

Review

Developing day-case units: imperative for optimal patient care in interventional radiology



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As interventional radiology (IR) treatments have evolved, they have become less invasive, enabling rapid recovery, which expedites ambulation and promotes same-day discharge. As a result of this, a significant proportion of IR elective work can be provided using a day-case service model. Reconfiguration of IR services to increase day-case procedures using a dedicated IR day-case unit (RDU) to facilitate the passage of patients is vital to ensure best medical practice. The aim of this review is to discuss the benefits of day-case IR procedures, the optimal structure of an RDU, and to inform radiologists how to introduce and/or improve day-case IR services in their IR practice.

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Introduction

Interventional radiology (IR) is an established subspecialty of radiology providing life-saving and cost-effective services integral to patient care.¹ More recently, IR has shifted from a procedure-based service to a clinical discipline whereby interventional radiologists take primary responsibility for their patients (Fig 1).² As IR treatments have evolved, they have become less invasive, enabling rapid

recovery, which expedites ambulation and promotes same-day discharge.³ Over 90% of IR procedures are currently undertaken via small incisions, using local anaesthesia and sedation with short recovery times. As a result of this, a significant proportion of IR elective work can be provided using a day-case service model.

Reconfiguration of IR services to fully capitalise on day-case activity, specifically by use of a radiology day-case unit (RDU), is vital to ensure best medical practice in line

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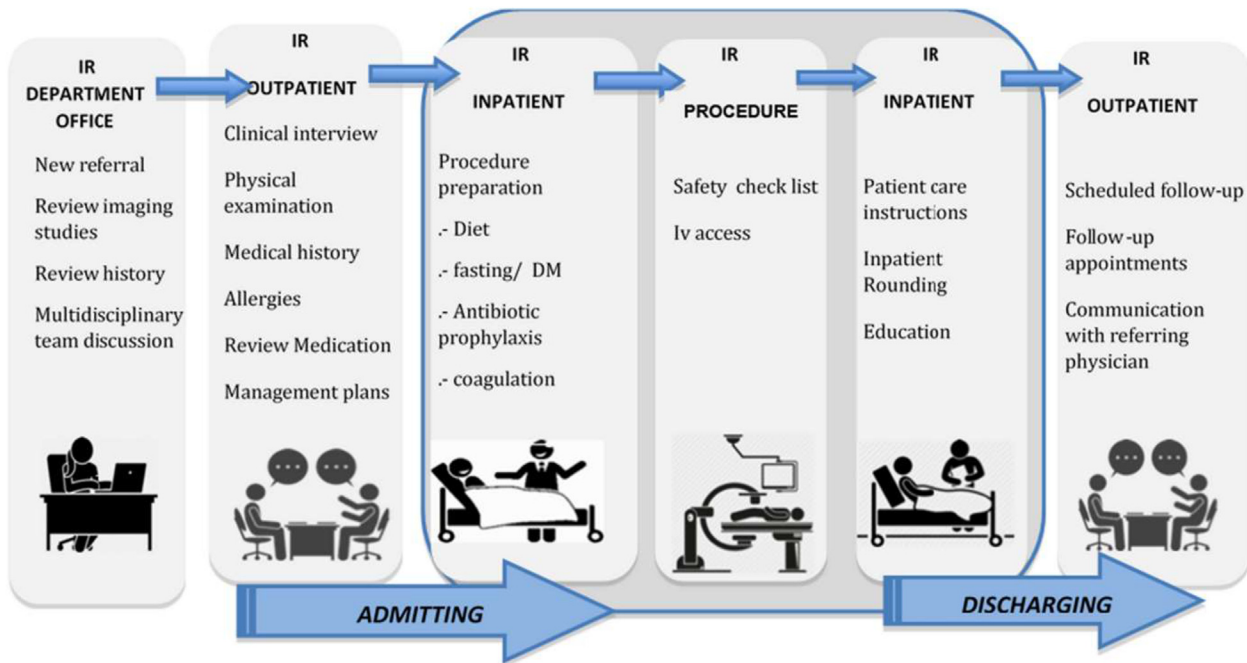


Figure 1 The IR process with the interventional radiologist taking responsibility for a patient through the entire clinical process.²

with the Getting It Right First Time (GIRFT) National Day Surgery Delivery Pack and the 2020 GIRFT Radiology report.⁴ The advantages of a dedicated RDU focus on improved IR service efficiencies maximising procedural capacity; reduced clinical pressures on inpatient wards and/or general day-surgery units due to repatriation of IR admissions and post-procedural care; and improved patient experience by ensuring a smooth patient journey. A recent paper has eloquently described optimising the processes involved with efficient day-case procedural throughput.⁵

A national snapshot survey conducted by the British Society of Interventional Radiology (BSIR) in 2021 showed that only 39% of IR units had dedicated RDU, indicating the need for a national drive towards improvement in IR day-case service provision.

