question 19:** Are there examples of cross-Trust co-operation?
- Question 20:** What has changed to accommodate TYC?
- Question 21:** What has been the impact of TYC?
- Question 22:** What is the present level of direct access for GPs?
- Question 23:** Have RQIA recommendations been satisfied?
- Question 24:** What remains to be done?

Appendix 5

Membership of Modernising Radiology Clinical Network

MANAGING RADIOLOGY CLINICAL NETWORK MEMBERSHIP

NAME	TITLE	AREA / BASE
Mrs Beth Malloy	Assistant Director, Scheduled Services (Co-Chair)	HSCB
Mrs Maria Wright	Service Improvement Programme Manager (Co-Chair) Network Manager	HSCB
Dr Peter Flynn	Consultant Neuroradiologist / Clinical Director	BHSCT
Dr Myles Nelson	Consultant Radiologist / Clinical Director	NHSCT
Dr Barry Patterson	Consultant Radiologist / Clinical Director	NHSCT
Dr Peter Ball	Consultant Radiologist / Clinical Director	SEHSCT
Dr Stephen Hall	Consultant Radiologist / Clinical Director	SHSCT
Dr Allam Adas	Consultant Radiologist / Clinical Director (Northern)	WHST
Dr Padhraic Conneally	Consultant Radiologist / Clinical Director (Southern)	WHST
Mr Nigel Wethers	Radiology Services Manager	BHSCT
Mr David Wallace	Radiology Services Manager	NHSCT
Ms Edith Kennedy	Radiology Services Manager	SEHSCT
Ms Jeanette Crossey	Acting Radiology Services Manager	SEHSCT
Ms Jeanette Robinson	Radiology Services Manager	SHSCT
Mr Dan McLaughlin	Radiology Services Manager	WHST
Dr Muhammad Sartaj	Consultant, Public Health Medicine	PHA
Dr John Lawson	Consultant Radiologist / Clinical Lead DHSSPS Imaging Review	BHSCT
Dr Ronan McNally	Consultant Radiologist / Workstream Lead DHSSPS Imaging Review	SEHSCT
Dr Barbara Savage	Medical Advisor	Integrated Care
Mr Ronan Carroll	Assistant Director Acute Services, Cancer and Clinical Services/ ATICS	SHSCT

Ms Debbie Burns	Interim Director of Acute Services	SHSCT
Ms Jenny Keane	AHP Consultant	PHA
Nicky Harvey	NIPACS Regional Service Manager	BSO IT

Appendix 6

Provision of Breast Imaging Services in Northern Ireland

Scope structure and delivery of Breast Radiology in NI

Breast Radiology in NI can largely be described in 2 areas: screening and symptomatic.

Symptomatic:

All symptomatic patients referred to each trust attend a one-stop triple assessment (clinical/imaging/needle biopsy) clinic. These clinics are provided at Antrim Area Hospital, Altnagelvin, Belfast City Hospital, Craigavon Area Hospital and The Ulster Hospital. The imaging and vast majority of needle assessments are carried out by the Radiology Team in a MDT clinic setting which includes Breast Surgeons, Breast Clinicians, Nurses and Pathologists. The symptomatic service takes up most of the Radiology resources for Breast and it is from this group that most Breast Cancers are diagnosed.

Screening:

The NI Breast Screening Programme (BSP) invites approximately 75,000 women per year for screening with an uptake of approximately 73% (2011/12). There are 4 screening units in NI (Northern (based at Antrim Area Hospital, Eastern (based at Linen Hall Street), Southern (based at Craigavon Area Hospital) and Western (based at Altnagelvin)). Women will usually attend for screening mammography outside the hospital setting. Roughly 4% of women will be recalled for further assessment at an assessment clinic and approximately 1 in 10 of these women will be diagnosed with invasive breast cancer. 432 breast cancers were detected in 2011/12.

Antrim Area Hospital provides Higher Risk screening on a regional basis providing Breast MRI and digital mammography (commenced April 2013). There are approximately 500 'higher risk' women in NI who are invited for annual screening.

NICE clinical guideline 164 June 2013 recommended extending the use of Breast MRI to women of 'High' risk. These guidelines have not been adopted by the NIBSP which continues to only provide MRI to 'higher' risk women according to higher risk screening protocols. The addition of Breast MRI in the surveillance of high risk women is a challenging resource issue.

The NIBSP is quality assured through QARC (PHA).

