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Improving use of Beds for Interventional Radiology in a Regional Hospital

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Abstract

Background: Interventional radiology (IR) at University Hospital Wishaw has limited access to beds and the CT scanner for performing procedures. This means that planned procedures have to be organized optimally to prevent wastage.
Methods: IR procedures were audited over a 21-week period to assess usage of beds and reasons for cancellation. Following audit, a proforma was introduced to ensure patients were correctly prepared for procedures. A subsequent 21-week audit was then performed.
Outcomes: During the initial audit cycle, 101 procedures were planned with 14 cancelled. Reasons for cancellation included patient factors (6); referrer factors (2); and radiology factors (6). A proforma was introduced to improve patient preparation. During the second audit cycle, 95 procedures were planned with 11 cancelled. Cancellations due to patient factors, referrer factors and radiology factors were 7/11, 4/11 and 0/11, respectively. Overall usage of beds remained similar between the first and second audit cycles.
Discussion: Cancellation of IR procedures was relatively high at 14% and remained similar at 12% following audit cycle. Cancellations due to radiology factors reduced from 6 to 0 but cancellations due to referrer factors increased from 2 to 4.

Keywords

Audit, Hospital Beds, Interventional Radiology, Quality Improvement.

BACKGROUND

Over the last few decades interventional radiology (IR) has become an essential service within most radiology departments in the United Kingdom and is often a core specialty within the hospital. The Royal College of Radiologists state that access to 24/7 IR is essential for all acute hospitals. However, they note that provision of IR remains variable and that many hospitals have limited or no access to IR [1].

IR procedures are minimally invasive, image-guided treatments required in both elective and emergency patient care across most specialties. Many patients require percutaneous biopsy for diagnosis and treatment planning, while other patients need image-guided procedures for haemorrhage or infection control. Often, IR procedures can be performed as day cases, requiring only a short observation period prior to discharge. This can benefit the hospital with decreased costs and bed occupancy, as well as the patient with quicker recovery and return to normal activities [1][2][3][4][5].

In the UK, a factor that was found to repeatedly result in delay and cancellation of IR procedures was pressures elsewhere in the hospital, particularly lack of available beds, meaning that patients cannot be admitted for their IR procedure [2]. Bryant and colleagues argue that access by the IR team to inpatient beds is essential to manage patients undergoing elective IR procedures. They envision a cooperative admission process with other specialties in which IR patients recover in beds of the referring clinical specialty. This is to keep patients within an appropriate environment while maintaining knowledge of IR procedures, expected complications and routine post-procedural care within referring specialties. Establishing pathways for admission, inpatient requirements and discharge can streamline the process [3]. For procedures that can be performed as day cases, a radiology day-case unit provides maximum benefit to patients and the hospital by maximizing procedural capacity, reducing pressures on inpatient wards, lowering the risk of hospital-acquired infections, minimizing the risk of cancellation and providing improved continuity of care [2][4]. Bryant and colleagues state that where there is resistance to providing IR with access to inpatient beds, it is important to highlight the importance of IR across most specialties. Furthermore, documentation of patient outcomes data is vital in demonstrating how IR can benefit the patient and hospital Trust [3]. There is an example of this process being effective within one UK hospital Trust. A radiology team successfully bid for funding to convert a teaching room into a two-bed recovery room for IR day case patients, and to recruit an additional IR nurse [2].

INTRODUCTION

The University Hospital Wishaw is one of three regional hospitals within the hospital Trust. At our site, IR procedures are organized via two patient pathways – outpatients and inpatients. Outpatient biopsies are discussed and requested via a relevant multi-disciplinary team meeting. Once an outpatient biopsy has been agreed, an electronic request is placed, which is vetted by the radiologist performing the procedure. The secretary in the radiology department then contacts the patient and confirms a bed for the procedure, before updating our live departmental booking system. The patient is seen in clinic by the referring specialty and they

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have their bloods taken and they are consented for the procedure. Depending on the referring department, the patient is either given a leaflet explaining the procedure, required preparation including temporarily withholding of medications and fasting, known complications of the procedure and the expected recovery process; or the referrer discusses this directly with the patient. On the day of the procedure, the patient is clerked into the recovery ward – either the medical day unit (MDU), the surgical day unit (SDU) or the ward of the referring specialty. Porters then bring the patient to the radiology department. The patient is taken through consent again by the performing radiologist and the procedure is undertaken. Immediately following the procedure, the patient is monitored within the radiology department by the nursing team before being taken back to the recovery ward, where they are usually monitored for four hours. The specialty referring the patient then assess the patient and facilitate discharge. Inpatient procedures, including biopsy and percutaneous drainage, are discussed directly with the responsible radiologist. The referrer is asked to prepare the patient for the procedure including verbal or written consent, bloods taken within 48 hours of the procedure time and cannulation. The radiology department then organizes a time for the procedure and notifies the referring specialty.

