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**Clinical
Radiology**

The Royal College of Radiologists

Standards for providing a 24- hour interventional radiology service

Second edition

Standards

January 2017

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RCR standards

The Royal College of Radiologists (RCR), a registered charity, exists to advance the science and practice of radiology and oncology. It undertakes to produce standards documents to provide guidance to radiologists and others involved in the delivery of radiological services with the aim of defining good practice, advancing the practice of radiology and improving the service for the benefit of patients.

The standards documents cover a wide range of topics. All have undergone an extensive consultation process to ensure a broad consensus, underpinned by published evidence where applicable. Each is subject to review four years after publication or earlier if appropriate.

The standards are not regulations governing practice but attempt to define the aspects of radiological services and care which promote the provision of a high-quality service to patients.

Current standards documents

Standards for the provision of teleradiology within the United Kingdom

Standards for the reporting of imaging investigations by non-radiologist medically qualified practitioners

Standards for the communication of radiological reports and fail-safe alert notification

Standards for providing a seven-day acute care diagnostic radiology service

Standards of practice and guidance for trauma radiology in severely injured patients, Second edition

Standards for intravascular contrast administration to adult patients, Third edition

Standards for the provision of an ultrasound service

Standards of practice of computed tomography coronary angiography (CTCA) in adult patients

Cancer multidisciplinary team meetings – standards for clinical radiologists, Second edition

Standards for Learning from Discrepancies meetings

Standards for radiofrequency ablation (RFA), Second edition

Standards for patient confidentiality and PACS and RIS

Standards for patient consent particular to radiology, Second edition

Standards for the NPSA and RCR safety checklist for radiological interventions

Standards for a results acknowledgement system

Standards for providing a 24-hour diagnostic radiology service

Standards for Self-assessment of Performance

Standards for the Reporting and Interpretation of Imaging investigations

Standards for Ultrasound Equipment

Foreword

The first edition of this document was published by the The Royal College of Radiologists (RCR) in 2008. While much of the original content remains relevant, the College felt it was important that it should be updated, particularly given the publication in 2015 of revised *Standards for providing a seven-day acute care diagnostic radiology service*, which sits alongside these guidelines.¹ The College is grateful to Dr Raman Uberoi and Dr David Richardson for reviewing and updating this edition to ensure that it is up to date and fit for purpose. Thanks are also due to members of the Clinical Radiology Professional Support and Standards Board and the Clinical Radiology Faculty Board for their input to the review. I hope that colleagues will find this new edition helpful and supportive.

For the safety of patients, it is necessary that acute hospital trusts have formal and robust arrangements to ensure provision of emergency services 24 hours a day, every day of the year. The provision of interventional radiology is no exception and all patients, regardless of geography and hospital size, should have timely access to interventional radiology. Several surveys have shown that this is not currently the case.²⁻⁶ Although there have been significant improvements in provision of out-of-hours interventional radiology since the previous edition of this publication, many radiology departments still have either no interventional on-call rota, or informal arrangements without adequate resource.² This suggests that there is an unmet need for intervention in many hospital trusts. In addition, only a small number of radiology departments report formal lines of referral to other trusts which can provide interventional radiology services on a full-time basis, as highlighted in the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report.⁷ Such unclear arrangements are a potential risk to patients and put unfair pressure on individual radiologists and certain hospital trusts.

There needs to be clarity about the services that can and cannot be offered by individual departments and clear pathways for referral to ensure a better resourced and collaborative national interventional radiology service is established.

The emphasis of this document is to encourage trusts to:

- Put patient safety first, recognising the essential role of interventional radiology in the provision of modern medical care
 - Recognise the human and financial resources required to provide an interventional radiology service
 - Be clear and transparent regarding the local provision of interventional radiology services
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- Decide what is and what is not possible to provide in and out of hours
- Enter into discussions with healthcare authorities and other trusts in the region to make arrangements which ensure robust and coherent regional interventional radiology service provision 24 hours a day, seven days a week.

This document is intentionally brief. It clarifies which services patients should have access to and suggests potential solutions to ensure 24-hour interventional radiology cover. It is stressed from the outset that the provision of appropriate diagnostic imaging is vital to the success of interventional radiology. As with all the College's guidance, this publication will be kept under review to ensure that it remains up to date and fit for purpose.