The aim of this review is to discuss the benefits of day-case IR procedures, to outline the optimal structure of an RDU, and to inform radiologists how to introduce and/or improve day-case IR services in their IR practice. A draft business case template is provided on the BSIR website,⁶ which may be used as a basis to secure investment for a RDU in departments where these facilities do not already exist.

Rationale for IR day-case procedures and RDU

There are several benefits of a day-case-based procedure model compared with the standard model involving inpatient-based elective procedural care. Managing IR patients on a day-case basis is ideal for the majority of routine IR work and is preferential for the patient and the hospital.⁷ Patient benefits include reduced risk of cancellation and improved continuity of care with recovery at home and the

reassurance of a pathway that facilitates re-admission should it be required. The Trust benefits economically from increased throughput, improved staff efficiencies and reduced bed occupancy. The service benefits from increased resilience to winter pressures, pandemics, and any other capacity issues.

A dedicated co-located RDU adds to these benefits. The patient pathway and associated governance processes become the responsibility of IR encouraging best practice and driving innovation. There is a concentration of experienced IR staff within a single unit, which has a positive impact on patient safety. Centralising the IR team in one clinical area improves team dynamics and collaboration.

Clear procedural pathways allow more efficient scheduling and targeted pre-assessment by the IR staff. Patient admission and preparation is streamlined without competing demands. There are reduced late procedural cancellations and list downtime, which in turn maximise IR capacity. Delays associated with patient transfer are removed, as is the requirement for porters and staff escort, and handover efficiency is improved.

Managing IR workload through a RDU releases capacity currently used elsewhere within the hospital for IR patients, examples include surgical pre-assessment and surgical day units (SDUs). Reduced demand on the portering service increases their availability elsewhere in the hospital. This leads to increase financial efficiency gains for NHS Trusts.⁸

Key principles of day-case IR practice

Several national bodies have published strategic recommendations and evidence for optimal day-case service provision.^{1,4,7,9,10,14,15} These can be subdivided into the following sections: facilities, staffing, IR day-case procedural

referrals, information technology, coding, audit and key performance indicators, and patient experience.

Facilities

The GIRFT National Day Surgery Delivery Pack best practice recommendation⁴ is for day surgery to be undertaken within a day-case unit, geographically discrete from inpatient activity. The IR day-case pathway should be provided through a co-located dedicated day-case facility including an admissions area, a preoperative assessment clinic and a secondary recovery/discharge lounge. Co-location of all aspects of service provision within the IR day-case pathway is important. This should include specialist preoperative assessment by IR healthcare professionals with knowledge of IR procedures facilitating information to ensure robust patient understanding as part of informed consent and providing an optimal pre-procedural pathway. The extensive variety and complexity of IR procedures means that IR healthcare professionals who are familiar with such procedures are in the right place to provide immediate pre- and postoperative care, particularly recovery and management of postoperative complications. This configuration will also provide the patient and their family with familiarity of the unit and staffing prior to their treatment thus improving patient experience (Fig 2).

As a minimum, an RDU should aim to open from Monday to Friday 08.00 to 18.00, with aspirations to extend hours to increase capacity and throughput. The recommendation from the Association of Anaesthetists (AoA)⁹ is for a 07.00 to 22.00 standard, which is less realistic in the short term. Optimal booking processes and planning (e.g., staggered admission times) need implementation to maximise throughput whilst ensuring adequate time for day-case recovery prior to unit closure. A robust conversion protocol is required to access inpatient beds if complications arise, including a clear standard operating procedure with access to IR on call for clinical queries where necessary.

A six- to eight-bed RDU is the average size nationally according to the BSIR survey. The number of beds was found to be closely related to workflow volume. Consequently, the number of IR theatres and the demand of other radiology day-case work such as ultrasound- and computed tomography (CT)-guided biopsy and musculoskeletal intervention, should be incorporated into local RDU bed requirement calculations.

Pre-procedural admission of elective inpatients through the RDU prior to their procedure can have similar benefits in terms of preparation and efficiency and should be included where appropriate in capacity planning.

Within the RDU, there should be maintenance of physical separation between male and female areas. To maximise space, a combination of trolleys and recliners may be utilised. If space allows, a second stage recovery or discharge lounge/seating area is helpful to reduce the number of patients occupying beds beyond their individual requirements, which may maximise IR throughput during the IR day. We expect that such a discharge lounge would serve as an observation area for procedures that are less invasive

and require brief observation, such as basic radiological biopsies and drainages, and for more complex IR procedures, as techniques become more advanced.