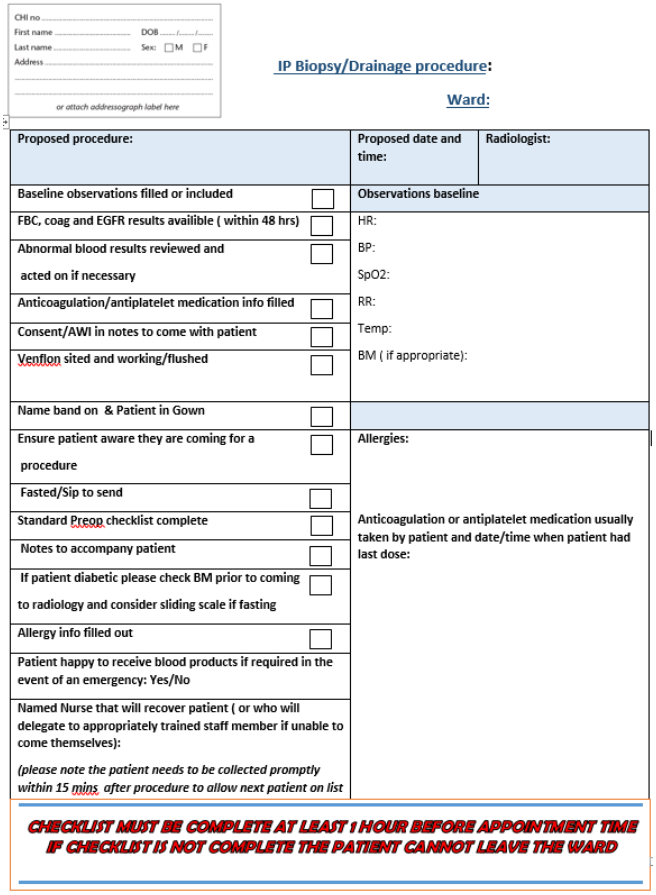
Availability of IR at our site has fluctuated over time but has always been limited by access to hospital beds. Currently, there are five beds available in the recovery wards per week. The number of outpatient procedures that can be performed per week is therefore limited to five, although this can be reduced depending on staffing and public holidays. The number of inpatient procedures that can be performed is limited by the availability of radiologists and nurses in the radiology department, as well as access to the CT scanner and ultrasound rooms. Agreed standard operating procedures (SOPs) have been developed between the radiology department and the recovery wards for patient transfer and post-procedural care.

The limited availability of IR beds at our site puts a lot of pressure on the IR service. This is compounded by cancelled procedures. In order to improve our IR service, we conducted audit to determine factors resulting in cancelled procedures. We then attempted to improve preparation of patients for IR before further audit.

METHODS

Prior to the initial audit cycle, a live spreadsheet was created on the radiology department's network drive. All planned procedures were entered into the spreadsheet, including details relating to the patient, referring consultant, referring ward, type of procedure, date and time of procedure, whether the procedure was completed and any reasons for cancellations. Two members of the secretarial staff in the radiology department were assigned to booking IR procedures and populating the spreadsheet.

A 21 week audit cycle was performed between 30/01/23 and 23/06/23. During the audit period, all planned IR procedures were assessed for whether the patient was an inpatient or an outpatient, the type of procedure, if the procedure took place and the reason any procedures were cancelled. Following the initial audit cycle, a proforma was generated to act as a checklist for patient preparation prior to radiological intervention. The proforma was adapted from an anaesthetic pre-surgical check list and included factors relating to patient optimisation (Figure 1). This was disseminated to all of the medical and surgical wards in the hospital via e-mail and ward posters and at hospital induction and educational events. Referrers were informed that the proforma must be completed prior to a patient leaving their ward for a planned procedure. Prior to the procedure, nurses in the radiology department phone the ward to ensure the proforma is completed, before collecting the completed proforma and then receiving the patient. A second 21 week audit cycle was performed between 05/08/24 and 27/12/24.


