DOH Review of Imaging Services

ICT Imaging Workstream

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1.0   Introduction

The key to the success of integrated health systems is achieving clinical integration. There is emerging evidence that delivering integrated health care systems improves outcomes for those who use Health and Social Care services and provides opportunities for financial savings.

Within Northern Ireland we have a regional RIS/PACS (NIPACS) covering 28 sites provided by Sectra UK Ltd. The remaining 2 sites are RVH provided by Philips Healthcare and BCH provided by GE Healthcare.

A Radiology Information Systems (RIS) is a computerised information system designed to manage the administrative functions of patient pathway in terms of demographics, procedures, appointments and other relevant patient information.

A Picture Archiving and Communication System (PACS) is a computerised system designed to manage medical images acquired as part of the examination process via digital modalities. The PACS provides the facility for the storage, distribution and electronic display of the acquired images to support clinical diagnostics, improve clinical pathway planning and enhance patient care.

Northern Ireland Picturing Archiving and Communication System (NIPACS) project was established by the DOH following a strategic review of Diagnostic Imaging services.

NIPACS contract was awarded to Sectra UK Ltd in 2008 for 10 years. All 5 Trusts encompassing 27 sites were deployed by December 2010 extending to 28 in 2014. The NIPACS post project evaluation in October 2012 stated that 'the projected linear financial savings associated with the deployment for the 10 year Term is estimated at £20,057,568'.[i]

NIPACS excluded the RVH and BCH sites due to local Private Finance Initiative (PFI) contracts with the exception of Breast Imaging within BCH which in 2014 became part of NIPACS. Current timeframes of all Northern Ireland RIS/PACS contracts are below:

        BCH (GE)   28th March 2003 – 28th December 2030
        RVH (Philips)   1st October 2006 – 30th September 2021
        NIPACS (Sectra)   30th September 2008 – 29th September 2022

The NIPACS, RVH and BCH systems provide a critical service within HSCNI to ensure images and reports are available at the point of need. Due to emerging technologies, there is no option to discontinue this service and return to the work processes of printing, transferring and storing hard copy film and manual transcription of radiology reports.

NIPACS revolutionised healthcare in Northern Ireland by providing radiologists and clinicians with a more ubiquitous patient examination history enabling access to images and reports from 28 sites within all 5 Trusts to be available where and when required improving patient

care and safety. It significantly improved Radiology efficiency reducing report turnaround times ensuring authorised reports were available much more quickly to clinicians.

NIPACS was the first regional system to break down organisational and Trust boundaries enabling cross site and cross Trust reporting.

NIPACS has recently agreed an extension to the current contract for an additional 4 years, until 2022. This is providing an enhanced service with a reduction in managed service costs of over £1 million for the four year period

2.0   Current Services

The introduction of NIECR in 2014 enabled radiology reports from all 3 systems to be available with a single log on. Implementation of NIECR Ordercomms has also been completed for NIPACS but this is still to be implemented to RVH and BCH.

An NIECR integration link is embedded within NIPACS with contextual linking to the patient to facilitate easier access to patient history for Radiologists vetting and reporting. There is also a contextual link within NIECR to view all NIPACS imaging via Sectra Liteview. Results Acknowledgement within NIECR is currently being piloted; this is imperative for patient safety and must be implemented regionally. While we continue to manage patient results on paper there is always the risk for loss or misplaced radiology reports to effect patient care.

Integration with imaging outside of radiology was integral to improving both patient care and user workflow. In 2014 NIPACS went live with integration with the National Breast Screening Service (NBSS) to facilitate the storage of all breast screening mammograms and assessment imaging from all sites within NIPACS including Belfast. NBSS reports are sent electronically to NIPACS for viewing alongside the imaging.

A number of successful pilots have been undertaken within Pathology and Medical Photography to demonstrate the benefits of storing imaging acquired outside of Radiology within the patient's NIPACS examination history.

The more ubiquitous examination history enables the sharing of cases with colleagues in real-time providing second opinions more speedily when diagnosing and staging cancers and has been shown to improve diagnosis, patient care and substantially reduce risks. Additional benefits include increase in productivity, education and training. Within Pathology, this is critical to the PATHNET NI Modernising HSC Pathology Services. The successful pilot identified that it greatly improved efficiency within MDT settings as these are often multi-modality and multi-site/Trust providing access to all images with a single log on to NIPACS.

These integrations have improved the patient pathway as it provides the full patient imaging history for Radiology, diagnostic and radiotherapy, Clinician and Pathologist i.e., screening, assessment, symptomatic, general radiology examinations and pathology.

