Diagnostic imaging network implementation guide

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Guidance developed in consultation with The Royal College of Radiologists, Society of Radiographers and Institute of Physics & Engineering in Medicine.

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1. Introduction

About 151 NHS trusts and foundation trusts provide their own imaging services, using operating models that need investment in premises, IT and equipment. Providers are also competing for increasingly scarce medical and non-medical staff.

To address these challenges, The NHS Long Term Plan committed the NHS to establishing imaging networks across England by 2023; later our national imaging strategy outlined how their formation will maximise use of existing capacity, improve access to specialist opinion and make efficiencies and economies of scale. NHS evidence shows that the modernisation of equipment, technology, and local innovation within imaging networks, increases quality of service, experience, and safety of patients. Network formation drives efficiency, making these services more resilient and sustainable.

We are now looking to up the ambition and accelerate the transformation of imaging services across the NHS. This brings benefits to patients, workforce, and service operations. The national imaging strategy proposes transformation by introducing an image-sharing platform whereby all digital images acquired within the network can be managed via a single shared worklist and transferred for reporting to any site in the network, or beyond. This allows patients to access imaging services on a wider geographical footprint, closer to home. Networking enables imaging services to maximise the benefits of pooling the reporting workforce by making economies of scale and improving access to specialist opinions, reducing errors, reassuring patients. This approach encourages collaboration with clinical pathways so patients can engage with treatment earlier.

Operating as networks, imaging services will be better placed to manage resources effectively and optimise the access to, and quality of, care for all patients served by the network. Networks offer a range of benefits to patients, staff and the wider NHS; these are articulated in this guidance.

Imaging networks are not a substitute for necessary investment in diagnostic imaging capacity (staff and equipment) for both acquisition and reporting of images, but they provide a structure that optimises the planning, deployment and utilisation of that capacity.

1.1. Purpose

This document provides guidance to NHS providers of diagnostic imaging services as they begin the process of forming imaging networks to deliver the NHS Long Term Plan commitment by 2023; and sets out the criteria by which NHS England and NHS Improvement will assess each network's progress towards being operational. It has been reviewed and approved by the National Imaging Optimisation Delivery Board which has broad representation from imaging services, including the Royal College of Radiologists, the Society and College of Radiographers, the Institute of Physics and Engineering in Medicine, and the imaging industry.

It does not provide a blueprint for an 'ideal' imaging network, but highlights the key areas for consideration, and the options available to networks in each of those areas. There is no 'one size fits all' solution and plans will vary from network to network according to local context, including the membership of the network (mix of NHS trusts and foundation trusts), age and distribution of the existing asset base, clinical case mix, geographical characteristics of the network (urban, rural) and the pattern and models of service delivery for those clinical service lines which are heavily dependent on imaging services.

This guidance reflects the principles and approaches in the national imaging strategy and should be read in conjunction with it, as well as the other documents we have written to support trusts form imaging networks.

It has been informed by senior clinical input from radiology services, imaging services management experience and expertise, a review of several case studies from developing diagnostic imaging networks, and input from teams with experience of leading the implementation of other clinical and diagnostic networks. We tested emerging thinking with a wide range of clinicians working in NHS imaging services and refined it based on that engagement.

We will update this guidance regularly to reflect new information and best practice evidence from groups of providers developing diagnostic imaging networks across the NHS in England.

1.2. Disclaimer

This guidance is provided to support NHS providers to form diagnostic imaging networks. It is not a substitute for specialist advice, where applicable, nor is it

intended to direct networks towards specific solutions, but to identify possible options and factors to be considered when making decisions.

1.3. Useful further reading

- The Royal College of Radiologists (2016). *Who shares wins: efficient, collaborative radiology solutions*
- The Society of Radiographers (SOR). The Quality Standard for Imaging
- Getting It Right First Time: Radiology
- Richards M (2020) Independent review: *Diagnostics: Recovery and renewal*
- The Royal College of Radiologists. RCR radiology workforce census 2019
- The Society of Radiographers (SOR). The Career Framework
- Institute of Physics and Engineering in Medicine (IPEM). *Policy statement: Leadership and management of medical physics and clinical engineering services*

2. Benefits of imaging networks

The national imaging strategy makes the case for changing how NHS diagnostic imaging services are delivered in England; detailing the benefits that could be realised from working in networks. These benefits include:

For patients:

- sustained local services, so patients can be scanned close to where they live but also have access to specialist opinion across a much wider geography
- faster turnaround times for reports, reducing anxiety and uncertainty for patients
- reduced risk of missed diagnosis, as all images will be reported by a suitably trained clinician and access to specialist opinion improved
- availability of images and other test results (eg digital pathology) to the clinician at the point of treatment, reducing need for multiple visits for treatment
- More patients having access to ‘state of the art’ imaging equipment with faster scan times, optimised radiation dose and higher quality images.