CHI no .....
First name ..... DOB ...../...../.....
Last name ..... Sex: ☐M ☐F
Address .....
.....
.....
or attach addressograph label here

IP Biopsy/Drainage procedure:

Ward:

Proposed procedure:	Proposed date and time:	Radiologist:
Baseline observations filled or included ☐	Observations baseline	
FBC, coag and EGFR results availible (within 48 hrs) ☐	HR:	
Abnormal blood results reviewed and acted on if necessary ☐	BP:	
	SpO2:	
Anticoagulation/antiplatelet medication info filled ☐	RR:	
Consent/AWI in notes to come with patient ☐	Temp:	
Venflon sited and working/flushed ☐	BM (if appropriate):	
Name band on & Patient in Gown ☐		
Ensure patient aware they are coming for a procedure ☐	Allergies:	
Fasted/Sip to send ☐		
Standard Preop checklist complete ☐	Anticoagulation or antiplatelet medication usually taken by patient and date/time when patient had last dose:	
Notes to accompany patient ☐		
If patient diabetic please check BM prior to coming to radiology and consider sliding scale if fasting ☐		
Allergy info filled out ☐		
Patient happy to receive blood products if required in the event of an emergency: Yes/No		
Named Nurse that will recover patient (or who will delegate to appropriately trained staff member if unable to come themselves): *(please note the patient needs to be collected promptly within 15 mins after procedure to allow next patient on list*		

CHECKLIST MUST BE COMPLETE AT LEAST 1 HOUR BEFORE APPOINTMENT TIME
IF CHECKLIST IS NOT COMPLETE THE PATIENT CANNOT LEAVE THE WARD

Figure 1. Proforma used to ensure adequate preparation of patients prior to radiological intervention

RESULTS

During the initial audit period, a total of 101 procedures were planned, with 87 taking place (86%) (**Table 1**). Of these procedures, 42 (42%) were performed as inpatients and 59 (58%) as outpatients. In total, 41/42 (98%) of inpatient procedures were performed, with the sole cancellation due to

the patient being deceased prior to the procedure taking place. In contrast, 46/59 (78%) of outpatient procedures took place. Factors in the radiology department were the greatest cause for cancellations (6/13, 46%), predominantly due to staff sickness. During the audit period, one of the two consultant radiologists performing lung biopsies left the department leaving no cover for procedural work in the event of unplanned staff absence. The second greatest cause for cancelled procedures was patient factors (5/13, 38%), due either to patient cancellation (3/5) or failure to stop medications prior to the procedure as instructed (2/5). Only 2 (15%) procedures were cancelled due to referrer factors, in both instances due to procedures considered being no longer required.

Table 1. Completion rate of planned IR procedures 30/01/23 –23/06/23

	Planned	**Cancelled**	**Performed**	**Reason cancelled**		
In-patients	42	1	98%	Patient factors	1 (100%)	1 Deceased
Out-patients	59	13	78%	Patient factors	5 (38%)	3 DNA/cancelled 2 Medications not stopped
				Referrer factors	2 (15%)	2 No longer required
				Radiology factors	6 (46%)	4 Staff sickness 1 Booked in error 1 Not technically possible
	101	**14**	**86%**			

During the second 21-week audit period, 95 procedures were planned, with 84 taking place (88%) (Table 2). In total, 36 (38%) of procedures were performed as inpatients and 59 (62%) as outpatients. Of the inpatient procedures, 32/36 (89%) were performed. Reasons for cancellations were split equally between patient factors and referrer factors. Overall, 52/59 (88%) of outpatient procedures took place. Between the two audit cycles an additional radiologist who performed lung biopsies was hired. No procedures were cancelled due to absence of a radiologist as a consequence of improved cover on the IR rota. The greatest reason for cancellation was patient factors (5/7, 71%), with 4 patients cancelling and 1 patient having a meal prior to the scheduled procedure. Overall, 2 procedures (29%) were cancelled due to referrer factors, both due to short-staffing in the recovery wards.

Table 2. Completion rate of planned IR procedures 05/08/24–27/12/24.