Within the new Cancer Centre based in the Western Trust, Sectra have interfaced with Varian to integrate their Aria Oncology system to share images between the 2 systems as well as storing all of the Radiotherapy/Oncology images within the NIPACS archive to provide a full examination history. Discussion is ongoing with Agfa to facilitate sharing of images and reports between the Republic of Ireland and NIPACS through the Agfa Portal for those patients who are attending the Altnagelvin Cancer Centre from the Republic of Ireland.

NIPACS, RVH and BCH, are all connected to the Image Exchange Portal (IEP). As well as connecting Northern Ireland to many UK sites, this also facilitated image sharing in Northern Ireland between the three PACS vendors. It also provides the necessary links to the cross border patients in the Republic of Ireland in Letterkenny and Dublin.

To date two Independent Sector (IS) providers in Northern Ireland have integrated fully with NIPACS to facilitate these IS providers having access to a patient's imaging history. It also enables outsourced NHS patient's images and reports to be uploaded directly avoiding the necessity to import images and reports from CDs increasing the timeliness and efficiency of the service they provide and contribute to patient safety.

In relation to our outsourced reporting we have a HL7 integration to facilitate reports from both IS providers PACS to send directly to Sectra RIS reducing errors of cutting and pasting reports and thereby improving patient safety and efficiency.

A successful pilot was undertaken to provide a regional reporting network through NIPACS. This enabled Radiologists from all 5 HSC Trusts to access a Regional Reporting dynamic worklist within Sectra RIS containing examinations which met certain criteria from all 28 sites. The aim is to reduce dependency on the Independent Sector for additional reporting.

3.0 Optimal Services

The HSCNI needs to put in place a single regional NIPACS solution across all sites with sufficient integration with NIECR so that images and reports can be reviewed alongside all other patient information held within NIECR.

NIPACS should also be utilised to include the storage and distribution of all appropriate medical images in obstetrics, cardiology and other appropriate specialties.

3.1 Single RIS/PACS for Northern Ireland

Northern Ireland requires a single RIS/PACS & vendor neutral archive (VNA) to provide a shared database of examinations and information available for review with a unique patient identifier. This will provide the necessary functionality and opportunity to improve patient care and meet some of the needs of the Imaging Review recommendations whereby imaging studies are archived on an agreed NI wide PACS, providing province wide access to the images as stated in Radiology, Cardiology, Obstetrics, Paediatric streams etc.

3.1.1   Benefits of a Single RIS/PACS for Northern Ireland

Increased patient safety due to having a complete radiological history provides greater information at the point of need improving diagnosis and quality of care.   It eliminates the risk of clinicians referring for examinations already requested or performed which could cause an inappropriate radiation dose. Having all the information in the right place at the right time in one system produces a more effective and efficient MDT meeting.

There will be a **Reduction in Training Requirements** for all HSCNI users as they alternate between sites and Trusts within Northern Ireland. Users will also only require one log on.

Single Integrations as there will be a reduction in the resources and time taken to integrate with third party systems as this will only be required once e.g. NIECR, Data Warehouse and Image Exchange Portal

Enable the ability to **standardise Radiology Workflows and Processes** across Northern Ireland to improve efficiency and productivity.

Cross Site Reporting is required to facilitate the recommendation of a regional reporting network to be implemented for general, MRI and CT. It will also assist with alleviating the pressures of the radiology workforce and the implementation of specialist hub and spoke models.

Single solution for storage and distribution of all imaging outside Radiology e.g., Endoscopy, Dermatology, Medical Photography, Pathology and Primary Care to be available through NIECR and in time the Electronic Healthcare Record (EHCR) Encompass system enabling the "Once for Northern Ireland" strategic direction whereby users have a single point of access to view full patient history.

Centralised Appointing will improve efficiency and help to manage the discrepancies in waiting times between Trusts. This ideally would reside within a scheduling module within the Electronic Healthcare Record Encompass system coordinating all of a patient's HSCNI appointments, accessible via a patient portal.

Current **Independent Sector integration** would then include all imaging within RVH and BCH to create a complete patient history.

3.2   Proposed Interim Solutions

The re-procurement of NIPACS (by September 2022) to include RVH and BCH RIS/PACS will achieve the above benefits.   There is, however, an option within the current contracts to integrate the 3 RIS/PACS systems enabling sharing of images and reports until the re-procurement is realised. This is currently being evaluated and the planned outcome will be a business case submitted to the DOH for funding.

There is another option being investigated which is to store a copy of all future images and reports that will reside in RVH and BCH PACS within the current NIPACS archive. This will benefit Northern Ireland, due to the reduction of data migration costs, when the current NIPACS is being replaced in 2022. While data migration has improved significantly over time with faster and cheaper solutions, it remains one of the highest components of any imaging system replacement. Subject to investigations proving successful a business case will be submitted to progress this option.