Appendix 7

Location of Main Imaging Departments and

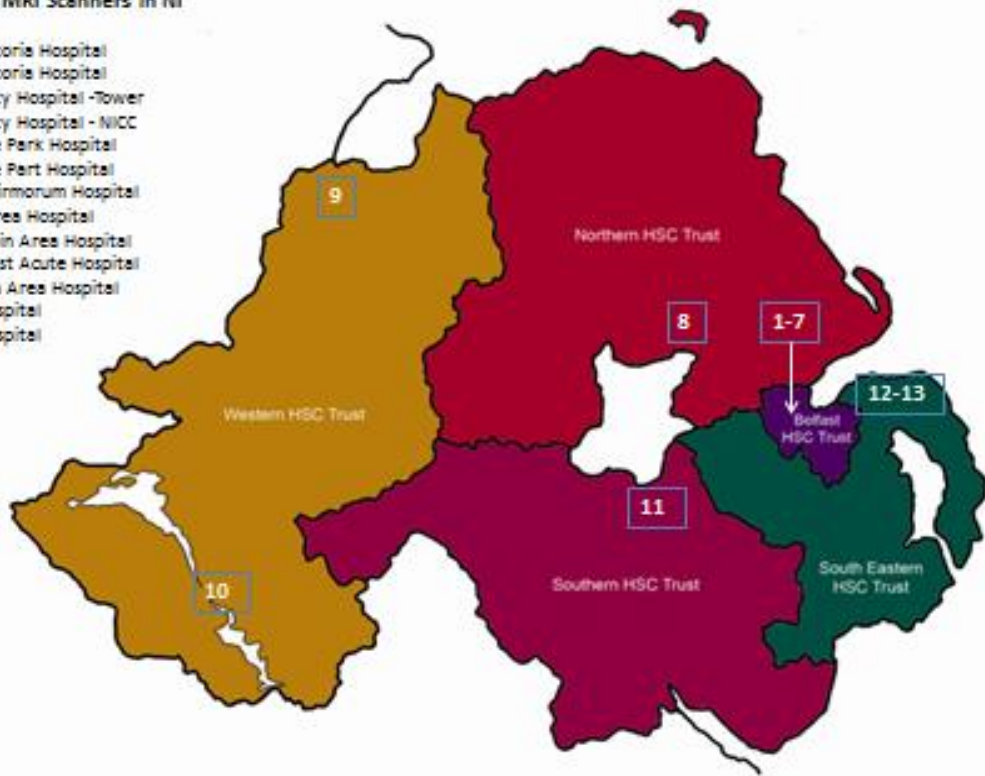
Number of Scanners in Key Imaging Modalities in Northern Ireland

Location of Main Imaging Departments, Number of Scanners and Key Imaging Localities in Northern Ireland
Position at June 2014

HSC Trust	Hospital	Location	MRI	CT	PET CT	Non-Obstetric Ultrasound	Radio Nuclide Imaging	Fluoroscopy	Plain Film X-Ray	Dexa
Belfast HSC Trust	Royal Victoria Hospital	Belfast	2	2	1	7	3	4	9	0
	Belfast City Hospital	Belfast	2	4	0	5	4	3	8	0
	Mater Infirmorum Hospital	Belfast	1	1	0	2	0	2	3	0
	Musgrave Park Hospital	Belfast	2	1	0	2	0	2	5	2
	Royal Belfast Hospital for Sick Children	Belfast	0	1	0	4	1	1	3	1
Northern HSC Trust	Antrim Area Hospital	Antrim	1	2	0	3	1	2	4	0
	Causeway Hospital	Coleraine	0	1	0	3	0	2	3	0
	Mid-Ulster Hospital	Magherafelt	0	1	0	2	0	0	2	0
	Whiteabbey Hospital	Newtownabbey	0	0	0	1	0	1	2	0
	Braid Valley Hospital	Ballymena	0	0	0	0	0	0	2	1
	Moyle Hospital	Larne	0	0	0	0	0	0	2	0
South Eastern HSC Trust	Ulster Hospital	Dundonald	2	2	0	8	0	2	6	0
	Lagan Valley Hospital	Lisburn	0	1	0	2	0	1	2	0
	Downe Hospital	Downpatrick	0	1	0	2	0	1	2	0
	Ards Hospital	Newtownards	0	0	0	0	0	0	2	0
	Bangor Hospital	Bangor	0	0	0	0	0	0	1	1
	HMP	Maghaberry	0	0	0	0	0	0	1	0
Southern HSC Trust	Craigavon Area Hospital	Portadown	1	1	0	4	2	2	6	0
	Daisy Hill Hospital	Newry	0	1	0	2	0	1	3	0
	South Tyrone Hospital	Dungannon	0	1	0	2	0	1	2	1
	Banbridge Polyclinic	Banbridge	0	0	0	0	0	0	1	0
	Portadown Care & Treatment Centre	Portadown	0	0	0	1	0	0	1	0
	Armagh Community Hospital	Armagh	0	0	0	1	0	1	1	0
	Lurgan Hospital	Lurgan	0	0	0	0	0	0	1	0
Western HSC Trust	Altnagelvin Area Hospital	Derry/Londonderry	1	2	0	6	2	2	5	1
	South West Acute Hospital	Enniskillen	1	1	0	4	0	1	3	1
	Tyrone County Hospital	Omagh	0	1	0	2	0	0	2	0
	Roe Valley Hospital	Derry/Londonderry	0	0	0	0	0	0	1	0
TOTAL			13	24	1	63	13	29	83	8
Notes:										
(1) A second MRI scanner is planned for June 2015 in Antrim and Craigavon Area Hospitals										
(2) A second CT is planned for June 2015 in Craigavon Area Hospital										
(3) RNI in RVH includes PET										
(4) RNI in BCH includes Cancer Centre										

