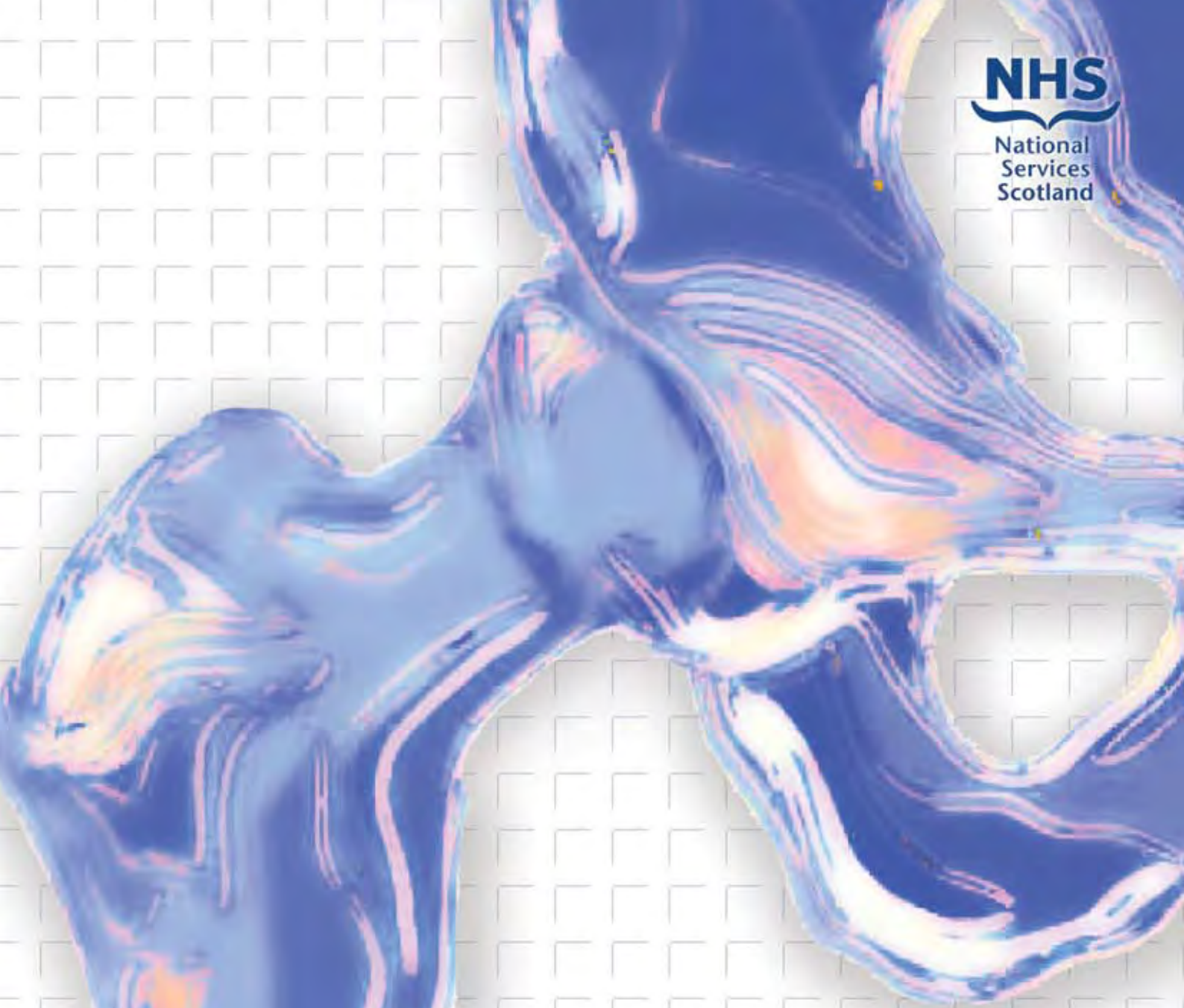

NHS National Services Scotland

Clinical Decision-Making: Is the Patient Fit for Theatre?

A Report from the Scottish Hip Fracture Audit

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يمكن أن يتوفر هذا الإعلان بلغات مختلفة، وطباعة بحجم أكبر، وطباعة برايل (باللغة الإنجليزية فقط). للحصول على معلومات حول ترجمة هذا الإعلان بلغتك المحلية، يرجى الاتصال بالرقم الوارد أدناه.

यह प्रकाशन विभिन्न भाषाओं, बड़े अक्षरों, ब्रेल लिपि (सिर्फ अंग्रेजी) में उपलब्ध कराया जा सकता है। आपके समुदाय की भाषा में इसे प्रकाशन के अनुवाद के बारे में जानकारी के लिए कृपया नीचे दिए हुए नम्बर पर टेलीफोन करें।

এই প্রকাশনাটি বিভিন্ন ভাষায়, বড় ছাপার অক্ষ-র এবং ব্রেইলী-ত (শুধুমাত্র ইং-রজী-ত) সরবরাহ করা যে-ত পা-র। এই প্রকাশনাটি আপনার মাতৃভাষায় অনুবাদ সম্পর্কিত ত-থ্যর প্র-য়াজ-ন অনুগ্রহপূর্বক নিম্নলিখিত নাম্বা-র টেলি-ফান করুন :

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یہ طبع مختلف زبانوں اور بڑے چھاپ میں دستیاب کی جاسکتی ہے، برائلی (صرف انگریزی میں)- اپنی کمیونٹی کے زبان میںاس طبع کے ترجمے کے بارے میں معلومات حاصل کرنے کے لئے، براہ کرم مندرجہ ذیل نمبر پر فون کیجئے-

Telephone 0131 275 7777

Contents

Foreword

Hip fracture is a common and serious injury typically affecting elderly, often frail, patients. Most patients are treated surgically, but may have co-existing medical illnesses which need to be investigated and treated urgently to enable safe operation. The national Scottish Hip Fracture Audit (SHFA) currently audits hip fracture surgery and care for all patients across mainland Scotland, amounting to over 6000 patients per year.

In 2005 we reported on delays in getting this group of patients to theatre. Although delay to theatre may not unequivocally impact on mortality, this group of patients can have serious co-morbidity issues, are at risk of complications, and on compassionate grounds merit early intervention.

An operational standard, based on the Scottish Intercollegiate Guideline (SIGN 56) and NHS Quality Improvement Scotland standard *Older Patients in Acute Care*, was introduced.

The Operational Standard:

By December 2007, 98% of all hip fracture patients are to be operated on within 24 hours of admission to an orthopaedic unit, subject to medical fitness and during safe operating hours (8 am – 8 pm, 7 days a week).

The SHFA was keen to understand why medical delays to theatre occurred, so in 2007 we undertook a time-limited audit which examined the clinical decision-making in determining medical fitness for theatre.

This report presents the results of that audit. These data allow us considerable insight into the relative contributions of different diseases and will allow units to, if necessary, refine their peri-operative management.

There are messages for many involved in the care of these patients. Rapid access to medical records and results can simply and effectively speed up surgical treatment. Use of readily available protocols for preoperative management of investigations and drug therapy may considerably reduce delay. Consistency and clarity of decision-making is important, as is the realisation that delay for treatment or investigation may well allow further deterioration to occur.