3.3 Additional Imaging Review Recommendations

3.3.1 Dose Monitoring

Northern Ireland requires a regional electronic patient dose management system. The requirements are currently being specified and a business case will be progressed. Once this is implemented it will increase patient safety as equipment can be more closely monitored, radiation incidents investigated and problems resolved more quickly. It will enable Northern Ireland to meet the new Regional and National guidelines and will reduce the time taken to gather required information for both Trust and Medical Physics staff.

3.3.2 Standardised home based reporting to include workstations, networking and access

With the new regional re-procurement, home reporting access and diagnostic workstations must be standardised to ensure that Radiologists can have full functionality and the ability to report off site. This is critical to ensure that Radiology Departments within HSCNI can continue to meet the increasing demand on services. This will provide better utilisation of Radiologists time, the ability to create regional wide Trust on-call rotas and easier access to second and expert opinion both in and out of normal working hours.

3.3.3 Additional NIECR Integration Requirements

A regional Ordercomms solution with full clinical decision support (CDS) is required for Northern Ireland. CDS is an initiative to enhance clinical decision making with real-time, evidence-based guidance to improve health and healthcare. It provides the mechanism for clinicians to choose the most appropriate and cost effective examinations first time reducing pressure on Radiology departments having to manage inappropriate requests. This could be implemented within current infrastructure of the NIECR and NIPACS and should be taken forward as a project now. This would support the strategic direction of closer/enhanced integration between primary and secondary care. Results acknowledgement within NIECR is required to be fully implemented across all Trusts.

4.0 Gap Analysis

4.1 Regional Procurement of NIPACS to include RVH and BCH sites

The NIPACS mandate for the re-procurement has been approved. The Strategic Outline Case (SOC) will be submitted in November 2017.   The Outline Business Case (OBC) needs to be completed and approved by March 2019. Procurement and award of contract will be required by September 2020 to enable the deployment of RVH by early 2021 to meet the end of their PFI contract in September 2021. All sites across Northern Ireland must be deployed with the new NIPACS service by September 2022 in line with the current NIPACS contract end.

4.2 Storage of images acquired outside of Radiology

A project needs initiated and costed to identify which specialties would benefit from utilising NIPACS as an image store. This will reduce the need and cost of unintegrated local storage while providing a single view of the patient's imaging history improving patient care.

4.3 Interim Integration between NIPACS, RVH and BCH

A business case will be submitted to DOH for funding to integrate the 3 RIS/PACS systems enabling sharing of images and reports until the re-procurement is realised.

4.4 Interim Single Regional NIPACS Archive

A business case will be submitted to DOH for funding to store a copy of future RVH and BCH radiology imaging within the current NIPACS archive to facilitate data migration for re-procurement.

4.5 Regional Ordercomms/Results Acknowledgement

The NIECR Ordercomms solution is available regionally for NIPACS sites and needs to be integrated with RVH and BCH to ensure there is a regional view of all patients' radiological requests. Implementation of a regional CDS is required. Electronic Results Acknowledgment will enable Trusts to ensure radiology imaging reports are accurately and effectively communicated to the responsible health professional in line with the National Patient Safety Agency; safer practice notice 16. These could both be implemented within confines of current architecture.

Implementation of the recommendations/interim solutions is subject to business case approval and available resources.

5.0   Horizon Scanning

The NIPACS re-procurement business case will need to ensure that the specification not only meets the current needs and requirements but looks to the future as to what will be available and ensure the next contract enables Northern Ireland to remain at the cutting edge of technology and patient care.

It is imperative that the RIS/PACS/VNA (Enterprise System) are interoperable, to ensure they can work with other products or systems, in either implementation or access, without any restrictions.

Artificial intelligence (AI) will shape the future of radiology. Machine learning will be a technology that can support radiologists in their daily work, providing increased efficiency and quality of care.

RIS/PACS vendors will have to look for ways to allow the systems to interface with mobile devices eg smart phones, to allow access to images whenever and wherever they are required. Doctors will be able to do Peer Review and perform second reads without availability of workstations and laptops.

The use of social media and Apps within Health Care needs to be assessed and used where appropriate to improve patient care.

Ability to data mine records via analytic tools is imperative to generate lists of patients by condition for quality improvement, reduction of disparities, research and also for preventive/follow-up care and patient-specific education resources. As well as improving the efficiency of radiology departments.

The PACS itself needs to accelerate the processing speed of diagnostic images to ensure increasing quality of reports and their reporting times can continue to be improved.

The application of 3D and 4D technologies have the potential to create better images for improved diagnostics in radiology.

It is imperative that services and technology remains patient centric and that quality of care is the measure of its success.