For service operations:

- greater service resilience where small or remote sites are struggling to recruit
- new equipment, purchased across a network for economies of scale; offering increased functionality including dose reduction features
- improved IT interoperability which can mean rapid transfer of images in an emergency situation
- planning of developments that are likely to increase demand on services, such as the lung health check, community diagnostic hubs incorporating rapid diagnostic centres, and increased access to stroke and cardiac services.

For staff:

- best use of reporting capacity given the shortages of radiologists and reporting radiographers, and improved access to multidisciplinary training environments through ‘academy style’ models
- more flexible working opportunities – across sites and, for example, ‘home reporting’ and flexible retirement options
- access to better training and continuing professional development (CPD) opportunities from being able to work across different sites and gain experience and training not available at base sites
- more opportunities to increase skill mix levels and both advanced practice and assistant practitioner roles, improving retention through job satisfaction.

This guidance advises on the key topics imaging networks need to address to be in a position to realise this wide range of benefits.

3. Key features of an imaging network

Realising the benefits set out in Section 2 will take time and, as imaging networks adapt to a new way of working to deliver the expected transformation of imaging services, they will need to move up a ‘maturity curve’. However, a few fundamental steps need to be taken at the outset of forming an imaging network, to enable its development to progress successfully.

We will check a network has met the following basic requirements to assess whether or not it has ‘formed’ and delivered the NHS Long Term Plan commitment.

1. An operational governance model signed off by all network member trust boards, with clear clinical and operational leadership arrangements.
2. A plan for establishing the necessary digital technology platform to enable real-time image sharing, signed off by all network member trust boards.
3. A plan to establish shared reporting worklists across all member trusts, agreed by all clinical leads of network member trusts.
4. An imaging workforce plan/strategy agreed by all network member trusts that addresses the network’s objectives in relation to:
    - skill mix (reporting and acquisition)
    - insourcing
    - training and CPD
    - recruitment and retention
    - staff mobility/passporting within the network.
5. A capital equipment plan agreed by all network member trusts that addresses:
    - ownership of assets

- replacement of assets
- investment in additional capacity to meet growth
- financial responsibilities of each network member trust to support future capital investment.

6. An agreement with all network member trusts to procure outsourcing, equipment support and consumables collectively.
7. An agreed process and methodology for capacity and demand modelling of imaging services at network level.

Without these imaging network ‘fundamentals’ being in place from an early stage of network development, there is a good likelihood that the development of the network will run into difficulties, slowing the realisation of benefits.

Formation of imaging networks should take into account existing formal or informal networking arrangements between NHS providers for sub-specialty imaging (eg interventional radiology, paediatric radiology, neuroradiology) but seek to further develop collaboration between them in organising and delivering imaging services.

4. Network ownership and governance

Experience from several other programmes that have sought to establish clinical and diagnostic networks unambiguously indicates that a clear governance structure with executive leadership is essential to a network's successful formation. Determining the governance model and relationships between the network and its individual owners should be the first milestone in the development of an imaging network.

Guidance on the available types of organisational structures that a new diagnostic imaging network could adopt to underpin the implementation of a target operating model is given in the *Diagnostic imaging network commercial structure and operational guide*.

In addition to clear executive sponsorship of the change process, and early agreement of the governance and ownership model for the imaging network, the imaging network should consider establishing a brand or distinct identity for itself. This will clearly signal that the imaging network is something different with its own distinct leadership, governance arrangements and mission.

5. Imaging workforce

Most of the benefits to be realised from establishing imaging networks come from transforming the way in which the imaging workforce is planned, supported and deployed.

The early focus of imaging networks should be on creating an environment in which the special skills of the workforce can be optimally used, through investment in digital technology and appropriate levels of modern equipment. These investments alone, however, will not result in the desired service transformation. This will need to be achieved through delivering significant changes to the way staff in imaging services work – how they are used – as well as their skills and the volume of supply.