The variation in rates of delay for medical investigation and management across the country has already prompted local responses to ascertain reasons for this, and to change practice if necessary. It may be that there are complex or unaudited reasons for these results, and we welcome the opportunity to work with all those who care for this vulnerable group of patients to identify further the underlying problems and help develop solutions.

I would like to thank all those who have collected, verified and analysed the data. The co-operation and energy demonstrated in units throughout the country indicates the importance they place on improving patient management.

Dermot McKeown

Consultant in Anaesthesia and Intensive Care, Royal Infirmary of Edinburgh
Medical lead for SHFA's Fitness for Theatre audit

Summary and Key Findings

Context

- Delay in surgical management of patients with hip fractures can result in pain and distress for affected patients and is associated with an increase in complications. The Scottish Government Health Delivery Directorate introduced a target of surgery within 24 safe operating hours by December 2007, subject to medical fitness.
- This time-limited audit looked at whether the variation in postponement rates for medical reasons between hospitals occurred as a result of differences in patient casemix between hospitals, or whether the differences reflected variation in anaesthetic and surgical management.
- From February to December 2007 medical staff across Scotland were asked to complete an assessment sheet describing hip fracture patients' fitness for theatre, or documenting their reasons for postponement and subsequent plans of action.

Patients and Postponement

- 5447 hip fractures (92% of Scottish total) were audited. 1254 (23%) hip fracture patients were determined to be 'medically unfit' and surgery postponed at first theatre assessment.
- Coagulation/haematology (5% of all patients), cardiac (5%), respiratory/infection (4%) and combined medical problems (4%) were the commonest specific reasons listed for postponement, but unavailability of information (past medical history, casenotes, routine results, etc) accounted for another 3% of patients being postponed.
- Postponements due to lack of information were resolved most quickly, whilst coagulation disturbance, respiratory infection and combined problems resulted in the longest postponements to surgery.

Preoperative Medical Abnormalities - Frequency and Associated Postponement

- Documented medical abnormalities recorded by routine investigations (e.g. heart rhythm, ECG and CXR) and observations (blood results, vital signs), were used to confirm whether postponement rates increased with medical co-morbidity. These data were defined as *major* or *minor* abnormalities, after a study where these were shown to be associated with poorer outcomes.
- 58% of 941 patients with one or more major abnormalities were postponed at first assessment, compared to 25% of 1384 patients with minor abnormalities.
- 361 (12%) patients with no documented abnormality were postponed at first theatre assessment. Many of these postponements were associated with lack of information, observations close to abnormal limits, or other problems not specifically audited by SHFA.
- Only 47% of the 548 patients with a major abnormality who were postponed at first theatre assessment had this problem resolved before they went to theatre. Rates of resolution depended on the nature of the abnormality (Table 3) – for example, 80% of patients with coagulation disturbance were improved significantly when re-assessed prior to surgery, but only 31% of patients with renal impairment as measured by creatinine levels exceeding 225 umol/L had these levels reduced.
- 126 patients (9% of all postponed patients) had additional major abnormalities identified whilst being postponed prior to surgery. At least 74% of these developed during postponement. Delay may have contributed to these deteriorations.

Delays by Hospital

- Rates of postponement at first assessment varied between 12 and 40% between hospitals. Hospitals with high rates of postponement for patients with major abnormalities were also more likely to postpone more patients with minor abnormalities. This range of hospital postponement rates was only slightly lowered following casemix adjustment (Fig. 18).
- There was no indication that hospitals that postponed more patients reduced overall delay by taking postponed patients to theatre more quickly.
- Use of specialised investigations differed between hospitals. 4.3% of all patients were planned to have echocardiography following first assessment, but this varied between 0 and 15% between hospitals.

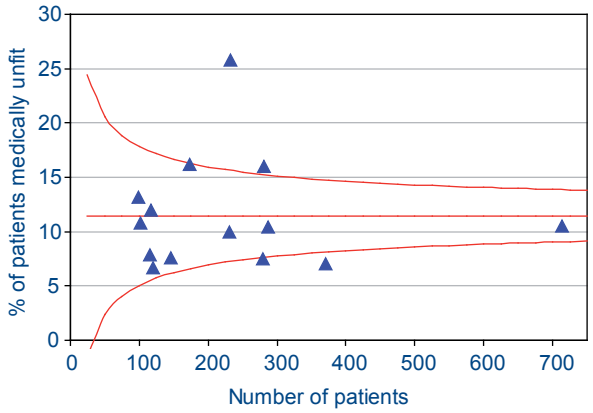
Bigger Picture

- Despite a concurrent target for reducing hip fracture patient times to theatre **if medically fit**, there was no indication nationally that the proportion of patients delayed as medically unfit increased from 2006, or during 2007 as pressure to meet the target increased towards the end of the year.
- Nationally, time to theatre was reduced for target (medically fit) patients, with no consequential adverse increase in waiting times of patients who were medically unfit.
- Medically fit patients who missed the target for surgery were not further postponed more than necessary: less than 2% were delayed beyond three days post-admission, and only 15% of these were associated with theatre unavailability.
- Mortality rates remained at pre-target levels.

Introduction

- Delay in surgical management of patients with hip fractures, while not unequivocally associated with increased mortality, results in pain and distress for the affected patients and is associated with increases in complications.
- Patients with hip fractures frequently have co-existing medical illnesses that affect the choice of anaesthetic and surgical techniques. Although it may be safer to treat these conditions preoperatively to reduce operative risks, delay may also be associated with deterioration in physical condition.
- 3267 (96%) of all hip fractures audited by the Scottish Hip Fracture Audit (SHFA) in 2006 were treated surgically, but 374 (11%) were excluded from Time to Theatre targets because they were documented as medically unfit for immediate surgery.
- The proportion of medically unfit patients in 2006 varied between hospitals (Fig. 1), raising the question of whether there were significant differences in patient casemix between hospitals, or whether the differences reflect variation in approaches to anaesthetic and surgical management.
- Consequently, we designed a time-limited audit to investigate these differences **in 2007**. We asked medical staff (particularly anaesthetists) to complete an assessment sheet describing patients' fitness for theatre, or documenting their reasons for postponement and subsequent plans of action.

Fig. 1: Pre-audit variation in medical fitness for theatre: percentage of patients in 2006 who were treated surgically but documented as unfit for theatre within 24 safe operating hours of ward admission



Data for patients admitted to 14 contributing hospitals between April and December 2006. Each triangle represents a different hospital. See link to SHFA Annual Report 2007 on www.shfa.scot.nhs.uk for more detail.

This report compared to SHFA Real-Time Reports:

Please note that postponements in this report are not directly comparable to delays in the SHFA/NWTU Real-time Reports sent to each participating hospital on a monthly basis.

SHFA 'Real-time Reports' report on the number of patients reaching theatre within 24 safe operating hours. Key points to consider are:

- Unfit patients who do not reach theatre within the 24-hour safe operating time-frame are **excluded** from the target.
- The percentage reaching theatre within 24 safe operating hours will include patients who were deemed unfit at some point but still made it to theatre within the target time.

