Interventional Radiology Quality Improvement Service Standards

Contents

Document Information

This document has been developed by the National Planning (NP) Interventional Radiology Group (see Appendix A for membership details) and the NP Interventional Radiology Writing Core Group, with involvement from the NP Interventional Radiology Credentialling Group. The Scottish Clinical Imaging Network (SCIN) Interventional Radiology Clinical Reference Group has also provided significant input, particularly regarding the drafting of the Patient Transfer Pro forma and Peripherally Inserted Central Catheter (PICC) and Hickman line training documents.

In February 2021, the NP Interventional Radiology Group electronically signed off a draft version of the Interventional Radiology Quality Improvement Service Standards. The following groups were asked to review the draft document as part of a formal consultation exercise during February and March 2021:

- Board Directors of Planning
- Board of Chief Executives
- Directors of Finance
- Healthcare Improvement Scotland
- Imaging Executive Board
- Interventional Radiologists across NHS Scotland
- Medical Directors
- National Imaging Nurses Group
- Regional Directors of Planning
- SCIN Core Team
- Scottish Executive Nurse Directorate

All comments and suggested changes received as part of the consultation exercise were recorded and actioned where appropriate. This document was subsequently finalised and has been endorsed by the appropriate governance groups.

The NP Interventional Radiology Group would like to acknowledge the valuable engagement with numerous groups throughout the consultation process in developing this National IR Standards document.

The Patient Transfer Pro Forma found in Appendix C has also been developed with involvement from colleagues in the Scottish Ambulance Service (SAS) and work to explore formal sign-off with SAS is ongoing.

This document will be reviewed every 3 years.
Next review date: November 2024
Review Ownership: SCIN IR Clinical Reference Group

1. Introduction

Interventional Radiology (IR) services are facing significant challenges across NHS Scotland. This paper presents the evidence-based recommendations of the National Planning (NP) Interventional Radiology Group presented as a Quality Improvement Service Standard. The recommendations are designed to develop a sustainable and equitable service model that is planned nationally and delivered regionally.

2. What is Interventional Radiology?

IR procedures are minimally invasive, targeted treatments performed under imaging guidance. A wide range of procedures are included extending from treatment of ruptured arterial aneurysms to the treatment of cancer and its complications. Interventional radiology procedures often replace open surgical procedures as they are less invasive, reducing morbidity and mortality and allow more rapid patient recovery and hospital discharge.

IR requires a specialist team including consultant staff, nursing and radiographic staff with particular skills. IR procedures, particularly emergency and emergent procedures, are mainly undertaken by specialist Interventional Radiologists. Some procedures, typically biopsy and drainages procedures, may be undertaken by general radiologists. Other medical and surgical groups may undertake a limited range of IR procedures. The range of procedures undertaken varies between individual specialists.

3. Scottish Government Policy and NHS Scotland Planning Context

2010: The Managed Diagnostic Clinical Imaging Network published a report; Interventional Radiology Out of Hours: Standards for haemorrhage-control services in Scotland which was presented to the Diagnostic Steering Group. This report outlined a strategy based on improving use of available resource to develop networks to improve the availability of 24/7 IR haemorrhage control.

2016: The Scottish Clinical Imaging Network (SCIN) published “Interventional Radiology Services in Scotland: A Discussion Paper”, highlighting gaps in service provision and recommending a networked model of service delivery. Recommendations in this document were cascaded to individual NHS Boards for implementation however there was no national governance and oversight of this process. Recommendations from this paper have not been systematically progressed.

2018: As pressures on service increased, Scotland’s Chief Medical Officer requested an assessment of the situation and in 2018 and a Situation, Background, Assessment, Recommendation (SBAR) of services pressures and risks was developed. In response to this, Scottish Government established a short life working group under the auspices of the Access Collaborative, to fully scope the scale of the problem and agree the way forward.

2019: SCIN agreed to refresh its work on IR and were developed a skills matrix to provide greater detail on where pressures were greatest. This was discussed with the Access Collaborative SLWG and a SCIN Clinical Reference Group (CRG) formed to provide clinical information, service knowledge and undertake specific work to inform deliberations, such as an audit of out of hours practice.

The conclusion of each of these strands of work was clear and consistent; that the current service model is not meeting current or future needs and a significant change in planning and delivery was required.

2019 -2020: NHS Scotland National Planning Board (NPB) established an National Planning (NP) IR Group to further develop and progress the outline recommendations in the paper presented to NPB in May 2019 (Paper 2019-22).

The standards and recommendations are in line with Realistic Medicine and will support the key themes of managing risk better, reducing harm and waste and provide a reduction in unwarranted variation.

The standards also reflect the agreed vision and principles and Target Operating Model of the Scottish Radiology Transformation Programme (SRTP), in particular:

2. Equitable access to imaging services including expert opinion available regardless of patient location.

7. A locally delivered service, informed by local needs, supported by regional and national coordination and collaboration where this adds value, resilience and sustainability.

4. Core Principles

The following core principles, based on national guidance and priorities, have been used to guide the development of the Quality Improvement Service Standard:

1. 24/7 IR cover must be available for the needs of all patients in Scotland, whether through on- site delivery or formal network access to a linked centre.
2. NHS Boards providing acute services which do not provide 24/7 IR cover must ensure they have agreed formal transfer arrangements appropriately funded and supported to deliver the required service.
3. The objective for planning IR services should be the development of models of care that enable Scotland to achieve the widest practicable availability of IR Services to the Scottish population.
4. It will not be possible to provide on-site services at all acute units. Patient transfer is a predictable and key element and should be undertaken within established processes and within formal established pathways to minimise risk.
5. Elective IR Procedures should be planned and delivered as equitably as possible across NHS Scotland.
6. Complex, low volume procedures offer the best patient outcomes if provided within a limited number of operators/centres as these procedures often have significant training requirements and more complex selection criteria. This should be co-ordinated at regional and where appropriate national level.
7. IR services should focus proactively on developing sustainable workforce models.

5. Current Service Provision

The current IR service model in Scotland is mainly based within geographic board area. Three areas have established networks; NHS Tayside with NHS Fife, and NHS Lothian with NHS Borders. A network arrangement was established between NHS Greater Glasgow & Clyde (GG&C) and NHS Forth Valley in early 2021. NHS Orkney, NHS Shetland and NHS Western Isles do not have an IR service within their Boards and refer to mainland NHS Boards.