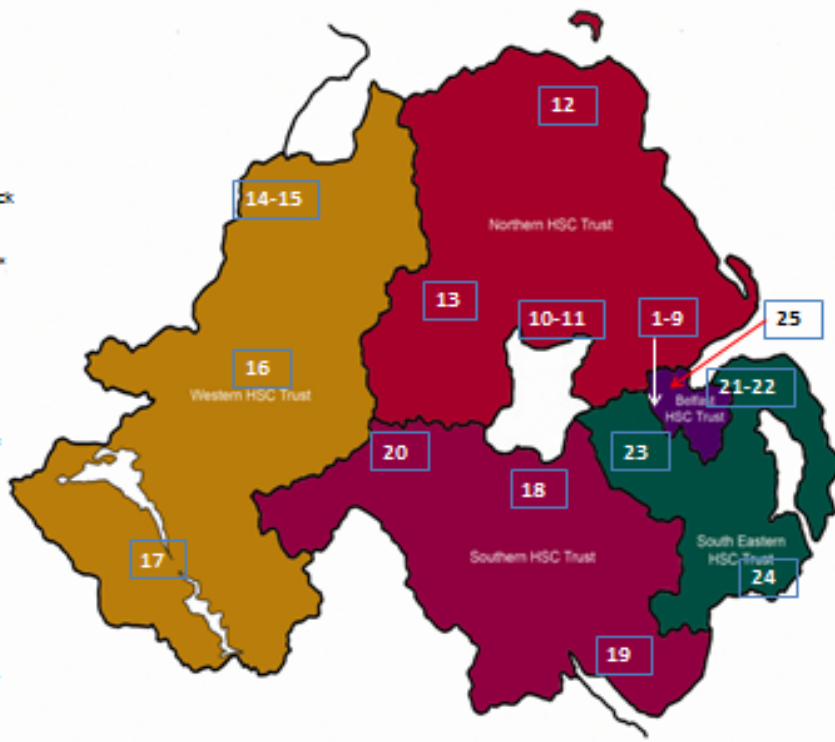
Location of MRI Scanners in NI

1. Royal Victoria Hospital
2. Royal Victoria Hospital
3. Belfast City Hospital -Tower
4. Belfast City Hospital - NICC
5. Musgrave Park Hospital
6. Musgrave Park Hospital
7. Mater Infirmorum Hospital
8. Antrim Area Hospital
9. Altnagelvin Area Hospital
10. South West Acute Hospital
11. Craigavon Area Hospital
12. Ulster Hospital
13. Ulster Hospital



Location CT Scanners in NI

1. Royal Victoria Hospital
2. Royal Victoria Hospital
3. Belfast City Hospital
4. Belfast City Hospital
5. Belfast City Hospital
6. Belfast City Hospital
7. Royal Belfast Hospital for Sick Children
8. Musgrave Park Hospital
9. Mater Infirmorum Hospital *
10. Antrim Area Hospital
11. Antrim Area Hospital
12. Causeway Hospital*
13. Mid-Ulster Hospital
14. Altnagelvin Area Hospital
15. Altnagelvin Area Hospital
16. Tyrone County Hospital
17. South West Acute Hospital*
18. Craigavon Area Hospital
19. Daisy Hill Hospital*
20. South Tyrone Hospital
21. Ulster Hospital
22. Ulster Hospital
23. Lagan Valley Hospital*
24. Downe Hospital*
- * Single scanner sites with ED



- Location of PET CT Scanner**
25. Royal Victoria Hospital

Appendix 8

Scanning Activity in Northern Ireland 2011/12 – 2013/14

	2011/12	2012/13	2013/14
MRI	Total	Total	Total
BHSCT	33,569	34,421	36,616
NHSCT	5,956	6,804	8,643
SEHSCT	6,815	8,439	10,254
SHSCT	8,752	10,301	11,301
WHSCT	8,456	10,245	11,356
REGION	63,548	70,210	78,170