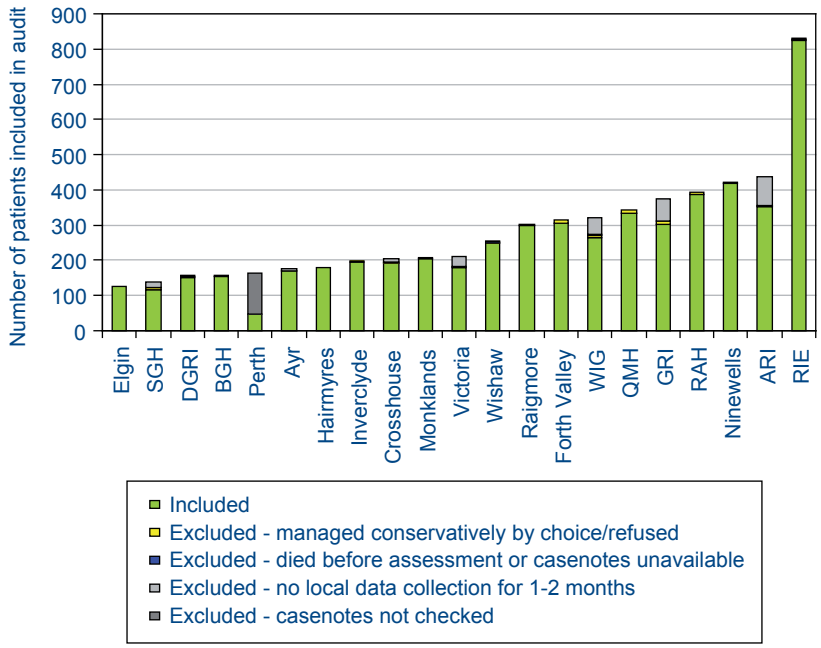
Here, **'Clinical Decision-Making - Is the Patient Fit for Theatre'** focuses on our 'time-limited audit', where we looked at the decision-making process in determining patients' fitness for theatre, cause of delays and plan of action. The percentage of postponed patients reported here is simply a reflection of how many patients were deemed unfit on *assessment*. Key point to consider:

- Some of these postponed patients ultimately reached theatre within the 24-hour safe operating period.

Participation and Methodology

This report summarises data collected during **February to December 2007** from 21 mainland orthopaedic units which carry out hip fracture surgery in Scotland (Fig. 2). Perth had variable participation in the audit, but submitted data from 66% of patients from September to December. Resource issues prevented collection of up to two months data from seven other hospitals. A small number of other patients were excluded who were managed conservatively by surgeon's choice or refused surgery (88), because notes were unavailable (7) or because the patient died soon after admission (7). Despite these exclusions, we report on data from 5447 patients, representing 92% of all hip fractures admitted in Scotland during this eleven-month period.

Fig. 2: Number of patients included/excluded by hospital

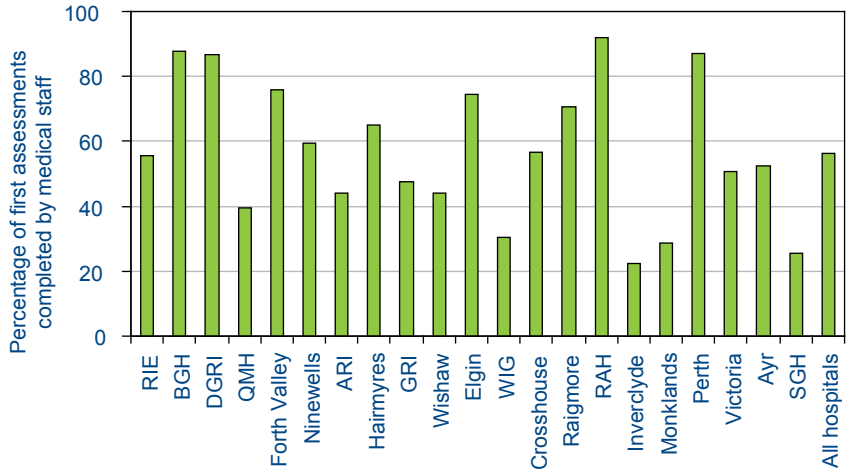


Link to table with more detail

This figure reflects all hip fractures admitted to hospitals between February and December 2007, except Ayr and Crosshouse who did not begin data collection until late February 2007.

Medical staff (predominantly anaesthetists) were asked to complete assessment forms each time they assessed a hip fracture patient for surgery, giving results of investigations carried out, the plan for theatre and/or subsequent further investigation or treatment. Data for first theatre assessments for 3062 patients (56%) were collected in this way (Fig. 3), while the remainder were collected from casenotes by SHFA's network of Local Audit Co-ordinators (LACs). Medical staff completion rates varied from 22% at Inverclyde to 92% at RAH. LACs also provided data on patient observations at the time of each assessment, as available from casenotes. Although LACs were more likely to have to complete assessment forms for patients who were postponed or who had major medical abnormalities, this was associated with casemix differences between Medical- and LAC-completed assessment forms and is not thought to have influenced other results presented in this report (see Appendix 1 for more detail).

Fig. 3: Proportion of first assessments completed by medical staff



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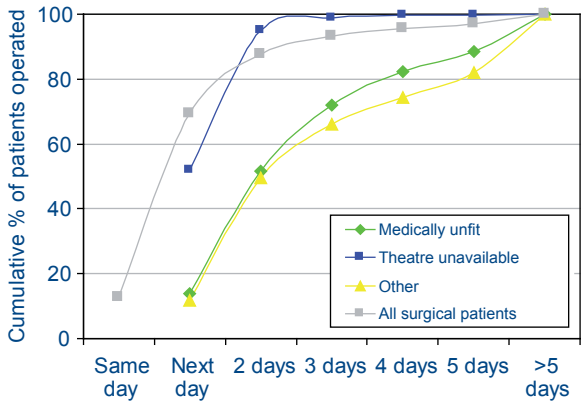
Patients and Postponement

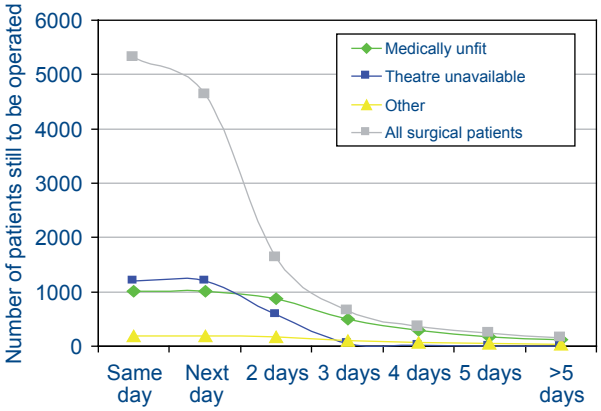
SHFA has traditionally reported on how long patients wait between admission to orthopaedic care and surgery, and recorded the reason(s) for any delay if the patient waits more than 24 hours. Fig. 4a shows that 50% of patients delayed by more than 24 hours to surgery because theatre time was not available still went to theatre on the next day after admission. By the second day after admission 95% of patients originally delayed due to theatre unavailability had gone to theatre, and 99% by the third day. Most patients who have not gone to theatre within three days have medical problems (Fig. 4b).