Referral patterns between neighbouring boards are complex. They reflect a mix of relatively limited number of formal networks, some regional networks (e.g. renal) and more often adhoc referrals, which are sometimes dependent upon individual clinicians' networks.

5.1 Out of Hours service provision

Only four NHS Boards (NHS GG&C, NHS Grampian, NHS Lothian and NHS Tayside) provide 24/7 emergency Interventional Radiology services. There is no formal patient transfer protocol established in NHS Scotland.

SCIN undertook an audit of Out of Hours activity for the period 1st - 31st March 2019, in addition to a Skills Matrix. These both provide insight into current provision of Interventional Radiology services throughout Scotland.

The Out of Hours audit captured 134 calls across 11 NHS Boards during the one-month observation period. Two procedures (embolisation and nephrostomy) accounted for almost half of the performed procedures (Appendix B Figure 1). The data from NHS GG&C did not include the majority of abscess drainages, as these procedures are provided largely by the diagnostic radiologists in NHS GG&C.

An analysis of NHS Board of origin for recorded calls demonstrates significant variation in event rate per 100,000 population, with a range extending from 0.3 to 5.1 per 100,000. This is suggestive of under provision of access within some areas (Appendix B Figure 2) Service provision for emergency procedures within standard working hours was not assessed in this survey.

In centres providing on-call, rota frequency for Interventional Radiology staff is significantly greater than diagnostic radiologists. The development of regional IR services will increase the number of staff contributing to the Out of Hours service, reducing rota frequency and helping to deliver services that have more long-term resilience and sustainability.

5.2 In-hours service provision

The range of procedures within local NHS Boards usually reflect the local demands and priorities and are resourced at local NHS Board level. There has been no regional or national forum to plan IR services which can lead to both under- and over- provision of specific procedures.

In larger centres, IR units frequently provide support to regional services e.g. renal transplant and renal dialysis services, but are usually planned at local NHS Board level.

NHS Tayside and NHS Fife have a formal in-hours service provision and consultant staff rotate from NHS Tayside to NHS Fife to provide a core range of procedures within NHS Fife. NHS GG&C and NHS Forth Valley are establishing a formal out of hours network and this will include some in-hours service provision. NHS Borders and NHS Lothian have a formal network for provision of IR services by transfer to NHS Lothian.

5.3 Workforce

Medical

Interventional Radiologists are able to provide the entire range of emergency IR procedures including embolisation. There is a recognised shortage of Interventional Radiologists in the UK and in Scotland; not all units have a Specialist Interventional Radiologist on staff. The age profile of this staff group shows a significant number of consultants in the higher age brackets. In some areas there will likely be an acute loss of experienced staff in the near future due to upcoming retirals.

Radiologists with an interest in IR provide a more limited range of IR procedures, usually focusing on a single specialty e.g. urology. This group may provide an acute service within their specialty area though this is most often restricted to in-hours provision.

There remains a significant geographic variation in recruitment and retention of IR consultant staff. The North of Scotland has experienced significant medium term issues with recruitment, which has created challenges for both in and out of hours services. District general hospitals within the central belt have historically used a more varied mix of specialist Interventional Radiologists and General Radiologists with a specialist interest to help maintain services. Larger centres within the central belt have usually been staffed with whole time Interventional Radiologists.

Radiographers

Interventional Radiographers have specialist skills in Interventional Imaging, particularly angiographic imaging. There is variation in how NHS Boards staff Interventional Radiology units and therefore comparison between NHS Board workforces can be misleading. In smaller units, radiographers will not be solely working within the Interventional Radiology unit. Nevertheless, at the time of the Skills Matrix survey, there were only four vacancies within this group.

Nurses

Interventional Radiology Nurses have specialist skills and incorporate skills in maintaining the safety and care of the patient pre-procedure, during the procedure and in the immediate recovery period. In addition, the Interventional Nurse has the operating theatre skills required to assist during an interventional procedure. Recruitment and retention within this staff group has been a significant challenge at several sites within NHS Scotland. At the time of the Skills Matrix, there were just over 100 Nurses working in Interventional Radiology in Scotland.

Extended Practitioners (EPs)

There is significant variation in the profile of procedures undertaken by this staff group across NHS Boards: PICC line insertion is an established nurse-led service in NHS GG&C, and sometimes undertaken by EPs in six other NHS Boards. However, the majority of NHS Boards are currently completely or partially reliant on the consultant workforce.

It should be noted that although most NHS Boards have Nurses on staff for Interventional Procedures, only six Boards reported in the SCIN Skills Matrix that they had an EP Radiographer or EP Nurse on their staff list. The age range of EPs reflects a similar distribution to the medical workforce, with only a minority of EPs in Scotland under the age of 40.

5.4 Interventional Radiology Environment and Equipment

Interventional Radiology practice increasingly involves the delivery of permanent implantable medical devices. As the complexity of procedures has increased there is a greater number of attendant staff often including anesthetic and surgical teams. It is essential that the environment and equipment are appropriate.

The main environment requirements relate to the physical space within the room, facilities to maintain an aseptic field including air exchanges, appropriate design of surfaces, appropriate scrub areas and appropriate access to anaesthetic gas supplies. The IR suite should be appropriately sited to allow rapid transfer and support from critical care areas and theatres and other emergency settings. In some environments, particularly in hub sites providing Out of Hours services, a hybrid suite that can function as either an operating room or as a interventional environment will be appropriate.

The development of standards for IR environments and equipment is beyond the scope of this document. We note that available national guidance has not undergone revision for some time and perhaps do not fully reflect the current requirements. In some respects, design decisions are often made locally underpinned by prior guidance and sharing effective design solutions across Scotland would be of value.

6. The case for IR service Quality Improvement Standards

6.1 Aim of the Standards

We have developed eight Standards, with the aim to:

- Improve access to IR services across Scotland.
- Reduce unwarranted variation in patient outcomes that may arise from inequity or delayed access to IR services.
- Clearly define the responsibilities of IR Services, NHS Boards and Regional structures in the provision of IR services.
- Improve patient safety by ensuring safer patient transfer through the development of formal networks and shared process documentation.
- Develop measures that enable NHS Boards to sustain a viable workforce of IRs, radiographers and nurses.
- Indicate a series of measures that can be used to indicate progress against these standards.