	2011/12	2012/13	2013/14
Cardiac MRI	Total	Total	Total
BHSCT	1,080	1,355	1,699
NHSCT	-	-	-
SEHSCT	-	-	-
SHSCT	-	-	-
WHSCT	-	-	-
REGION	1,080	1,355	1,699

	2011/12	2012/13	2013/14
CT	Total	Total	Total
BHSCT	42,940	46,314	49,021
NHSCT	20,398	22,464	25,902
SEHSCT	17,741	19,344	20,158
SHSCT	17,616	20,595	23,367
WHSCT	18,342	20,900	22,756
REGION	117,037	129,617	141,204

	2011/12	2012/13	2013/14
Cardiac CT	Total	Total	Total
BHSCT (just nipacs)	-	2	2
NHSCT	-	195	90
SEHSCT	954	1,115	1,045
SHSCT	-	7	2
WHSCT	903	996	1,015
REGION	1,857	2,315	2,154

	2011/12	2012/13	2013/14
PET CT	Total	Total	Total
BHSCT	2,457	2,550	2,665
NHSCT	-	-	-
SEHSCT	-	-	-
SHSCT	-	-	-
WHSCT	-	-	-
REGION	2,457	2,550	2,665

	2011/12	2012/13	2013/14
Non-Obstetric Ultrasound	Total	Total	Total
BHSCT	37,931	38,525	40,605
NHSCT	37,175	37,413	42,314
SEHSCT	25,282	27,830	29,871
SHSCT	33,839	36,827	39,225
WHSCT	31,340	32,658	34,574
REGION	165,567	173,253	186,589
	2011/12	2012/13	2013/14
Plain Film X- Ray	Total	Total	Total
BHSCT	271,931	281,115	249,359
NHSCT	178,575	181,860	191,877
SEHSCT	176,343	183,643	186,055
SHSCT	169,473	174,937	183,924
WHSCT	155,681	160,848	164,847
REGION	952,003	982,403	976,062
	2011/12	2012/13	2013/14
Dexa Scanning	Total	Total	Total
BHSCT	7,412	7,814	7,104
NHSCT	-	6	1,120
SEHSCT	1,680	1,911	2,286
SHSCT	3,016	3,237	2,977
WHSCT	3,119	2,869	3,389
REGION	15,227	15,837	16,876
	2011/12	2012/13	2013/14
Radio Nuclide Imaging	Total	Total	Total
BHSCT	6,315	6,755	6,224
NHSCT	2,305	2,429	2,814
SEHSCT	-	-	1
SHSCT	2,463	2,256	2,340
WHSCT	1,682	1,783	1,683
REGION	12,765	13,223	13,062
	2011/12	2012/13	2013/14
Fluoroscopy	Total	Total	Total
BHSCT	9,853	9,001	9,192
NHSCT	2,280	2,319	2,345
SEHSCT	2,407	2,598	2,510
SHSCT	3,174	3,501	3,245
WHSCT	2,458	2,551	2,811
REGION	20,172	19,970	20,103

Appendix 9

Waits for Imaging Services in Northern Ireland at 30th June 2014

Imaging Waits @ 30th June 2014		
MRI	Total Number Waiting end June 14	Total Waiting >9 weeks end June 2014
BHSCT	2,100	689
NHSCT	2,035	680
SEHSCT	960	67
SHSCT	2,130	433
WHSCT	1,130	22
REGION	8,355	1,891
Cardiac MRI		
BHSCT	720	487
REGION	720	487
CT		
BHSCT	2,043	1,156
NHSCT	1,272	6
SEHSCT	552	2
SHSCT	1,170	154
WHSCT	764	27
REGION	5,801	1,345
PET CT		
BHSCT	99	-
REGION	99	-
Non-Obstetric Ultrasound		
BHSCT	4,451	1,211
NHSCT	5,154	965
SEHSCT	1,628	1
SHSCT	2,671	252
WHSCT	2,261	1
REGION	16,165	2,430
Plain Film X-Ray		
BHSCT	185	15
NHSCT	1,388	3
SEHSCT	340	1
SHSCT	558	6
WHSCT	298	-
REGION	2,769	25

Dexa Scanning		
BHSCT	569	15
NHSCT	228	-
SEHSCT	270	60
SHSCT	924	232
WHSCT	265	-
REGION	2,256	307
Radio-Nuclide Imaging		
BHSCT	215	14
NHSCT	72	-
SEHSCT	1	1
SHSCT	88	1
WHSCT	48	-
REGION	424	16
Fluoroscopy		
BHSCT	1,213	338
NHSCT	114	-
SEHSCT	145	7
SHSCT	260	8
WHSCT	82	-
REGION	1,814	353