Fig. 4: Time to theatre in relation to reason for delay

a) Percentage frequency



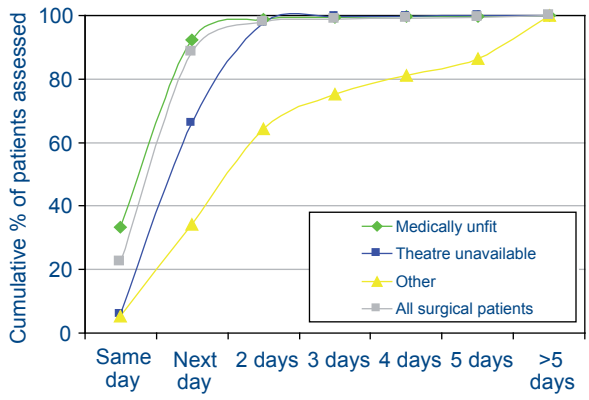
b) Absolute numbers



'Other' reasons for delay include delayed diagnosis, delay for further fracture definition and delay because the patient was originally treated conservatively. Grey lines show data for all 5319 surgical patients, including those who were not delayed.

Timing of first theatre assessments (Fig. 5) usually reflects these reasons for theatre delay, although patients who were documented as medically unfit were assessed quickest of all, reflecting that many had obvious severe co-morbidities.

Fig. 5: Time to first theatre assessment in relation to reason for delay



91 patients were excluded because first assessment dates were not documented.

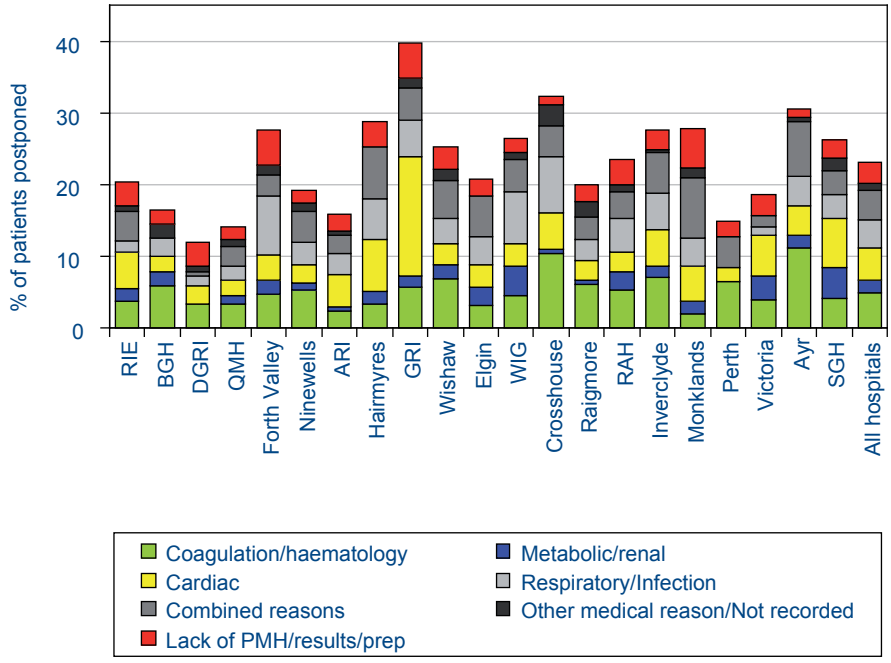
1254 (23%) hip fracture patients were determined to be 'medically unfit' and surgery postponed at first theatre assessment. Nationally, there was no significant difference in rates of postponement during the eleven-month duration of this audit, or by day of the week. In addition to patients excluded from this report because they were treated conservatively by surgeon's choice (and hence medical fitness for theatre never assessed), a further 128 (2.3%) patients were assessed as unfit at first or subsequent assessment and eventually treated conservatively.

It was felt that surgeons generally assessed the patient's 'need' for theatre, whilst anaesthetists assessed the patient's 'fitness' for theatre. Therefore orthopaedic medical staff were only asked to complete an assessment form if they deemed the patient to be medically unfit for theatre. Consequently, anaesthetists carried out 89% of all known-specialty first assessments. The 10% of assessments carried out by orthopaedic staff generally reflected assessment forms from a group of patients with obvious significant co-morbidities incompatible with immediate surgery.

422 patients postponed at first assessment were assessed by a trainee. Most trainees who postponed patients had referred to consultants (97% of 282 patients with documented consultation) or staff grades (2%).

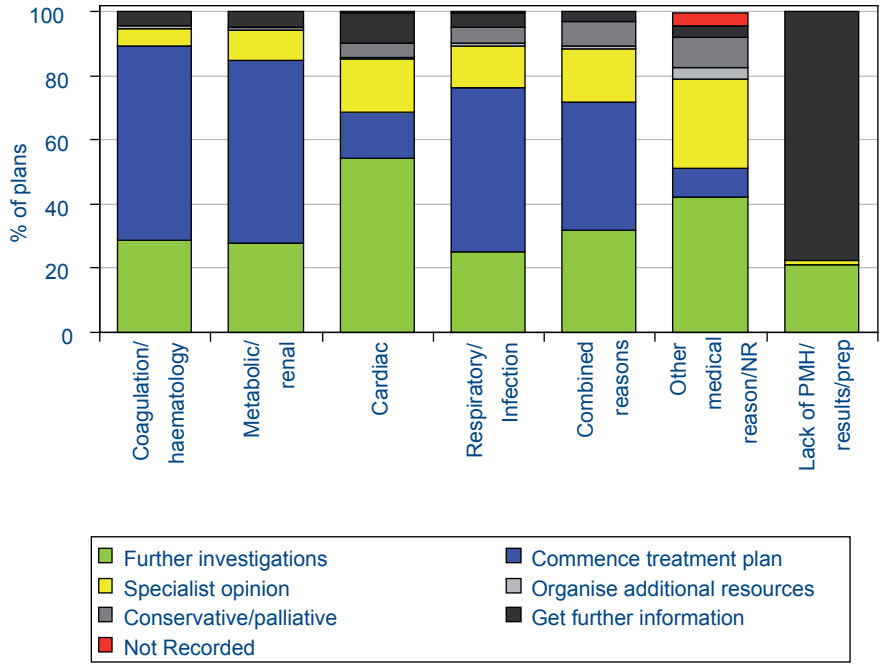
Most postponements were attributed to specific medical problems, rather than unavailability of information (PMH, casenotes, routine results, etc.) (Fig. 6). Subsequent plans of action depended on the reason for postponement (Fig. 7), but also varied between hospitals (Fig. 8).