6.2 Who are the Standards for?

The Standards described are relevant for all hospitals in Scotland that receive scheduled or unscheduled patients. The standards describe responsibilities depending on the role of the healthcare providers within a networked service.

6.3 Are the Standards mandatory?

No. However, they should be used to plan, deliver and improve patient safety and quality of care. Individual boards and regional networks can chose to use the standards to assure their quality of care against evidence based standards developed by the clinical community.

6.4 Format of Standards

The Standards have a common format:

- A statement describing the Standard
- The rationale and evidence for the Standard
- Suggestions of how to measure progress against the Standard

7. IR Standards

7.1 Standard 1: A regional approach to plan the delivery of IR Services

Standard 1 Statement

IR services should be planned from a regional perspective with national coordination and inter-regional planning to ensure an equitable service for the people of Scotland, improving the use of available resources and sustainability of services.

Standard 1 Rationale

24/7 IR cover must be available for the needs of all patients in Scotland, whether through on-site delivery or formal network access to a linked centre. NHS Boards providing acute medical or surgical services which do not provide 24/7 IR cover have a responsibility to ensure they have agreed formal transfer arrangements appropriately funded and supported to deliver the required service (1).

The objective for planning IR services should be the development of models of care that enable Scotland to achieve the widest practicable availability of IR Services to the Scottish population. The intention is to maximise patient access using existing facilities and staff.

Given the distribution of IR services and personnel, the most effective use of facilities and staff will necessitate working across traditional health board boundaries A regional planning approach will provide the forum and leadership to determine the optimum model of service across health board boundaries. In order to make the best use of personnel, Interventional Radiologists may be required to work across previous health board boundaries. Services will be most resilient and effective with the participation of the maximum number of appropriately trained staff.

It will not be possible to provide on-site services at all acute units. Patient safety will be best maintained if the IR team work in a familiar environment of equipment and broader support services. Therefore, the “patient travels to team” model is preferred. This model of specialist care in larger centres has existed for many other specialist services that need complex acute treatments, for eg trauma, neurosurgery, cardiothoracic surgery. Standard 4 of this document supports the development of safety patient transfer between units.

Emergency and emergent IR covers a spectrum of procedures of varying complexity, equipment and personnel requirements. Different models for service delivery may be used for indications within the same region. For example, a site may be able to provide on-site nephrostomy but require to transfer patients for haemorrhage control.

Standard 1 Measuring progress against this Standard

Regional planning networks should maintain engagement with local IR services, develop appropriate formal networks and report on progress at regular intervals.

7.2 Standard 2: Unscheduled care - emergency procedures.

Standard 2 Statement

NHS Scotland patients receive as equitable access as practically achievable for emergency IR procedures.

Standard 2 Rationale

This group of patients represent the most time critical and may be severely compromised. Decisions on the type of intervention and suitability of the patient for transfer are complex and will need to balance individual patient factors and risks. Where possible these decisions should be taken with the involvement of a multidisciplinary team. It is recognised that for acutely ill patients, the less invasive nature of IR procedures often reduce morbidity and risk of intervention compared to conventional surgical procedures.

A relatively small range of procedures make up the majority of emergency interventions - these are defined in this document as core emergency procedures. The core emergency IR procedures are -

IR for haemorrhage control

Interventional radiology is vital in the treatment of haemorrhage from multiple clinical scenarios including gastrointestinal haemorrhage, variceal haemorrhage, trauma, iatrogenic injuries and obstetric haemorrhage.

In the control of haemorrhage, transcatheter arterial embolization can occlude surgically inaccessible vessels with minimal trauma and minimal collateral damage and is ideally suited to patients who are severely compromised by haemorrhage. In variceal haemorrhage which cannot be controlled by endoscopic therapy urgent Transjugular Portosystemic shunt placement can be lifesaving. IR procedures are key components in national and professional body guidelines for haemorrhage control including guidelines from NICE, National Confidential Enquiry into Patient Outcome and Death (NCEPOD) and the British Society of Gastroenterology. (2,3,4,5,6,7)

IR for haemorrhage control requires dedicated fluoroscopy equipment, a significant range of complex and expensive medical devices and a high level of technical complexity. Services providing IR for haemorrhage control are likely to be larger specialised units with subspecialist IRs and dedicated IR Nurse and IR Radiographer Support.

Image guided drainage for sepsis

Image guided drainage of abscesses forms an essential component of source control in patients with severe sepsis. Percutaneous image guided drainage offers a minimal morbidity method of achieving source control in deep sited sources of infection that would require significant surgical intervention. In the most severely ill patients this should be undertaken as soon as practically achievable and for most patents this is advised within a maximum time window of 6 -12 hours. (8)

Image guided drainage of abscesses most often requires ultrasound or CT equipment and a relatively small range of medical devices that are usually available within all acute hospitals. Technical skills of image-guided drainage are within the core diagnostic radiology curriculum and it should be the aim that this element of service is provided within the base unit whenever possible. In the rare circumstances that these skills cannot be achieved within the base hospital then formal network arrangements should be put in place with a unit in the region.

Image guided nephrostomy insertion for sepsis

Infection within a kidney obstructed by stone or tumour is not only an issue for control of sepsis but can lead to a rapid irreversible reduction in renal function unless treated rapidly. Percutaneous image guided nephrostomy insertion can usually be performed under local anaesthesia and provides rapid decompression of the infected system. The need for acute medical receiving units to have access to an emergency nephrostomy service is emphasized in a report by the National Confidential Enquiry into Patient Outcome and Death (Acute Kidney Injury: Adding Insult to Injury' National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report 2009).

Image guided nephrostomy requires ultrasound and fluoroscopy equipment with a small range of medical devices that will be available within the majority of acute hospitals. Technical skills required are not part of the core diagnostic curriculum though some general radiologists will have a specialist interest in this area.

IR for thoracic and abdominal aneurysm rupture and acute aortic syndromes

IR procedures are included within the pathway for acute aortic syndromes and thoracic and abdominal aneurysm rupture (10,11). The management of this group of patients is complex and best undertaken in specialist centres within a multidisciplinary team that includes interventional radiology, vascular surgery, vascular anaesthesia and where appropriate consultation with cardiothoracic surgery. IR procedures, most commonly insertion of stent grafts, offer a much lower morbidity than conventional surgical repairs particularly for thoracic interventions.