Dr Richard FitzGerald

Vice-President, Faculty of Clinical Radiology

1. Introduction

The demand for all types of radiological imaging and intervention on a 24-hour, seven days a week basis has increased significantly in recent years.

Interventional radiology (IR) is a collective name given to radiological procedures where the aim is to treat the patient with minimally invasive techniques, with the vast majority of procedures carried out through incisions of around 2–3 mm, and most procedures performed under local sedoanalgesia. IR is a diverse, procedural based subspecialty where interventional radiologists often subspecialise in certain areas such as vascular, urogenital, hepatobiliary and so on. Interventional techniques are now at the forefront of management of many life-threatening emergencies (Table 1).⁸

Every acute trust has a duty to ensure that there are formal arrangements to secure the provision of elective and emergency IR services.⁹ Several surveys have shown that this is not the case.^{2,6–9} There has been a gradual improvement in providing 24-hour interventional services since the first publication of this standard, however, due to insufficient resource, out-of-hours service provision still remains patchy.² **This situation puts patients at risk.**

Table 1. Management of emergencies using interventional techniques

Situations where urgent or emergency interventional radiology is indicated
<ul style="list-style-type: none"> ▪ Stopping haemorrhage (for example, trauma, gastrointestinal [GI] bleeding, post-partum haemorrhage.^{10,11}) ▪ Thoracic aortic aneurysm, traumatic dissection and the complications of Type B dissection, ruptured peripheral aneurysms. ▪ Acute peripheral and visceral ischaemia. ▪ Managing sepsis secondary to upper urinary tract and biliary obstruction (often urgent though rarely an emergency). ▪ Draining complex intra-abdominal and intra-thoracic abscess (often urgent, though rarely an emergency).* ▪ Colonic stenting (often urgent, though rarely an emergency). ▪ Emergency management of abdominal aortic aneurysm.⁵
Situations where emergency interventional radiology might be indicated in the future
<ul style="list-style-type: none"> ▪ Stroke.

* This service will often be shared with diagnostic colleagues.

2. Recommended standards

Standard 1

Recognition that in the absence of provision of IR services patients will be placed at risk.^{5,6,9-13}

Standard 2

There should be clarity within the trust and among referring clinicians and service commissioners about what IR services are available and when they are available.

Standard 3

Clear pathways should be in place for treating patients appropriately when the IR service is not available.

Standard 4

Out-of-hours service provision should be subject to a formal sustainable rota of a 1:6 or greater frequency depending on the population covered and workload.^{8,14}

Standard 5

There should be recognition of the resource implication of supporting a 24-hour interventional service in terms of diagnostic imaging and manpower.^{1,15,16}

Standard 6

Onward referral pathways must be clear.

Standard 7

All doctors are bound to adhere to General Medical Council (GMC) guidance and must comply with the principles and values set out in Good Medical Practice.¹⁷

Standard 8

Radiologists should not normally carry out procedures with which they are unfamiliar.^{9,16}

Standard 9

Radiologists should recognise that ad hoc on-call rotas are not in the best interest of patients.

Standard 10

It is the duty of the radiologist to report any risk management concerns to the trust's clinical governance authorities.²

Standard 11

Radiologists should audit local and regional provision of on-call IR services as well as their personal and unit outcomes.

3. Recommendations for individual departments and trusts

The following issues should be addressed.

Standard 1

Recognition that in the absence of provision of IR services patients will be placed at risk.^{5,6,9-13}

There should be exploration of ways in which a comprehensive service may be offered through internal reorganisation, maintenance of core skills, additional funding/training/appointments or external networking.

Discussion should take place with the clinical governance department about the implications of a lack of 24-hour access.

Standard 2

There should be clarity within the trust and among referring clinicians and service commissioners about what IR services are available and when they are available.

If a service is not available at all, within or outside routine working hours, for example, embolisation for acute haemorrhage, this should be known to the clinical governance authorities. Where there is an unmet clinical need, it is the responsibility of the clinical and medical director to have made all reasonable attempts to ensure these IR services are available to all patients 24/7 and discussions should take place about purchasing appropriate services from another trust. It should be clear which particular IR services are being purchased.