Fig. 6: Percentage of hip fracture patients postponed at first theatre assessment for medical reasons, and reasons for postponement



Link to table with more detail

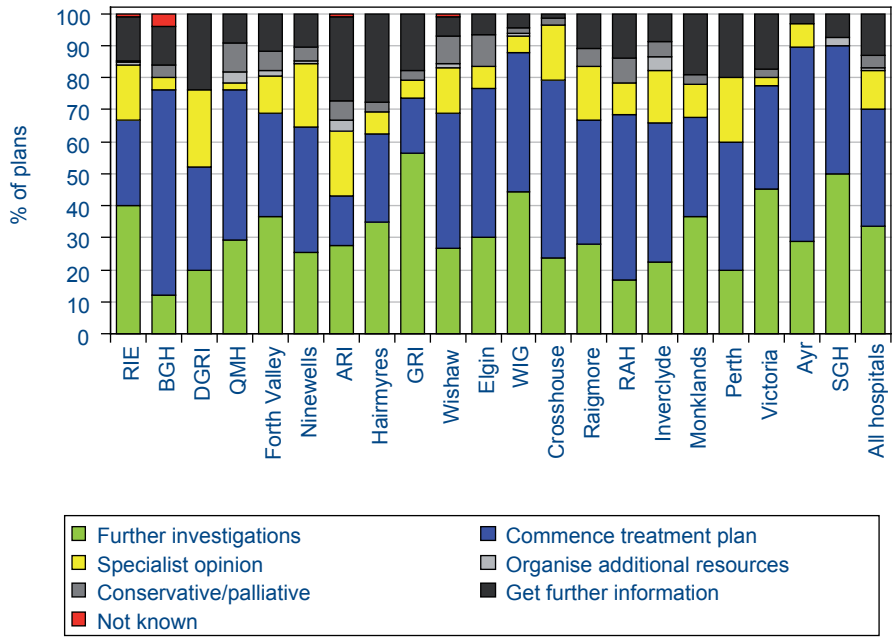
Fig. 7: Plans of action by reason for postponement for patients postponed at first theatre assessment



Patients who were delayed for cardiac reasons frequently required further investigation, or review by specialists.

Fig. 8: Plans of action by hospital for patients postponed at first theatre assessment

Link to table with more detail

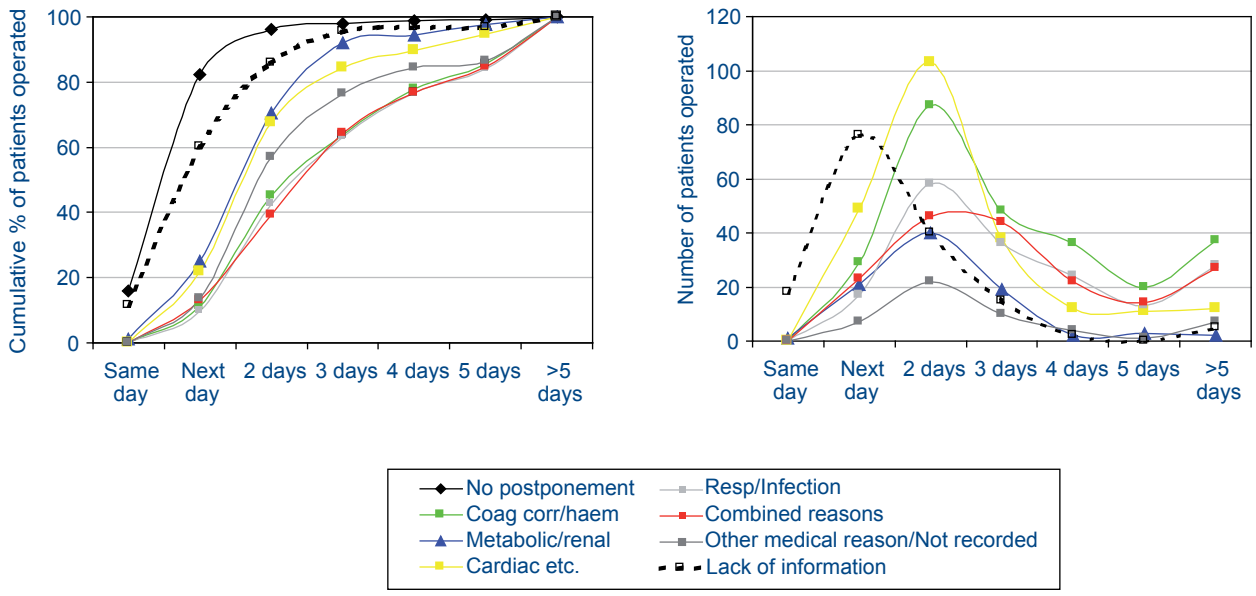


Postponements due to lack of information were resolved most quickly. Patients with cardiac, metabolic or renal problems proceeded to surgery next (Fig. 9a). Coagulation/haematology, respiratory/infection and combined problems resulted in the longest postponements to surgery. This is also reflected in terms of absolute numbers (Fig. 9b): patients originally delayed with cardiac problems predominate on the first day or two after admission, but surgery on patients delayed by coagulation/haematology problems, respiratory/infections or combined problems were more frequent thereafter.

Fig. 9: Time to operation by medical reason for postponement at first assessment

a) Percentage frequency

b) Absolute numbers



Preoperative Medical Abnormalities - Frequency and Associated Postponement

Many hip fracture patients have co-morbid conditions with abnormalities on, for example, clinical examination, blood tests or electrocardiograms. The link between these and outcome has not always been clear.

Whilst the previous section of this report outlined the assessor's subjective medical opinion of the reasons for postponement (cardiac failure, metabolic/renal, etc.), we also collected corresponding data on medical problems identified on routine exams (e.g. heart rhythm, ECG and CXR) and observations (blood results, vital signs) to back up these opinions.

McLaughlin et al (2006)[1] defined eleven classes of preoperative clinical abnormalities (major and minor) that were associated with poor postoperative outcomes in a group of hip fracture patients. They concluded that major clinical abnormalities should be corrected (if possible) prior to surgery, although 15% of patients still proceeded to surgery with major abnormalities. To allow comparison, SHFA used McLaughlin definitions as far as possible (Table 1) to identify patients with preoperative abnormalities, their associated rates of postponement and correction prior to surgery.

Table 1: McLaughlin/SHFA abnormalities

Abnormality:		**Major**		**Minor**	
		McLaughlin Description	SHFA equivalent	McLaughlin Description	SHFA equivalent
1	Blood pressure (BP)	Systolic BP <= 90	Systolic BP <= 90	Systolic BP >=181; diastolic BP >= 111	Systolic BP >=181; diastolic BP >= 111
2	Rate and rhythm	AF or SVT >= 121; ventricular tachycardia; 3rd degree heart block or heart rate <= 45 bpm	Pulse <= 45; Pulse >= 121 & AF/flutter; Pulse >= 121 & highlighted other problem; complete heart block; ventricular tachycardia	Atrial fibrillation (AF) or supraventricular tachycardia (SVT) 101-120; sinus tachycardia >= 121; or heart rate 46-50 bpm	Pulse 46-50; Pulse >= 121 with no other Rate/Rhythm problem; Pulse 101-120 & AF/flutter; Pulse 101-120 & highlighted other Rate/Rhythm problem
3	Infection/ pneumonia	Temp < 35 C; T >= 38.5 C with clinical diagnosis of pneumonia or infiltrate on CXR	Temp < 35 C; infection on CXR & temp >= 38.5 C	T >= 38.5 C; or clinical diagnosis of pneumonia; or infiltrate on CXR	T >= 38.5 C but no documented infection; or infection on CXR but T normal or not recorded