The RDU should ideally have at least one consultation room, a patient waiting area, beverage preparation area, and toilets catering for patients with different abilities. Provision of administrative, nursing, radiographic, and consultant office space within the footprint should be included within the RDU design to optimise patient safety, improve efficiencies in accessing individuals and improving team bonding and morale.

An essential part of a successful day-case service is the aftercare. The most important aspect of this is detailed aftercare planning with the patient. Within the RDU, experienced nursing staff dedicated to this role would provide a point of contact for patients during working hours. Easy access to consultant advice and the ability for outpatient review where appropriate should reduce readmissions and the associated demand on the acute surgical or emergency departments. Out-of-hours provision should also be incorporated within this planning by working with appropriate clinical teams and utilising the out-of-hours IR service.

Staffing

A dedicated team is key to the success of a day-case pathway. Although this should clearly involve nurses working in the IR department to manage patients before, during, and after procedures, other key staff include radiographers, receptionists, and other administration staff.

Scheduling of patients and list coordination can be managed by a team of IR administrative staff with support from senior medical, nursing, and radiographic staff. Pre-assessment and patient communication regarding admission timing and requirements can be coordinated through the RDU nursing staff. Units should develop Local Safety Standards for Invasive Procedures (LocSSIPs).¹¹ The IR/RDU nurses also have the role of monitoring post-procedural recovery and discharge.

The aspirational nurse to bed ratio for a day-case unit is based on clinical acuity and requires insight into the roles and competencies of different staff groups. Due to the heterogeneous nature of IR procedures, the Safer Nursing Care Tool (SNCT)¹² suggests 7.92 staff (based on a selection of grades) to staff an eight-bed day-case facility. Close involvement of senior nursing staff and an accountable hierarchy is important to ensure proper investment in staffing and career progression.

In general, the primary role of the IR theatre team is in ensuring perioperative patient safety and providing hands-on assistance with cases requiring in-depth knowledge of device preparation and management. The RDU team coordinate pre-assessment, admission, patient preparation, the postoperative recovery period, including identification and management of any postoperative complications, and discharge. They, alongside an IR clinical nurse specialist (CNS) team (or advanced practitioners [AP]), should also be able to provide post-discharge advice and planning.



Figure 2 Examples of day-case units in two parts of the country.

Several models of IR nurse staffing exist depending on unit size and throughput. Many units promote skills mix and using the workforce flexibly in both roles with correct training in place. This has benefits in terms of recruitment, where one area is more popular. In other units, the staff are divided into separate teams each managing a different aspect of the patient journey as detailed above. Certain common areas, such as provision of safe sedation and pain relief, may mean there is still the opportunity to provide cover between areas where desired or required. This also has benefits in recruitment if nurses are looking for specific roles. Whichever model is used, incorporating all staff as part of a larger IR team with appreciation of each other's roles and the importance of good working relationships and communication between both groups is important.

CNS and AP roles to support the day-case service promote personal development, job satisfaction, staff retention, and increase unit performance. With appropriate training, these individuals can also be involved in the consent process and coordinate follow-up, requesting imaging and managing follow-up pathways.

Training and support for the IR nursing team is mandatory to encourage staff and to plan and facilitate service and career progression where possible. Moreover, positive feedback and endorsement of innovative practice will ensure day-case IR care will continue to flourish and develop within individual units. An RDU must be supported by a dedicated team of IR administrative staff, specifically bookings clerks and secretaries.

Movement of patients is less important where the RDU is co-located with the IR theatre; however, close relationships should be maintained between the IR department and the portering department to ensure an efficient service when required. Portering should not be an extended role of the IR nursing or radiography teams (Box 1).

IR day-case procedural referrals

At most UK hospital Trusts, IR procedural referrals are from hospital-based specialties. For selected indications, 15.8% of IR departments nationwide have established IR day-case referral pathways and receive direct procedural requests from general practitioners (GPs). These latter pathways utilise “fit to refer” pro formas and mandate that

Box 1. Summary of key features for a model interventional radiology (IR) day-case unit

- Opening hours: 08.00 to 18.00 as a minimum
- Located in close proximity to IR theatres/IR recovery
- Admission and/or discharge lounge
- Pre-assessment facilities
- Consultation rooms for IR outpatient clinic appointments
- Nurse-led unit
- Administration support
- Nurse-led telephone contact with patients 48 h post-discharge

patients are fully optimised prior to procedural requests. As a clinical specialty, the development of dedicated IR day-case pathways with direct IR procedural referrals from both hospital and community-based teams, benefits patients and the referring services and reduces avoidable time delays. As a premise, this approach, along with establishment of IR admitting rights, should be encouraged across IR for recognised elective referral pathways (Box 2).