Intervention for this group of patients requires dedicated interventional angiographic units, a range of complex medical devices and specialist technical skills and will only be undertaken with vascular hub centres.

All hospitals receiving acute medical or surgical patients should have an agreed pathway for the emergency procedures described above. Where possible this pathway should provide on-site services. For some hospitals, on site provision will not be achievable and it is essential that delays in treatment are minimised and therefore a formal agreed pathway for a neighbouring unit should be agreed. Ad hoc pathways for predictable emergency events are not acceptable as they incur delay in transfer and present a patient safety risk. Pathways developed for emergency transfer are not appropriate for elective procedures and where there is a requirement for a centre to provide an elective service that cannot be provided locally this should be taken forward regionally. All patient transfers for emergency treatment should be undertaken using the IR Patient Transfer Pro forma.

Standard 2 Measuring progress in this Standard

- Consideration should be given to the production of an annual audit to share the current position for IR Out of Hours activity and learning which may improve formal network provision.
- IR emergency service providers should aim to achieve a response time that is as short as possible for this group of patients.
- The personnel delivering this care will frequently be on call from home. A target response time should be agreed within each unit and will be of value when planning and auditing these services.
- Response times should be audited at all sites. This will determine whether the guidance set out in this document are being achieved and facilitate the prompt identification and resolution of issues impeding provision of the service.

7.3 Standard 3: Unscheduled care - emergent procedures

Standard 3 Statement

NHS Scotland patients receive equitable access for emergent procedures.

Standard 3 Rationale

This standard describes procedures that are required in an emergent period - usually this will be in the next 12-24 hours. This group of patients are usually more stable, while the decision regarding intervention should always be determined by the individual patient's wishes and the clinical scenario, it will usually be appropriate to consider transfer to another site if required.

A number of IR procedures could potentially fall into this category; however the following four procedures will make up the majority of emergent interventions. The core emergent procedures are:

IVC Filter Insertion

Inferior vena caval (IVC) filters are mechanical devices used to prevent passage of deep venous thrombosis to the lungs. The indications for IVC filters have become progressively more restricted however there is still a role in patients who have a contraindication to anticoagulation and those with recurrent pulmonary embolus despite anticoagulation. (11)

Limb saving vascular procedures e.g. arterial thrombolysis

Acute limb ischaemia requires urgent investigation and treatment by a multidisciplinary team that includes vascular surgery and interventional Radiology. Management is dependent upon the type of occlusion, duration of ischaemia, neuromuscular ischaemia and limb viability but for a proportion of patients may include arterial thrombolysis which involved the placement of a catheter into the occluding thrombus and infusion of a thrombolytic drug over 24-48 hours. (12, 13)

Colonic stent insertion (can often be deferred until standard hours)

Colonic stent insertion is used in the palliation of large bowel obstruction typically secondary to malignancy. In selected patients this technique obviates the need for open surgery and is particularly useful for frail patients. The technique should be delivered within a multi-disciplinary team and frequently requires endoscopic assistance. (14)

Renal access declotting

Dialysis access fistulae and grafts are a lifeline for patients. Thrombosis of grafts and fistulae is a well-recognised complication and prompt treatment can rescue the conduit. UK

guidance recognises the importance of a combined approach with surgical thrombectomy and angioplasty / stent insertion offering the best outcomes. (15)

All Interventional Radiology units should ensure they have agreed consistent pathways to provide this group of procedures within 12-24 hours.

All hospitals receiving acute medical and surgical admissions should consider whether they have appropriate formal access to this group of procedures. Access via formal established pathways should be used to minimise patient risk and transfer delay.

All patient transfers for emergent treatment should be undertaken using the IR Patient Transfer Pro forma (Appendix C).

Standard 3 Measuring progress against this Standard

Indicators for this may include

- Interventional Radiology units should ensure they have agreed consistent pathways to provide this group of procedures within 12-24 hours by regular audit.
- Hospitals receiving acute medical and surgical admissions should consider whether they have appropriate formal access to this group of procedures.
- Access via formal established pathways should be used to minimise patient risk and transfer delay and evidenced by audit.
- Patient transfers for emergent treatment should be undertaken using the IR Patient Transfer Pro forma and evidenced by periodic audit (Appendix C).

7.4 Standard 4: Unscheduled care - safe patient transfer

Standard 4 Statement

The IR Patient Transfer Pro forma is used for patient transfer for specialist IR treatment to improve patient safety and ensure appropriate information is captured at the time of transfer.

Standard 4 Rationale

This standard describes the information that must be captured and shared to enable safer patient transfer. Transfer of patients to receive IR care may be necessary due to the specialist nature of IR services. In the past, a lack of established formal networks, standardised processes and appropriate documentation have caused inappropriate risk to patient safety.

It is acknowledged that a significant proportion of emergency IR patients will be clinically unstable (haemorrhage, sepsis, vascular procedures etc.), some emergent cases may be unstable and elective cases will largely be stable. An experienced critical care doctor may be required as escort for unstable cases. Patient transfer is a time of increased risk, only limited interventions are possible and unanticipated delays are common. Optimal patient safety requires good communication, appropriate assessment and preparation, and minimising inappropriate delays. (16, 17, 18)

An Interventional Radiology Patient Transfer Pro forma was developed by the SCIN IR CRG and approved by the National Planning IR Group. The IR Patient Transfer Pro forma (Appendix C) describes the roles and responsibilities of those involved in patient transfer, the information that should be captured and shared, and the actions to be followed to enable safer patient transfer. The document was communicated to Executive Medical Directors, Directors of Planning and Regional Directors in March 2020. The intention was to have a 6-month period for feedback and review of use. Unfortunately, due to the COVID-19 pandemic this assessment period has been interrupted. The IR Patient Transfer Pro forma will be reissued in Autumn 2021 with a view to undertaking audit of use.

Standard 4 Measuring progress against this Standard

- Periodic audit of the transfer process and the use of the IR Patient Transfer Pro forma (see Appendix C) should be undertaken and at a minimum of 6 months post roll out of the IR Patient Transfer Pro forma.
- Learning from these audits should be shared nationally by an appropriate forum such as the SCIN IR CRG.