1 *Preoperative status and risk of complications in patients with hip fracture – J Gen Intern Med 2006; 21:219-225*

Abnormality:		Major		Minor	
		McLaughlin Description	SHFA equivalent	McLaughlin Description	SHFA equivalent
4	Chest pain	Any new MI on ECG, or chest pain with abnormal ECG	Evidence of new MI; angina with ST depression or elevation	Chest pain but normal ECG	Angina +/- ischaemia or other highlighted concerns on ECG or otherwise (rhythm, ectopics, pacemaker)
5	Congestive heart failure (CHF)	Pulmonary edema on CXR; or CHF on CXR with dyspnea and/or abnormal exam	Evidence of failure on CXR; pulmonary oedema; other highlighted CHF problem on CXR; pleural effusion (in absence of infection)	Dyspnea or pulmonary rales or S3 but a normal CXR; or CHF on CXR with a normal exam and no dyspnea [a]	None
6	Respiratory failure	Pulse oximetry < 90%; pO2 < 60 mmHg; or pCO2 >= 55 mmHg	O2 sat < 90; pO2 < 8 k/Pa; pCO2 >= 7.4 k/Pa	46 mmHg < pCO2 < 55mmHg	pCO2 6.2-7.3 k/Pa
7	INR	> 1.6	> 1.6	1.4-1.6	1.4-1.6
8	Electrolytes	Na <= 125 or > 155 mEq/L; K <2.5 or >= 6.1 mEq/L; or HCO3 < 18 or > 36 mEq/L	Na <= 125 or > 155 mEq/L; K <2.5 or >= 6.1 mEq/L; or HCO3 < 18 or > 36 mEq/L	Na 126-128 or 151-155 mEq/L; K 2.5-2.9 or 5.6-6.0 mEq/L; or HCO3 18-19 or 35-36 mEq/L	Na 126-128 or 151-155 mEq/L; K 2.5-2.9 or 5.6-6.0 mEq/L; or HCO3 18-19 or 35-36 mEq/L
9	Glucose	> 600 mg/dL	> 33 mmol/L	451-600 mg/dL	25-33 mmol/L
10	Urea/ creatinine	BUN > 50 mg/dL; or Creatinine >= 2.6 mg/dL without h/o ESRD [b]	Urea >= 18 mmol/L; creatinine > 225 umol/L	BUN 41-50 mg/dL; or Creatinine 2.1-2.5 mg/dL without h/o ESRD	Urea 14.5-17.9 mmol/L; creatinine 186-225 umol/L
11	Anaemia	Hb <= 7.5 g/dL	Hb <= 7.5 g/dL	Hb 7.6-8.0 g/dL	Hb 7.6-8.0 g/dL

a Patients delayed for cardiac reasons may have had dyspnea, pulmonary rales or S3 diagnosed on clinical exam, but this was not audited specifically by SHFA.

b ESRD not recorded by SHFA

See Appendix 6 for list of abbreviations

Of the 5447 patients included in this report, 941 (17%) had one or more major abnormalities (Fig. 10). Of these, 548 (58%) were postponed for theatre at first assessment. The probability that a patient would be postponed for theatre increased if they had more than one major abnormality (Fig. 11).

Fig. 10: Frequency of abnormalities

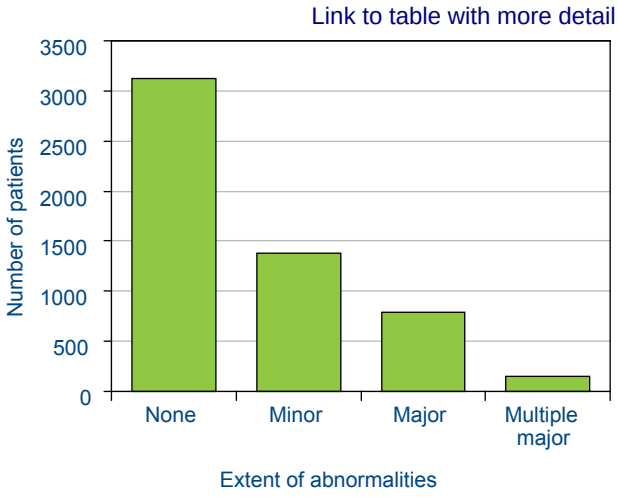
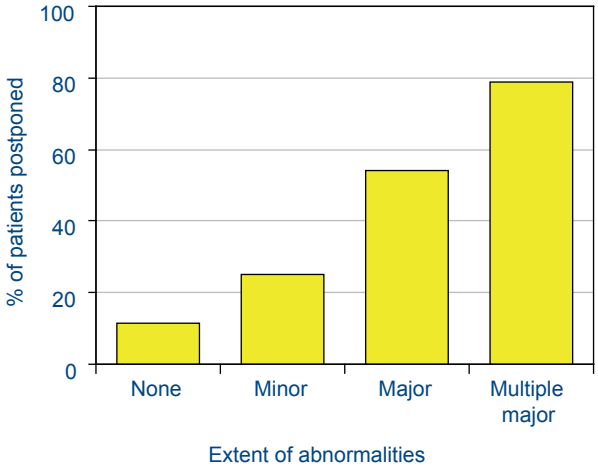


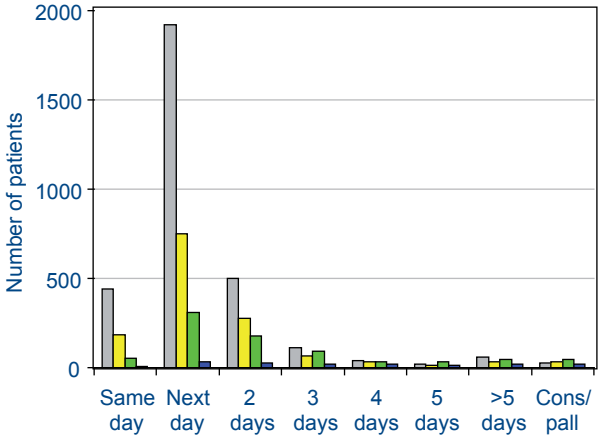
Fig. 11: Percentage of patients postponed



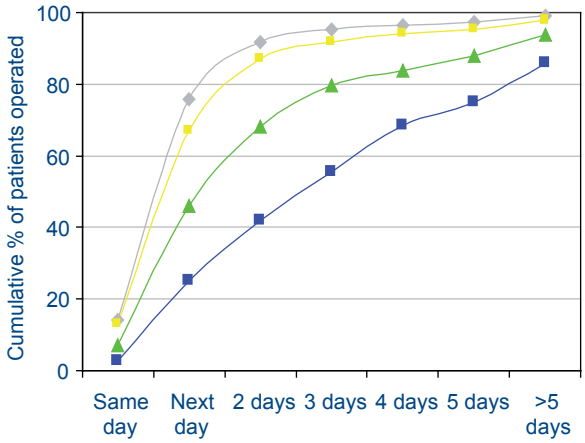
As expected, patients documented as having major abnormalities on first assessment were more likely to wait several days before theatre, and were more likely to be treated conservatively/ palliatively (Fig.12).