	Planned	**Cancelled**	**Performed**	**Reason cancelled**		
In-patients	36	4	89%	Patient factors	2 (50%)	1 Cancelled 1 Acutely unwell
				Referrer factors	2 (50%)	2 No longer required
Out-patients	59	7	88%	Patient factors	5 (71%)	4 DNA/cancelled 1 Ate meal
				Referrer factors	2 (29%)	2 Recovery ward short-staffed
	95	**11**	**88%**			

DISCUSSION

The overall proportion of planned IR procedures completed during the first and second audit cycles was similar at 86% and 88%, respectively (Figure 2). During the initial audit cycle, the completion rate of inpatient procedures was 98%. The only planned inpatient procedure that was cancelled was due to the patient being deceased. During the second audit cycle, the completion rate was 89%. Procedures were cancelled due to patient factors such as refusal of procedure or the patient being acutely unwell, or due to the referrer deciding that the procedure was no longer required. No procedures were cancelled due to radiology factors or insufficient patient preparation. Between audit cycles, the completion rate of outpatient procedures increased from 78% to 88%, a 13% relative increase. The improved completion rate of outpatient procedures was partly due to the hiring of a second radiologist trained to perform lung biopsies. However, during the second audit cycle cancellations occurred due to staff shortages in the recovery wards, which did not happen during the initial audit cycle. The rates of cancellation due to patient refusal and incorrect patient preparation remained similar. During the second audit cycle, no outpatient procedures were cancelled due to the referrer deciding that the procedure was no longer required, which was an improvement.

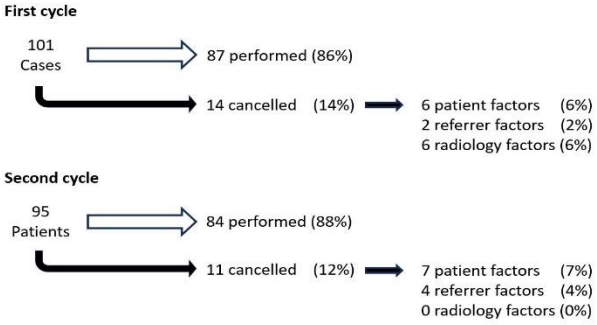


Figure 2. Summary of outcomes in each audit cycle.

This audit of IR procedures helped to improve the IR service at our site. We introduced an on-line spreadsheet for procedure planning and booking and two members of the secretarial staff within the department were made responsible for managing bookings, including communication with patients and referrers. This helped to stream-line the service and remove some of the burden of organization from the IR radiologists. Over the course of the audit, we managed to eliminate radiology-related reasons for cancelled procedures, including staff shortage and errors in bookings. This process highlights the difficulty in trying to run an IR service with a single radiologist in a regional hospital. Cancellation due to the referrer deciding that the procedure is no longer required results in the loss of an IR bed and may potentially be avoided with better anticipation and planning. This may be improved by highlighting to referrers the demands on the IR service and the limited number of beds available for IR patients. Cancellations/DNA by patients is more difficult to manage. This was more frequent in the lung biopsy population, likely due to a higher perceived risk profile of complications associated with lung biopsy. A potential solution might be for the secretarial staff to contact the patient after clinic consent but prior to the procedure to check whether they still wish to proceed. However, it is realistic to accept that there will always be unanticipated cancellations by patients. The overall aim should be to increase availability of beds for IR, accepting that demand comes in peaks and troughs and that occasionally some beds may be unused. Given the current demand for beds in the hospital, this may be an unpopular model for hospital management but this needs to be balanced with increasing waiting times for IR procedures.

CONCLUSION

Following this audit of bed use for IR in a regional hospital the overall completion rate of IR procedures remained similar. Through the hiring and training of an additional IR radiologist and the setting up of a dedicated departmental IR booking system, we managed to eliminate radiology-related reasons for procedural cancellations. By fostering a good relationship with specialities making IR referrals, the limited resource of IR beds is well-appreciated and only a small number of IR procedures were cancelled by referrers throughout both audit cycles and numbers were unchanged. During the second audit cycle two procedures were cancelled due to a shortage of nurses in the recovery wards, which was a new cause for cancelled procedures. Patient factors were the greatest cause of cancelled procedures during both audit cycles, largely due to cancellation/DNA and this is likely to be the focus of improving IR completion rates in the future. The authors hope that the changes we implemented during our audit process serve as a useful model for other regional hospitals trying to run an IR service with limited resources.

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