Therefore, imaging networks should develop comprehensive workforce plans which address the following areas:

- **Skill mix (reporting and acquisition)** – the national imaging strategy highlights significant unwarranted variation across England in the use of advanced practice roles and the inconsistent adoption of the four-tier staffing model.[1] Service providers should ensure that they identify roles for assistant practitioners in image acquisition, and roles for advanced practice radiographers in plain film image reporting.
- **Insourcing** – every imaging service provider in 2018/19 relied to some extent on either insourcing or outsourcing imaging activity to meet demand. Networks need to understand their capacity gaps and develop plans to meet clinical demand. Insourcing (for most exams), as a short-term solution while enough substantive staff are recruited, is likely to be more cost-effective than outsourcing.
- **Training and CPD** – networks will have the scale to commission undergraduate and postgraduate training programmes (through Health Education England), and CPD programmes to facilitate ongoing clinical re-validation and career progression in new and different ways from traditional trust-based models. Networks need plans that set out how this opportunity will be exploited. They may wish to consider virtual and online training resources

[1] Department of Health Learning and Personal Development Division (2003) *Radiography skills mix: A report on the four-tier service delivery model.* London: Department of Health.

locally where they do not exist nationally, in a peri- and post-COVID-19 environment. New entry routes into the imaging professions will need to be exploited, such as apprenticeships and ‘direct access’.

- **Recruitment and retention** – networks will need to oversee a move away from competition between neighbouring trusts for recruitment of scarce clinical staff, and instead encourage their collaboration on plans to attract and retain the staff they require to deliver their service commitments.
- **Staff mobility within the network** – working in networks may create opportunities to employ staff flexibly across provider sites to deliver the best service to patients. Networks will need to develop internal processes that support the free movement of staff to work in this way. Appropriate deployment of staff to the new community diagnostic hubs will also need to be considered.

More detailed practical guidance on the development of imaging network workforce plans will be developed as part of the NHS England and NHS Improvement Imaging Transformation Programme, working with Health Education England, and will be published in due course.

6. Image sharing technology

The capability to share digital images in real time is fundamental to the creation of an imaging network; however, it must be understood that the technology is the **enabler** of transformation, not the end in itself. Without fully functioning technology, none of the clinical benefits of imaging networks can be realised.

There are a range of technical solutions available to deliver the required functionality. The right solution will not be the same for every network. It will vary according to a range of different contextual factors, such as the variety of existing PACS/RIS systems and the existing contract end dates.

Trusts forming an imaging network will need at an early stage to establish the extent to which they wish to share and integrate their imaging service information, and, from that, identify the correct technology solution for their network. A comprehensive mapping of the ‘as is’ status of existing imaging IT infrastructure and applications is a key early activity for imaging networks. This will underpin the development of a roadmap and investment plan for establishing the network’s image sharing platform.

The *Diagnostic imaging networks technical and informatics toolkit 2020* provides a detailed practical guide to support imaging networks develop these digital plans, and will be published shortly.

7. Capital equipment

Delivery of imaging services is dependent on a large number of high cost capital assets such as CT, PET/CT and MRI scanners. Ensuring this equipment is safe and operationally effective/resilient is a fundamental requirement of running an imaging network.

Networks need to establish comprehensive equipment asset registers and develop robust plans for the rolling replacement of imaging equipment, to ensure the sustainability of the services they deliver to patients. They also need to consider how to ensure the populations they serve can access the latest imaging technology, which can be expected to enhance image quality, reduce radiation dose and scan acquisition time, and improve patient experience.

Networks need to identify how they will finance equipment replacement and expansion of equipment capacity to meet demand growth over time. They need to have clarity about the individual financial obligations of each network member trust with respect to capital investment for equipment replacement and growth. Each network's ownership model must be clear about access to capital funding and ownership shares, and agreed by all parties at the point of network formation.

The establishment of imaging networks creates an opportunity to ringfence capital resources for imaging to ensure the long-term sustainability of imaging services and the effective triangulation of operational, financial and workforce planning for imaging services.

The *Diagnostic imaging network capital equipment planning guide* provides practical advice on the development of capital investment plans at network level.

8. Procurement

Evidence from the development of other diagnostic networks demonstrates that collaborating on procurement is a relatively safe early step that brings individual partner organisations together. The savings from this can release resources to re-invest in other aspects of service transformation, and therefore is something to consider at the outset of forming imaging networks.

The buying power of the network is substantially greater than that of the imaging department of a single trust. This should enable collective procurement by the network to deliver immediate savings.