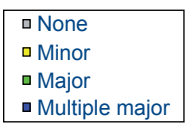
Fig. 12: Time to theatre by degree of abnormality

a) Absolute numbers



b) Percentage frequency





Curves do not reach 100%, reflecting differing proportions of patients in each category who are treated conservatively /palliatively.

Postponed, but no abnormality

Of the 3122 patients with no documented abnormality (major *or* minor), 361 (12%) were postponed at first theatre assessment (Table 2). Investigation of these postponements showed that they occurred across all hospitals (range 7-22%), and all but 40 were associated with observations close to the McLaughlin limits, or other problems identified on audited examinations that did not constitute McLaughlin abnormalities in their own right (e.g. AF/flutter, ischaemia, added heart or lung sounds, heart murmur). These observation and examination results are subsequently referred to as **'Concerns'** in this section.

In 55% of patients with Concerns, the assessor's listed reason for postponement matched the reason for Concern (e.g. 72% of the 72 patients with a heart murmur were delayed for cardiac reasons). Details of the remaining 185 patients postponed with no documented abnormality (including the 40 without concerns) are listed in Table 2. Eighty-one were postponed due to lack of information (PMH, results, prep), and 26 for 'Other' medical reasons that were not specifically audited by SHFA (e.g. neurological, GI bleeds, bowel obstructions, allergies). The remaining 78 patients were postponed for coagulation/haematology, metabolic/renal, cardiac or respiratory/ infection reasons but did not have an associated anomalous observation/exam amongst the results examined in this audit. At least 19 (24%) of the plans for these patients included stopping antiplatelet agents such as clopidogrel in order to control bleeding during surgery, and others may have been postponed for problems that were not specifically audited.

Table 2: Postponed patients without abnormalities as routinely documented by SHFA

Reason for postponement	Patients with Concerns		Patients without Concerns		Total	
Matched Concerns and reason for postponement	176	55%			176	49%
Lack of Info, PMH, results	68	21%	13	32%	81	22%
'Other' medical reasons	22	7%	4	10%	26	7%
Listed medical reason but no *associated* anomalous observation/result	55	17%	23	58%	78	22%
Totals	**321**	**100%**	**40**	**100%**	**361**	**100%**

Are abnormalities resolved prior to theatre?

Of the 548 patients postponed at first theatre assessment who had one or more major abnormalities, 259 (47%) had these abnormalities resolved or reduced (to at least a minor abnormality) before they went to theatre, or, in the case of some ECG or CXR exams, had had the original abnormality reviewed as a lesser problem. 147 (27%) patients postponed at first theatre assessment with one or more major abnormalities still had unresolved major abnormalities when they went to theatre, and resolutions for 74 (14%) patients were unknown because there was no documented re-examination result available. A further 68 (12%) patients were eventually treated conservatively.

Rates of resolving major abnormalities varied according to the specific abnormality (Table 3).

It is important to optimise the condition of patients prior to operation, with the aim of reducing mortality and morbidity. Evidence would suggest that reversing major abnormalities as defined offers such opportunities. Some abnormalities are life-threatening in themselves (e.g. pulmonary oedema, severe hypokalaemia), and can be reversed in a reasonable time by standard therapies.

Some abnormalities are, however, unlikely to be altered by therapy, or might require considerable delay. In these circumstances, there is a danger that further minor or major abnormalities may develop during the prolonged waiting time.

Clearly (see Table 3) significant numbers of patients progress to operation with major abnormalities that are uncorrected. Many of these will have been where the clinical judgement of experienced anaesthetists has been that earlier operation has a better risk-benefit profile than continued delay.

Table 3: Postponement rates of patients with major abnormalities, and resolution rates for these abnormalities in postponed patients

Type of abnormality	Number with abnor-mality	N (%) with abnormality who were postponed		Outcome after postponement							
				Resolved		Not resolved		No documented resolution		Managed conserva-tively	
				N	%	N	%	N	%	N	%
Blood pressure											
SBP <= 90	53	36	68%	26	72%	2	6%	1	3%	7	19%
Rate and rhythm											
Pulse >= 121 and AF/flutter	29	25	86%	20	80%	1	4%	1	4%	3	12%
Pulse >= 121 and arr/br/ tach/blocks	8	5	62%	2	40%	1	20%	0	0%	2	40%
Complete heart block	6	2	33%	1	50%	0	0%	0	0%	1	50%
Pulse <= 45	9	3	33%	3	100%	0	0%	0	0%	0	0%
Infection/Pneumonia											
T >= 38.5 and infection/pneu on CXR	5	5	100%	5	100%	0	0%	0	0%	0	0%
T < 35	11	5	45%	3	60%	0	0%	0	0%	2	40%
Chest pain											
New MI	38	23	61%	9	39%	7	30%	0	0%	7	30%
Angina + St Dep/Elev	4	3	75%	1	33%	1	33%	1	33%	0	0%
Congestive heart failure											
Pulmonary oedema	7	7	100%	0	0%	2	29%	2	29%	3	43%
Pleural effusion	32	17	53%	1	6%	10	59%	3	18%	3	18%
CXR = Failure	96	44	46%	6	14%	19	43%	14	32%	5	11%
'Other' CHF problem	19	9	47%	3	33%	3	33%	2	22%	1	11%
Respiratory failure											
pCO2 >= 7.4	27	17	63%	0	0%	5	29%	2	12%	10	59%
pO2 < 8.0	76	49	64%	11	22%	9	18%	21	43%	8	16%
O2 sat < 90%	139	57	41%	35	61%	10	18%	4	7%	8	14%

Type of abnormality	Number with abnor-mality	N (%) with abnormality who were postponed		Outcome after postponement							
				Resolved		Not resolved		No documented resolution		Managed conserva-tively	
				N	%	N	%	N	%	N	%
INR											
INR > 1.6	191	181	95%	129	71%	32	18%	12	7%	8	4%
Electrolytes											
K < 2.5	2	2	100%	2	100%	0	0%	0	0%	0	0%
Na > 155	4	3	75%	1	33%	0	0%	1	33%	1	33%
Na < 126	61	30	49%	18	60%	9	30%	2	7%	1	3%
HCO3 < 18	47	19	40%	7	37%	6	32%	5	26%	1	5%
HCO3 > 36	22	11	50%	4	36%	1	9%	1	9%	5	45%
K > 6.0	14	10	71%	7	70%	2	20%	0	0%	1	10%
Glucose											
Glucose > 33	1	1	100%	0	0%	0	0%	1	100%	0	0%
Urea / Creatinine											
Urea >= 18 & Creatinine >225	64	35	55%	9	26%	21	60%	0	0%	5	14%
Urea >= 18	73	42	58%	12	29%	14	33%	5	12%	11	26%
Creatinine > 225	45	16	36%	4	25%	8	50%	2	13%	2	13%
Anaemia											
Hb <= 7.5	42	37	88%	30	81%	1	3%	3	8%	3	8%
All abnormalities	1125	-	-	349		164		83		98	
All patients	941	548	58%	259	47%	147	27%	74	14%	68	12%