Standard 3

Clear pathways should be in place for treating patients appropriately when the IR service is not available.

The trust's clinical governance process and relevant referring clinicians need to be aware of the situation. This will allow discussion about planned patient pathways when the IR service is not available, for example, default to surgical treatment. This will also document an area of possible need for service development.

Standard 4

Out-of-hours service provision should be subject to a formal sustainable rota of a 1:6 or greater frequency depending on the population covered and workload.^{8,14}

It is not sustainable, safe or timely to rely on ad hoc methods of trying to find a suitable radiologist who is not officially on-call. Nor is it acceptable to assume that another trust will be willing or able to provide the service without official and agreed service level agreements.

A mechanism should be in place for informing clinical teams in advance about when services will and will not be available, so that all involved are clear about when alternative non-radiological treatments or referral will be required.

Standard 5

There should be recognition of the resource implication of supporting a 24-hour interventional service in terms of diagnostic imaging and manpower.^{1,15,16}

Appropriately trained radiographers and nurses are required to support a full-time IR service as are computed tomography (CT) and ultrasound facilities.

Standard 6

Onward referral pathways must be clear.

When a service is not provided on a 24-hour basis, and when this usually results in patients being transferred to other trusts, this pattern of referral requires clarification with the clinical governance processes and agreement on the part of the receiving trust.

It is not sufficient to assume that another trust will accept patients without such agreements. When there is a clinical need for a service on a routine or emergency basis but this cannot be provided locally and patients are transferred elsewhere:

- a. Formal contractual agreements should be in place with any trust to which patients are transferred
- b. Protocols should be in place describing the arrangements for transfer

- c. Transfer must be in a timely fashion
- d. Arrangements for appropriate funding need to be in place
- e. Arrangements for repatriation of patients following treatment should be in place.

4. Recommendations for individual radiologists

Standard 7

All doctors are bound to adhere to General Medical Council (GMC) guidance and must comply with the principles and values set out in Good Medical Practice.¹⁷

When a radiologist who is designated to be on-call is consulted about a patient, it is incumbent on that individual to advise the clinical team appropriately, even if they are unable to carry out the requested examination/procedure themselves.

This may include advice on alternative imaging/treatment or transfer to the agreed alternative provider.

Standard 8

Radiologists should not normally carry out procedures with which they are unfamiliar.^{9,16}

Previous guidance from the RCR has indicated that a radiologist should not carry out at night, an investigation or treatment that they do not carry out during the day.^{9,16} If a service is required on a reasonably regular basis then individual radiologists should maintain the necessary skills. Inevitably, there will be a risk-benefit analysis in any individual case. The risks of transfer of the patient, the presence or absence of any alternative therapies and the experience of the radiologist will all need to be taken into account.¹⁸ As such, a radiologist providing an IR emergency service may only be skilled at some of the procedures listed.

If it is agreed among all the doctors involved that, because of difficulties or danger of transfer or delay, it is in the best interests of the patient to be treated by a less experienced radiologist locally, the situation should be made clear to the patient (and/or their relatives if appropriate) and informed consent obtained.

Standard 9

Radiologists should recognise that ad hoc on-call rotas are not in the best interest of patients.

This form of service provision is unsatisfactory and may conceal a lack of safe, robust and reliable service provision. Formal IR rotas should be supported by appropriate nursing and radiographic staff.¹⁶

There must be a safe environment for performing the procedure, including patient monitoring and anaesthetic help when required, together with liaison with the appropriate clinical team.

Standard 10

It is the duty of the radiologist to report any risk management concerns to the trust's clinical governance authorities.²

This applies when a radiologist has concerns regarding any aspect of the provision of the radiology service.

Standard 11

Radiologists should audit local and regional provision of on-call IR services as well as their personal and unit outcomes.

They should discuss cases at regular discrepancy and morbidity and mortality meetings for continued learning.¹⁹

5. Implementation of standards

Departmental leads should ensure the following.