7.5 Standard 5: Scheduled Care

Standard 5 Statement

Elective IR Procedures are planned and delivered as equitably as possible across NHS Scotland.

Standard 5 Rationale

Elective IR procedures are now key components of many common clinical pathways.

Variation in IR services across Scotland means that, in some hospital units, IR procedures may not be available even for common pathways e.g. management of uterine fibroids. This creates challenges in ensuring equality of access and patient outcomes.

Speciality areas that have seen a recent increase in available IR treatment options are particularly vulnerable to variation in access across Scotland. Of particular note is Interventional Oncology that includes a number of procedures, which are used in both curative and palliative treatment of cancer.

Lack of local availability to a specific pathway treatment should not preclude appropriate access. General Medical Council (GMC) guidance requires a doctor to discuss options for treating or managing the condition and includes the statement that information should be shared for "any treatments that you believe have greater potential benefit for the patient than those you or your organisation can offer.".

In order to avoid delays in treatment for individual patients, NHS Boards should work to establish referral pathways for common procedures with neighbouring units. A regional approach to planning the delivery of IR services should aid more flexibility and collaboration and improve equity of access.

Pathways developed for emergency and emergent treatment are not appropriate for use in scheduled care.

Standard 5 Measuring progress against this Standard

NHS Boards are encouraged to make reference to standard pathways and consider the ability for the Board to access IR treatment in this area.

Periodic audit of key areas of access to IR procedures within defined pathways would be valuable. Such audits could be led by NHS Boards, MCN or other groups. Evidence of regional planning structures engaging to improve access for clinical pathways that are dependent on IR.

7.6 Standard 6: Scheduled care - low volume complex procedures

Standard 6 Statement

Low volume complex IR elective procedures are planned for NHS Scotland using a regional or where appropriate national approach to provide equity of access and provide optimum outcomes.

Standard 6 Rationale

IR procedures are mainly planned at local level within NHS Boards. This remains appropriate for most procedures however there are a number of complex and low volume IR procedures which would benefit from a regional or national approach. Complex, low volume procedures often have significant training requirements, more complex selection criteria and offer the best potential for optimal patient outcomes if provided within a limited number of operators/centres. Establishing a forum that would allow Interventional Radiologists to consider the best method to provide new complex low volume services across NHS Scotland would be of value. Consideration should be given as to whether the SCIN IR CRG would be an appropriate forum. This group when established would provide an important function of horizon scanning and consideration of notification of new local procedure provision is advised.

Individual units, and if appropriate regional or national planning structures, should consider whether formal specialised services designation is appropriate for procedures under consideration and put this forward to the NSD. It should be recognised that this will not be the case for most procedures and alternative collaborative mechanisms for service delivery and funding will be required. Where a local site recognises it cannot provide an elective service, this should be arranged at a regional level.

Pathways developed for emergency and emergent treatment are not appropriate for use in scheduled care.

Standard 6 Measuring progress against this Standard

Indicators for this may include;

- The development of collaborative pathways between NHS Boards for elective complex, low volume procedures.
- The development of a national IR forum to consider the delivery of novel procedures.

7.7 Standard 7: Developing Sustainable IR Services

Standard 7 Statement

IR services focus proactively on developing sustainable workforce models.

Standard 7 Rationale

The IR team requires specialist skills from medical, nursing and radiographic staff. There have historically been shortages in all these staff group and workforce planning is essential to ensure future services can be sustained.

The number of Interventional Radiologists within a unit is a key factor in determining whether a safe and sustainable IR rota can be maintained. Royal College of Radiologists (RCR) Guidance provides clear guidance based on the number of Interventional Radiologists within a unit: (1)

- Fewer than 4 IR: Services should liaise with neighbouring units.
- Between 4- 6 IR: Services may be able to provide an on-call service depending on the intensity of activity.
- Greater than 6 IR: Services will usually be able to provide a robust 24/7 service that is compliant with European Working Time Directive (EWTD) or equivalent. For units covering populations greater than 1 million a 1:8 rota or greater will be more sustainable.

It should be noted that while the calculations above focus on the number of Interventional Radiologists clearly a similar ratio should be applied for nursing and radiographic staff.

Developing a regional approach to IR services will provide an opportunity to design job plans that ensure that posts across the region contain sufficient intervention and clinical components to make jobs attractive for recruitment. Interventional Radiologists contributing to the regional OOH service should have a regular timetabled IR session within the hub hospital to ensure familiarisation with the process and equipment within this unit.

Interventional Radiologists have clearly defined clinical responsibilities including pre-intervention ward visits, outpatient clinics, consent and follow-up and it is essential that these activities receive support and are planned into job-plans.

The British Society of Interventional Radiology (BSIR) and the RCR have made a commitment to increasing diversity in the workforce, including the establishment of a BSIR Women and Diversity sub-committee. Members of the Scottish IR community have already engaged with these initiatives, and activity in this area should be both supported and encouraged to help address the sustainability and diversity of the IR workforce.

Interventional Nurses and Interventional Radiographers are essential components of the IR team. A range of staffing models for nursing and radiographic staff are used within IR units for example IR radiographic staff are frequently rotated between a number of clinical areas. Calculation of the number of staff required are therefore best taken within the local context.

Interventional Radiographers and Nurses possess specialist skills and recognition of these skills is essential to maintain a sustainable workforce. A significant impediment to recruitment has been the lack of a link between Agenda for Change (AFC) banding and career progression. A consistent approach in this area, particularly for Advanced Practitioner (AP) roles would aid recruitment and retention.

Training

The UK has a long-standing shortage of Interventional Radiologists. Data from the RCR 2018 Workforce Census determined that an additional 345 Interventional Radiologists are required to allow sustainable 1:6 cover across the UK.

Within Scotland the number of Interventional Radiologists in training has improved considerably over the last 5 years. There has been a concentrated effort to increase the IR training numbers from IRs within the Diagnostic Speciality Training Board (STB) and there are currently 13 IR trainees Scotland.

It is essential that a close link between the IR community and the STB is maintained to allow continued assessment of this position. An IR representative has been elected/nominated to STB to improve that liaison. All four training schemes should be encouraged to have their IR Training Leads attend the STB.

Standard 7 Measuring progress against this Standard

Possible indicators for this standard include audit of number of sustainable IR rota in Scotland, audit of training numbers with Scotland.