For some items, particularly capital equipment, national procurement frameworks established through the relevant Category Tower of NHS Supply Chain (owned by the Department of Health and Social Care) may deliver good value, and imaging networks may want to consider and compare this with other available options to optimise savings. There may also be opportunities to save when purchasing IT infrastructure by doing this collectively with other diagnostic networks that use digital image transfer and storage (eg digital pathology, ophthalmology).

Further savings opportunities will exist through standardisation of the consumable items used across all network member trusts. Sharing procurement data and enabling an understanding of warranted and unwarranted variation in the consumption of consumables will support this approach.

The benchmarking data published on Model Hospital highlights a wide variation in the volume and mix of outsourcing undertaken by trusts. Networks should ensure that they develop a strategic approach to outsourcing, connected closely to their capacity and demand planning and workforce planning processes.

Practical guidance on collaborative procurement for imaging networks will be developed as part of our Imaging Transformation Programme, and will be published in due course.

9. Capacity and demand modelling

All the workforce and capital planning activities of imaging networks need to be firmly grounded in an understanding of what the demand for imaging services will be from the population the network serves. Therefore, a clear capacity and demand model for the network is a fundamental requirement.

Demand and capacity modelling for imaging services needs to consider both capacity for image acquisition and image reporting. This is particularly important as the two activities draw on different parts of the imaging workforce in most imaging modalities. Modelling also needs to be sufficiently detailed to capture the impact of case mix variation on scan time for individual modalities (eg CT head and cardiac CT), number of image sequences required, use of contrast agents, training, etc.

It is imperative that this modelling in imaging services carefully aligns with specific clinical pathways in trusts, and with the wider clinical service plans of the trusts in the imaging network, to ensure all drivers of additional demand are anticipated. The NHS Long Term Plan makes at least 19 commitments which directly impact on future demand for imaging services across a wide range of service lines, including cardiac, stroke, cancer, maternity, mental health and respiratory medicine. The impact on imaging demand of local plans to deliver these clinical care improvements needs to be captured in imaging network capacity and demand modelling.

Our Elective Care Intensive Support Team have developed a diagnostic capacity and demand tool to support networks with the required planning. The tool does have some limitations for modelling imaging services, notably that it does not separately recognise image acquisition and image reporting activities. Despite these limitations, it helps give an understanding of available imaging capacity and the relationship to patient waiting times.

We are developing more sophisticated demand and capacity planning tools for imaging networks as part of our Imaging Transformation Programme and will make these available in due course.

10. Clinical and operational leadership

The central role of executive sponsorship and effective clinical leadership in successful NHS service change programmes is well understood, and this applies to establishing imaging networks.

To manage the transformation, networks must have clear clinical, radiographic and scientific leadership, with these leaders given sufficient time and support from executive leaders to do their job effectively. Leading an imaging network is a very different proposition to leading a clinical department in an acute hospital trust. Clinical, radiographic and scientific leaders of networks will therefore need a different kind of support. Adequately resourced operational management support to work alongside network clinical, radiographic and scientific leaders will also be necessary. A clinical and managerial leaders development programme is likely to be needed, once the key posts have been appointed to.

Clinical, radiographic and scientific representation from each of the trusts within the formal governance structure of the network is also essential for success. Many of the clinical and operational benefits of networking will be realised from standardising clinical practice across the network. Therefore, every network member trust must commit to engage with changing clinical practice.

As part of our Imaging Transformation Programme, we have established a ‘community of practice’ for clinical, radiographic, scientific and operational leaders working in imaging networks, or in imaging services working towards establishing a network. To join this ‘community’ and access events and materials shared between its members, please contact nhsi.imageservices@nhs.net.

11. Resources for implementing change

As might be expected from a large-scale transformation programme, the outputs expected from imaging networks to ensure successful implementation are significant. They include:

- a governance model
- a target operating model
- business cases progressing through SOC/OBC/FBC stages
- a workforce plan
- a digital plan
- a capital plan
- a demand and capacity model.

To deliver these outputs within a reasonable timescale that enables the network change process to develop momentum, network partners must commit to providing adequate resources to support the transformation. In addition, investment in IT infrastructure and new imaging equipment will be required.

Once established, networks require dedicated operational management teams to run the imaging services on behalf of all member trusts. Recommended minimum levels of resourcing for the operation of an imaging network are set out in the national imaging strategy. Networks enable the pooling of existing operational management resources for imaging services, and this should make more efficient use of those resources to deliver greater capacity and/or resilience.

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