1. Local agreement is reached among radiologists in clinical departments about what services are provided on-call. Discussion about maintenance of and definition of what constitutes 'core' radiological skills among local radiologists and how these may be maintained should take place. Attendance at relevant continuing professional development (CPD) courses such as those provided by the British Society of Interventional Radiology (BSIR) and the RCR is advisable and it may be necessary to update practical skills by spending time in larger departments.
 2. There is agreement with clinicians on treatment/alternative imaging pathways when a particular aspect of the imaging/interventional service is not available, with written protocols and pathways which are easily accessible.
 3. There is a mechanism for information to be available to clinicians on a daily/weekly basis about when services are/are not available.
 4. Formal contracts exist with other trusts to which patients are transferred for imaging and or intervention.
 5. Locally agreed protocols and/or guidelines for referral for emergency imaging/intervention have the potential to reduce confusion and/or disagreement in individual cases. These protocols should be evidence-based and be agreed with the local clinical governance committee and the relevant clinical teams.
 6. Individual radiologists, in conjunction with clinical leads or their appraiser, should keep their range of skills and routine practice under review, with the aim of balancing subspecialty expertise with the maintenance of core skills needed to provide a trust-wide emergency radiology service (see 1 above).
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6. Suggested models of safe interventional radiology provision

IR is a 'small specialty'; in other words, there is insufficient elective work in many hospitals to support the employment of a large enough number of interventional radiologists to provide a safe IR service during or outside working hours. The same problem exists in many other specialties, such as cardiothoracic surgery, interventional cardiology, neurosurgery, intensive care and so on. For these specialties, centralisation or networking have been the favoured solutions.^{14,20} There is no single solution for provision of 24-hour cover, as geographical considerations may come into play. Collaboration can occur in a variety of local, sub-regional, regional or supra-regional forms. The exact model chosen may vary for each of the subspecialties of IR.

When considering provision of safe IR services, the following potential models of service provision might be considered (Table 2).

Table 2. Models for providing interventional radiology services

Model	Advantages	Drawbacks
Individual centres could each provide a safe IR service.	Maintains the status quo in the short term. Provides local service.	It has been recommended that doctors providing a consultant-delivered service should not be on call on a rota more onerous than 1:6. ^{8,14} This may not be achievable or cost-effective.
Several centres could collaborate to develop a network to provide a safe IR service. <ul style="list-style-type: none"> a. Patient moves b. IR moves 	Makes use of existing staff and facilities across several sites.	Depending on the model, either doctors or patients transfer. Doctors might have to provide cover for several hospitals. Most doctors prefer to work in familiar surroundings where they understand the operational systems and know the equipment and staff.
Hub and spoke arrangement: large specialist centres could provide services for a region on a full- or part-time basis.	Economy of scale of both staff and equipment. Simplifies provision of a robust resilient service in and out of hours. Depending on the model, allows maintenance and development of skills for interventional radiologists working in the periphery.	If the level of care was equivalent, most patients would prefer to be treated locally.
Regional hub with doctors from large centres travelling to acute trusts for non-emergency and minor procedures, but patients coming to the centre for emergency and complex procedures.	Economy of scale of both staff and equipment. Simplifies provision of a robust resilient service in and out of hours. Maintenance of a daytime service locally in the smaller acute hospitals and supporting local interventional staff particularly for periods of leave.	Less efficient use of resources and higher costs. Staff might have to provide cover for several hospitals. Most staff prefer to work in familiar surroundings where they understand the operational systems and know the equipment and staff.

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Appendix 1. Safe interventional radiology service provision

The items below identify the elements of a safe IR service. It is assumed that a department will be appropriately staffed for the safe performance of interventional procedures, including the availability of trained radiographers and radiology nurses.

Vascular diagnosis and intervention

Arterial diagnosis

- a. Interpretation of emergency CT, magnetic resonance (MR) and ultrasound for the detection of vascular pathology.
- b. Mesenteric angiography.
- c. Trauma angiography.
- d. Peripheral angiography.

Arterial intervention

- a. Embolisation of haemorrhage: gastrointestinal (GI) tract, urinary tract, trauma, bronchial, obstetric.
- b. Management of acute arterial ischemia: peripheral, renal, visceral by angioplasty, stenting, thrombolysis and thrombus aspiration.
- c. Use of stent grafts for arterial/aortic rupture.
- d. Stenting and stent grafting for the complications of Type B aortic dissection.