7.8 Standard 8: IR procedural delivery: a team approach.

Standard 8 Statement

IR units utilise appropriate role extension models to optimise the delivery of care.

Standard 8 Rationale

Extended Practice Roles

Expansion in the IR procedural workload has created pressure on the capacity of IR units.

The most common IR procedures are PICC line insertion and vascular access as highlighted by the 2019 SCIN IR Report. Both PICC line insertion and venous access have been successfully undertaken by specialist nurse and radiographer roles in some sites within NHS Scotland. Analysis of nursing and AHP practice in the delivery of PICC line insertions and venous access across NHS Scotland was undertaken by the SCIN IR CRG. (Appendix D)

There is significant variation between NHS Boards in the use of nursing and AHP roles to deliver these procedures and optimising the use of nursing and AHP roles would offer significant benefits in capacity.

The NP IR Group have gathered guidance from successful nursing and AHP groups and this is presented in the supporting documentation manuals, highlighting approached to training, assessment of competency, medical support systems and standard operating procedures.

Currently, nursing and AHP training in these procedures is NHS Board specific and it is hoped that the guidance complied by the NP IR Group and SCIN IR CRG will provide a basis for a more consistent approach across NHS Scotland. While beyond the scope of this document, considering standardisation of entry requirements for non-medical practitioners undergoing training in IR procedures developing a more consistent approach to training and ensuring experience and qualifications are transferable between Boards would all be of value. The development of a specific qualification module on vascular access should be considered. We note that development of these roles will be considered as part of the work of the Scottish Radiology Transformation Project.

The training of these staff may impact on education and training capacity for trainee doctors in IR and so we suggest that services carefully plan mitigation strategies such that there is equity in access to training opportunities and skills maintenance.

Medical Credentialing

A subgroup of the NP IR group, co-chaired by Mr Ian Findlay Medical Advisor, Health Workforce Directorate, have considered the potential for medical credentialing to provide services within IR.

Consideration was given to how medical credentialing might support areas of need in the provision of emergency and emergent IR. The consensus was any upskilling of other medical groups will be based on local need and Diagnostic Radiologist performing some nonvascular procedures as per RCR curriculum would be the safest.

The group identified individual medical and surgical specialists that have successfully made contributions to the provision of select IR procedures.

In some speciality areas, for example vascular surgery, the standard training pathway now includes a level of training in some endovascular procedures. The training does not encompass a significant proportion of emergency and emergent procedures.

At this stage, it is not possible to identify a credentialing pathway that would be suitable for the provision of a wider range of IR procedures.

Standard 8 Measuring progress against this Standard

- Local audit of the use of nurses and AHPs within NHS Boards
- National audit of the use of nurses and AHPs within NHS Boards with comparison against SCIN 2019 audit

8. Quality Performance Indicators

The development of QPI indicators is an essential step in driving quality improvement based on the standards within the document. The QPI should reflect the responsibility of NHS Boards to ensure 24/7 and elective access including safe patient transfer.

The quality improvement standards developed in this document should be assessed on a periodic basis, at least annually, to determine if there has been appropriate progress and attainment. This assessment will be most effective if it is driven and led by the clinical community. The SCIN IR CRG would be an ideal position to lead and report on this work.

An established UK wide quality improvement programme exists in the form of the British Society of Interventional Radiology Quality Improvement Initiative (BSIRQI initiative). This programme includes self-assessment of;

- Scope of services - defining services both in hours and out of hours.
- Providing good quality care
- Patient focus
- Service improvement

Enrolment within this programme is strongly recommended for IR Units within Scotland and would contribute valuable information for the assessment of quality and sustainability of IR Units.

9. Implementation

The following Implementation Plan has been agreed by the National Planning Executive Group, National Planning Board, Imaging Executive Board (IEB) and Diagnostics in Scotland Strategic Group (DiSSG), and will be applied starting autumn 2021:

- 2021 National Interventional Radiology Service Standards and accompanying Impact Assessment / Risk Matrix document to be produce by National Planning and issued to all NHS Boards via Regional Directors of Planning
- Directors of Regional Planning will work with respective NHS Boards to complete the Impact Assessments. NHS Boards will consider gaps, with potential options for regional collaboration explored if appropriate
- Directors of Regional Planning, on behalf of constituent NHS Boards, will update the NHS Scotland National Planning Board on progress in 2022.

10. Conclusions

The Interventional Radiology Quality Improvement Standards aim to provide a structure for continuous improvement in the delivery of Interventional Radiology Services within Scotland. Achieving progress within these standards will take time and will require clinical leadership supported by national and regional structures.

The most acute area of need is improving access to emergency and emergent Interventional Radiology. This will require significant change to plan and deliver services within a regional model to ensure the delivery of a sustainable high-quality service. This model will necessitate patient transfer and the standards in this document include measures to improve the safety of patient transfer.

In the medium term, there are significant opportunities to improve both the access and the quality of Interventional Radiology services for elective delivery.

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12. Appendices

Appendix A: National Planning Interventional Radiology Group Membership

Name:	Job Titles:	Organisation/ Division:
Dr Raj Bhat (Chair)*	Consultant Interventional Radiologist	NHS Tayside and Fife
Sharon Adamson	Director of Regional Planning	West of Scotland
Liz Blackman	Senior Programme Manager, NNMS	NHS NSS
James Cannon	Regional Director of Planning	North of Scotland
Ian Zealley	Chair SCIN Clinical Reference Group	
Ian Finlay	Medical Workforce	Scottish Government
Peter Johnston	Chair of Scottish Diagnostic Speciality Training Board	
Karen Grieve	Programme Associate Director, National Planning	NHS NSS
Graeme Houston	Consultant Interventional Radiologist	NHS Tayside
Dr Shilpi Pal*	Consultant Interventional Radiologist	NHS Tayside
Jan McClean	Director of Regional Planning	East of Scotland
Hamish McRitchie	Consultant Radiologist	NHS Borders
Alexander Nath	IR Trainee	NHS Greater Glasgow & Clyde
Derek Phillips	Director of Workforce Planning	East of Scotland
Iain Robertson*	Consultant Interventional Radiologist	NHS Greater Glasgow & Clyde
Andrew Walker*	Consultant Radiologist	NHS Lothian
Grant Baxter	Consultant Radiologist	Standing Scottish Committee for Radiology