Information technology

Information technology (IT) is pivotal in driving the success of an IR day-case service. An electronic patient record (EPR) should be used to support the entire IR day-case pathway. Components should include an electronic booking form, preoperative assessment, an IR day-case record, operation notes including links to imaging systems, nursing care charts, and electronically generated discharge prescription and discharge letters. IT systems should also be able to generate patient lists for follow-up telephone calls. All this information should be downloadable to a central database for audit interrogation by hospital informatics to drive continued service improvements.

Coding

Activity from day-case work must be recorded appropriately to ensure that IR departments are credited for budgeting purposes. Accurate coding is vital to monitor IR activity and staff involvement in clinical care episodes via Hospital Episode Statistics (HES) as this directly influences workforce planning. IR procedures are complex, with multiple steps, all of which should and could be coded. In the GIRFT Radiology Report, it was noted that there was less incentive to code IR accurately, as most costs were bundled, and therefore, listing additional codes would not generate additional income for the Trust. Consequently, there is a lack of data on length of stay for IR, infection, and re-admission rates; these datasets are all crucial to quantify the efficacy of IR day-case care and demonstrate best practice. Accurate recording of case complexity and comorbidities also impacts tariff and outcome data.

Nationwide, 15.8% of IR departments directly liaise and collaborate with hospital coding teams to assist in providing

evidence of clinical activity, which is needed to secure future investment. It is recommended that IR departments pro-actively ensure IR procedures and day-case stays are coded accurately via radiology information systems (RIS), as these are used by NHS England to populate the Digital Imaging Dataset (DID). These DID data can then be linked to HES to identify more clearly where an IR procedure has been conducted and to help formulate the case for future service development and financial investment at both national and local levels via outputs from the Model Hospital digital tool.¹³

Audit and key performance indicators

Follow-up and audit are a vital component of the IR day-case pathway, ensuring the delivery of a high-quality patient centred service whilst driving quality improvement. In addition to national audits such as Patient Recorded Outcome Measures (PROMS) and NHS Friends and Family Tests, continuous audit of day-case key performance indicators (KPIs) and hospital-based metrics is essential for service development. Collection of specified datasets will allow comparison with national benchmarks and other Trusts to drive and enhance clinical care further.

IR day-case KPI examples should include: post-procedural symptoms (post-procedure pain, nausea and vomiting [PONV]); unplanned overnight admission; length of stay; re-admission rates (including accident and emergency); postoperative GP visits; index procedures; satisfaction questionnaire (GS-PEQ); missed opportunities (inpatient length of stay = 0). Centralising IR throughput through a dedicated RDU and utilising experienced staff, including administrative staff, CNSs, and APs with a vested interest in this will hugely improve data collection and better demonstrate IR activity and outcomes.

Patient experience

Day-case and inpatient separation by IR service provision through a RDU encourages patients to focus on recovery and promotes successful day-case discharge by a positive attitude to getting home. Combining all aspects of pre-, peri- and post-procedural IR service delivery into one unit reduces patient anxiety as it allows patients and their families to be familiar with the personnel, transport arrangements, location, and the environment of their hospital stay, which in turn improves and expedites recovery, whilst assisting in the success of delivery of post-procedural care at home.

Day-case care is completed after discharge from the hospital when the advanced nursing or radiographic practitioner contacts patients within 48 h of discharge to assess for wellbeing and for any adverse events.

RDU's can increase clinical service resilience by ensuring continuation of procedural care even during times of maximum escalation, such as pandemic scenarios, which has been demonstrated over the past couple of years. This has resulted in fewer cancellations and expeditious treatment, which can be distressing for patients.

Box 2. Summary of potential patients who might benefit from radiology day-case unit care

- Angiography or venography
- Angioplasty/stenting of the arterial or venous systems
- IVC filter insertions and removals
- Embolisation procedures, such as uterine fibroid embolisation, varicocoele embolisation, prostate artery embolisation, and others
- Radial access procedures including transarterial embolisation
- Tube changes
- Biopsies and drainages
- Ablations involving various organs
- Vertebroplasties and nerve root blocks

Summary

Many IR procedures can be performed on patients using a day-case model without the need for admission into inpatient beds within the hospital. These day-case procedures are best performed in IR departments with a dedicated RDU located adjacent to or forming part of the IR department.

RDU offers healthcare Trusts the opportunity to optimise the benefits of minimally invasive IR techniques and provide patients with a better and safer patient experience. By co-locating pre-assessment, day-case admission, and post-operative care of IR patients in a specialist facility the patient journey is more efficient, bed usage is optimised, and patients have IR tailored clinical care throughout their journey. Not only will this improve clinical outcomes and patient experience, but it will also realise significant cost savings for the Trust.

Conflict of interest

The authors declare no conflict of interest.

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