Venous intervention

- a. Insertion of an inferior vena cava (IVC) filter.
- b. Mechanical pulmonary thrombectomy.*
- c. Thrombolysis for phlegmasia caerulea dolens and massive ilio femoral deep vein thrombosis (DVT).
- d. Haemodialysis access: central venous catheter (CVC) fistula thrombolysis and thrombectomy.**
- e. Transjugular intrahepatic portosystemic shunts (TIPS) for variceal haemorrhage.*

Non-vascular diagnosis and intervention

Many of the skills required in this area are core radiological skills and departments should ensure that there are sufficient numbers of radiologists to provide these services in and out of hours.

- a. Interpretation of emergency CT, MR and ultrasound for the detection of non-vascular pathology
- b. **General:** image-guided drainage of abscess.***
- c. **Urological:** nephrostomy to drain infected pelvicaliceal (PC) system, insertion of suprapubic catheter.***
- d. **Hepatobiliary:** percutaneous drainage of infected biliary tree.***
- e. **Gastrointestinal:** colonic stenting.***

* It is recognised that even in large centres uncommon procedures may not be performed by all interventional radiologists hence such interventions may not be available 24/7.

** Fistula salvage is not required as an out-of-hours intervention but may occasionally be required over weekends and bank holidays.

*** It would be rare for these procedures to be required at night-time but they may be required urgently during the daytime at weekends.

Appendix 2. Audit template

Assessment of a department's provision of all aspects of a 24-hour interventional radiology service

The audit template can also be downloaded from www.rcr.ac.uk

Background

The demand for all types of radiological imaging and intervention on a 24-hour, seven day a week basis has increased significantly in recent years. The term '24-hour radiological imaging services' applies equally to elective and acute services.

Interventional techniques are now at the forefront of management of many life-threatening emergencies. Every acute trust has a duty to ensure that there are formal arrangements to secure provision of elective and emergency IR services.^{1,2}

The cycle

The standards

1. Is the IR service formally available 24 hours a day, every day of the year?
2. Is the service formally supported by an on-call rota for a named individual for each of the following groups: consultant radiologist, radiographer, IR nurse, anaesthetist when appropriate?
3. Is diagnostic imaging support such as CT formally available 24 hours a day, every day of the year?
4. Are facilities and consumables available for each of the services listed:
Vascular: arterial diagnosis, arterial intervention, venous intervention?
Non-vascular: general, urological, biliary?
5. If the IR service (part/complete) becomes unavailable for whatever reason is a clear written, agreed substitute patient pathway in place?
6. Is there an IR on-call rota in place with substantive staff and a minimum 1 in 6 frequency?
7. Where the provided IR service is not routinely available 24/7 is a written and agreed pathway in place for patient transfer to another trust?
8. Do IR radiologists participate in relevant continuing professional development (CPD) activity?
9. Are locally agreed protocols in place covering referral for emergency intervention?

Target

100% compliance in all areas.

Assess local practice

The indicator(s)

Affirmative answer to each question.

Data items to be collected

Questionnaire to be completed for each aspect of the service; that is, arterial diagnosis, arterial intervention, venous intervention, general, urological, biliary.

Suggestions for change if target not met

Any deficiency in service provision should be brought to the attention of trust management and interventional radiological colleagues and appropriate discussions initiated to allow compliance with guidance and safe provision of the IR service.

Resources

Interventional imaging lead four hours to complete questionnaire and write up report and checklist for safe IR provision.

Appendix 3. Checklist for safe IR service provision

Performing this simple audit will quickly identify whether your IR service is safe. This should be performed for each of the services specified in Appendix 1.

- | | |
|---|--|
| 1. Service is formally available 24 hours day every day of the year | <input type="checkbox"/> Yes – go to question 3 |
| 2. If the answer to 1 is NO, is the service formally covered under contract with another trust? | <input type="checkbox"/> Yes – go to question 4 |
| 3. Service is formally supported by on-call rota for a named individual for each of the following groups: | |
| Consultant radiologist | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Radiographer | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Interventional radiology nurse | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Anaesthetist when appropriate | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 4. Diagnostic imaging support such as CT is formally available 24 hours per day every day of the year | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 5. Facilities and consumables are available for each of the services listed | <input type="checkbox"/> Yes <input type="checkbox"/> No |

Any deficiencies identified in IR service provision should be acknowledged and acted upon in accordance with the standards provided in this document.



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