Name:	Job Titles:	Organisation/ Division:
Ram Kasthuri	Consultant Interventional Radiologist, Clinical Lead	NHS Greater Glasgow and Clyde
Wilma Kincaid	Associate Postgraduate Dean (Diagnostics)	NES
Philli Cottam*	Programme Manager, National Planning	NHS NSS
Mark Allardice*	Senior Programme Manager, National Planning	NHS NSS
Donna McLean	Programme Support Officer, National Planning	NHS NSS
Iain Cameron	Clinical Representative	NHS Lanarkshire
Robert Cockburn	IR Charge Nurse	NHS Grampian
Alan Denison	Postgraduate Dean (Diagnostics)	National Education Scotland (NES)
Mike Ashcroft	Locum Consultant	NHS Grampian
Neil Masson	Consultant IR	NHS Lothian
Paul Bachoo	Consultant Vascular Surgeon	NHS Grampian
Dympna McAteer	Consultant Radiologist	NHS Grampian
Amit Patel	Consultant Radiologist	NHS Greater Glasgow and Clyde
John Taylor	Consultant Radiologist	NHS Lothian
Ioannis Paraskevopoulos	Lead Interventional Radiologist	NHS Grampian
Camilla Young	Programme Manager, SCIN	NHS NSS

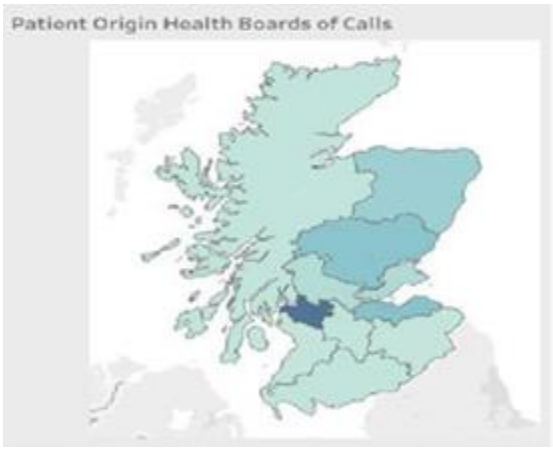
*Denotes that individual is also a member of the NP Interventional Radiology Writing Core Group

Appendix B: SCIN Audit Skills Matrix / OOH Audit tables

Figure 1: Procedures performed in OOH

Procedure Performed	Percentage of Procedures Performed
Nephrostomy	29.10%
Embolization	17.91%
Abscess Drainage	8.96%
Gallbladder Drainage	4.48%
CT Angio	3.73%
Thrombin Injection	1.49%
TIPPS	1.49%
Billiary Drainage	0.75%
Colonic Stent	0.75%
Other Procedure	16.42%
None	14.93%
Grand Total	**100.00%**

Figure 2: Patient Origin Health Boards of Calls



Patient Originating NHS Board	Event Rate
NHS A&A	0.270
NHS Borders	0.877
NHS D&G	1.336
NHS Fife	1.902
NHS Forth Valley	1.982
NHS GG&C	5.131
NHS Grampian	2.382
NHS Highland	0.623
NHS Lanarkshire	0.306
NHS Lothian	0.305
NHS Tayside	4.578
Other	-

Appendix C: Patient Transfer Pro forma for IR Procedures

FILL IN ALL SECTIONS ON BOTH SIDES OF THIS FORM. PRINT ONE COPY TO BE TRANSFERRED WITH THE PATIENT TO THE RECEIVING HOSPITAL. A FURTHER COPY SHOULD BE RETAINED WITHIN THE CLINICAL NOTES AT THE REFERRING HOSPITAL.	**Patient Transfer Pro Forma for Interventional Radiology Procedure** Nov 2021 v1

Roles and responsibilities for Interventional Radiology Transfer

Please read this information before completing the Patient Transfer Pro Forma Document

- To be used in referral of emergency or urgent referrals to Interventional Radiology (IR), consultant to consultant referral. Transfer of critically ill patients between hospitals carries significant risk and therefore it is **essential** that consultation occurs at the level of consultant to consultant.
- Referring clinical consultant to discuss proposed procedure with receiving IR consultant.
- Referring clinical consultant to discuss with receiving clinical consultant.
- If facilities are available, then a conference call is the most effective means of communication.
- Critically ill / unstable patients will require the involvement of intensive care at both the referring and receiving hospitals and may require a critical care escort for the transfer. NB if it is thought likely that ICU will be needed at the receiving centre, then critical care assessment prior to transfer is required and an escort is likely to be needed.
- When the patient has arrived at the receiving centre IR consultant should be informed.
- When no further IR involvement is required, the clinical specialist consultants at receiving and referring hospitals should arrange patient repatriation
- If the patient has cross-matched blood please d/w Blood Bank and arrange for the blood to be transferred with the patient.
- Please send an additional cross-match sample with the patient (and on to the receiving hospital Blood Bank).
- Please ensure all recent blood results are noted.
- The trend of serial observations (worsening / stable / deteriorating) is more important than isolated values.

To complete:

Referring hospital information		Receiving hospital information	
Consultant Clinician: Contact details:		**Consultant Clinician: Contact details:**	
		IR who has been consulted: Contact details:	
Intensivist (if req'd): Contact details:		**Intensivist (if req'd): Contact details:**	

FILL IN ALL SECTIONS ON BOTH SIDES OF THIS FORM. PRINT ONE COPY TO BE TRANSFERRED WITH THE PATIENT TO THE RECEIVING HOSPITAL. A FURTHER COPY SHOULD BE RETAINED WITHIN THE CLINICAL NOTES AT THE REFERRING HOSPITAL.	**Patient Transfer Pro Forma for Interventional Radiology Procedure** Nov 2021 v1

Patient details		**Referring details**	
CHI No:		**Referral date:**	
First name:		**Referral time:**	
Last name:		**Specialty:**	
DOB:		**Referring Ward:** **Tel no:**	
Sex:		**Receiving ward confirmed:** **Tel no:**	
Address:		**Person completing form:** **Contact details:**	

Patient Clinical Information			
Clinical event precipitating transfer (*e.g. GI bleed*):		**Recent clinical background situation (*e.g. minor rectal bleeding*):**	
IR procedure under consideration:		**Blood results available and sent already:**	
Imaging performed (*inc date and time*):		**PMHx:**	
Allergies:		**DHx:**	

Assessment Tool				
	Observations (write in)			**Any findings in these highlighted boxes require critical care assessment re. escort for transfer**
Airway:				OP/NP Intubated/Tracheostomy
Breathing:	Resp. rate			<12 or >22
	Oxygen			>40%
	SpO_2			<92%
Circulation:	Pulse			<55 or >110
	BP			SBP <90 or 20mmHg < patient's normal
Disability:	Eyes		/4	GCS less than 14/15 (anything worse than drowsy or mildly confused)
	Motor		/6	
	Verbal		/5	
	GCS		/15	

Assessment Tool – Further Information			
Renal function:	☐eGFR >60 ☐eGFR <60 but >30 ☐eGFR <30	**Conscious level:**	☐Unconscious ☐Confused but alert ☐Alert and Orientated
MEWS Score (time taken):		**Does patient have capacity to consent?**	☐ Yes ☐ No
Does patient have a DNACPR form in place?	☐ Yes ☐ No	**Does patient have a urinary catheter?**	
Venous access (size and site):		**Fluid given:**	

Outcome information			
Patient transfer with clinical notes to:		**Patient notes included (tick box to confirm):**	☐ Yes ☐ No
Patient to be transferred with critical care support?	☐ Yes ☐ No	**Is blood being sent with patient?**	☐ Yes ☐ No
Level of care requ'd (*ITU, HDU, Surgical Ward etc*):		**Once completed, please send to:**	

Appendix D: Interventional Radiology Procedure by Staff Group

(SCIN Skills Matrix)

Health Board age ranges for Radiol.. | Staffing Ratios | National Procedure % | **Procedure % Per Centre** | Emergency Procedures | AP Procedures | Radiographers with Imaging

Interventional Radiology procedure percentage by centre

Procedure	A&A	BOR	D&G	FIFE	FOV	GG&C	GRAM	HIG	LAN	LOT	TAY
Angioplasty infrapopliteal	100%		100%	86%	100%	100%	100%	100%	95%	100%	70%
Angioplasty superficial femoral Rt	100%		100%	86%	100%	100%	90%	100%	80%	100%	90%
Angioplasty/Stent iliac	100%		100%	88%	100%	100%	100%	100%	70%	100%	90%
Fistulogram	100%		100%	100%	100%	100%	100%	50% 50%	100%	100%	100%
Hickman Line Insertion	100%		100%	50% 50%	100%	95%	70%	50%	100%	100%	100%
Nephrostogram		100%		93%	100%	100%	50% 50%	60%	50% 50%	88%	100%
Nephrostomy	100%	100%		95%	100%	100%	100%	50% 50%	50% 50%	100%	100%
Nephrostomy catheter exchange	100%	100%		96%	100%	100%	100%	50% 50%	50% 50%	100%	100%
Oesophageal stent insertion		100%	100%	100%	80%		100%	50% 50%	90%	100%	90%
Percutaneous nephrolithotomy	100%			100%	100%	100%	50% 50%	100%	100%	100%	60%
PICC Line insertion	80%		100%	91%	90%	100%	95%		50% 50%	75%	100%
Portacath Insertion	100%		100%	100%	100%	100%	100%	50% 50%	100%	100%	100%
PTA Dialysis fistula	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%
Radiological NG tube placement		100%		100%	85%	100%	80%	50% 50%	50% 50%	55%	100%
Stent graft abdominal aorta					100%	100%	50% 50%	100%	50% 50%	100%	50% 50%
Tunnelled central venous line exchange	100%		100%	100%	100%	60%	100%	50% 50%	100%	100%	100%
Tunnelled central venous line removal	100%		100%	95%	100%	100%	100%	100%	100%	100%	100%
Tunnelled dialysis catheter placement	100%		100%	96%		60%	100%	60%	100%	100%	100%

Staff Group
- Interventional Radiologist
- Radiologist
- Advanced Practitioner Radiology
- Advanced Practitioner Nursing
- Other healthcare professional

Appendix E: List of Abbreviations Used

AFC – Agenda for Change

AHP – Allied Health Professional

AP – Advanced Practitioner

BSIR - British Society of Interventional Radiology

CRG – Clinical Reference Group

DiSSG – Diagnostics in Scotland Strategic Group

EP – Extended Practitioner

EWTD – European Working Time Directive

GG&C – Greater Glasgow & Clyde

GMC - General Medical Council

IEB – Imaging Executive Board

IR – Interventional Radiology

NCEPOD - National Confidential Enquiry into Patient Outcome and Death

NHS – National Health Service

NP – National Planning

NPB – National Planning Board

NSD – National Services Division

NSS – National Services Scotland

PICC – Peripherally Inserted Central Catheter

QI – Quality Improvement

QPI – Quality Performance Indicators

RCR – Royal College of Radiologists

SBAR – Situation, Background, Assessment, Recommendation

SCIN – Scottish Clinical Imaging Network

SLWG – Short Life Working Group

SRTP – Scottish Radiology Transformation Programme

STB – Speciality Training Board

Appendix F: Document Revision History

For activation dates, refer to Q-Pulse.

Version	Description of Amendments
0.1	Compiled version for meeting with PC / MA
0.2	Changes post T/C Core principles and referencing
0.3	Minor amendments form NP IR and Small Writing Group
0.4	Amendments following consultation feedback
0.5	Further minor amendments following consultation
0.6	Further minor amendments following consultation
0.7	Put on appropriate Q-Pulse template
0.8	Patient Transfer Pro forma updated and further minor amendments
V1	Published December 2021

Distribution:

Date	Version	Audience
08/12/2020	0.1	NP IR Writing Core Group
13/01/2021	0.2	NP IR Writing Core Group, Regional Directors of Planning, SCIN Leads, SCIN IR CRG Chair
26/02/2021	0.3	Various groups – consultation process
19/03/2021	0.4	NP IR Group and SCIN IR CRG
26/04/2021	0.5	NP Executive Group
-	0.6	-
27/08/2021	0.7	NP IR Writing Core Group
	0.8	NP IR Writing Core Group
14/12/2021	V1	Regional Directors of Planning for Health Board distribution

NOTE
This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.