See Appendix 6 for list of abbreviations

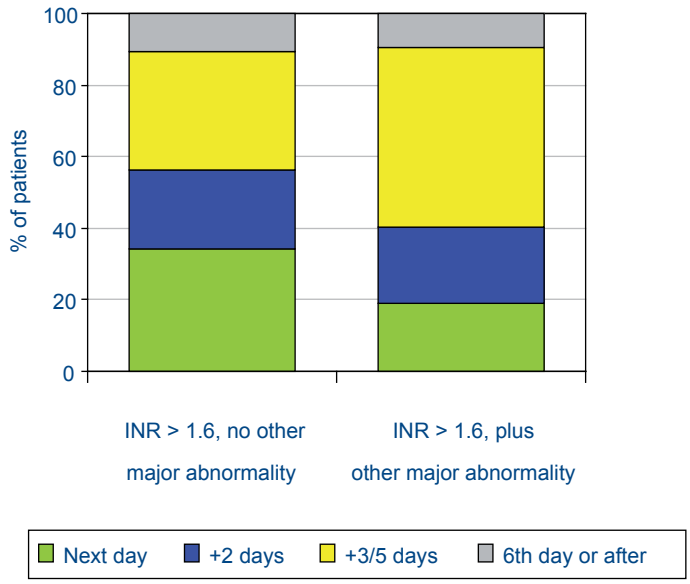
Examples of Specific Abnormalities

INR abnormalities

One of McLaughlin's criteria for a major abnormality is an INR above 1.6, normally due to anticoagulant drug therapy or liver dysfunction. 25% of patients had INR measured at first assessment and 191 of these had INR above 1.6 (3.5% of all patients). 95% of patients who had an INR above 1.6 at first theatre assessment were postponed. This may have been for anaesthetic and/or surgical reasons.

Seventy per cent of patients postponed with INR over 1.6 did not subsequently get taken to theatre for two days or more (Fig. 13). If all patients requiring coagulation correction for INR above 1.6 could be corrected and taken to theatre within one day, nearly 400 bed-days would be saved across the service annually. In 80% of cases in this group of postponed patients where INR was re-recorded prior to surgery, INR had been lowered to 1.6 or below.

Fig. 13: Length of time from first assessment to theatre if patient originally postponed with INR above 1.6



Not all hospitals had written protocols for the management of anticoagulant drugs and drug effect in the perioperative period. There are safe and effective therapies available to reverse warfarin therapy to allow timely surgery, and the appropriate information should be available in wards.

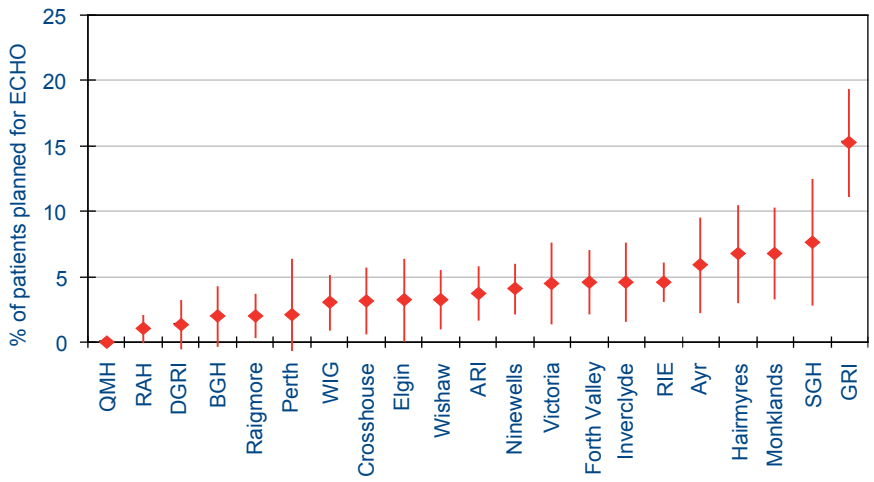
Patients requiring echocardiography

232 (4.3%) of all patients were planned for echocardiography following first assessment. Use of this investigation varied between 0 and 15% between hospitals (Fig. 14). This variation may be related to the availability of cardiological support, or whether prior echocardiogram results were available.

As a proportion of all patients (whether postponed or not), echocardiograms were more frequently planned if patients had any major (7.8% of patients) or minor (5.4%) abnormality than if patients had no abnormalities (2.7%). 13% of patients with a major abnormality who were postponed had echocardiography. Echocardiograms were also planned for 23% of the postponed group with *no* apparent abnormalities. This could reflect non-audited indications for echocardiography or relative overuse of the investigation. It is not possible to determine this from the current dataset, but further follow-up would clearly be useful.

Nineteen per cent of patients delayed with a major cardiac abnormality were subsequently planned for echocardiography. Some patients may, of course, have had pre-existing recent echocardiographic reports.

Fig. 14: Percentage of patients planned for echocardiography at first theatre assessment



Link to table with more detail

Red bars represent 95% Confidence Intervals.

Seventy per cent of patients planned for echocardiography had documented ECG or CXR problems (MI, ischaemia, heart failure, infection, pleural effusion or some other listed ECG or CXR concern, but not necessarily a defined abnormality), and this increased to 89% if added heart sounds or murmur were documented. None of these problems were associated with a high delay rate for echocardiography in their own right (range 7-12% of patients with these problems were planned for echocardiography), except for heart murmurs: 127/621 (20%) patients with heart murmurs were planned for echocardiography. Planned rates for echocardiography for patients with heart murmurs varied between 0 and 48% between hospitals. Again some of these patients are likely to have had previous echocardiographic examinations.

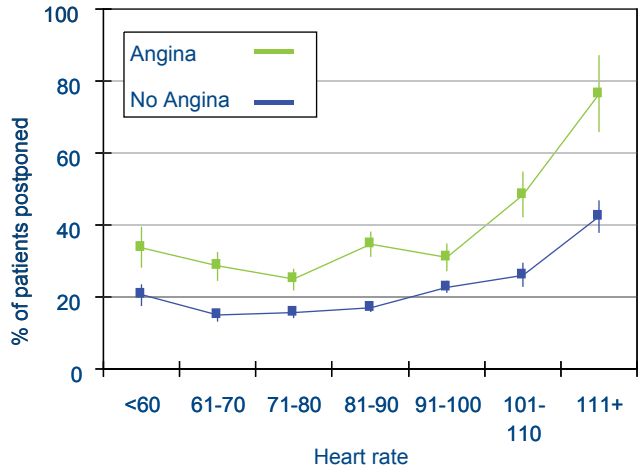
Where known, 54% of echocardiograms (N=204 known timings) were done on the same day as first assessment. A further 28% were done next day, and 15% two days later. Seven were done 3-6 days after first assessment. 52% of patients who were planned for echocardiogram were subsequently operated on by the day after first assessment, and 34% more by two days after first assessment. 25 (11%) were operated on more than three days after first assessment, whilst seven (3%) were ultimately managed conservatively. Although reasons for and timing of echocardiography were not specifically audited here, it is clear that prompt ordering and availability of echocardiograms could potentially reduce delays.

Angina or AF/Flutter in combination with Heart Rate

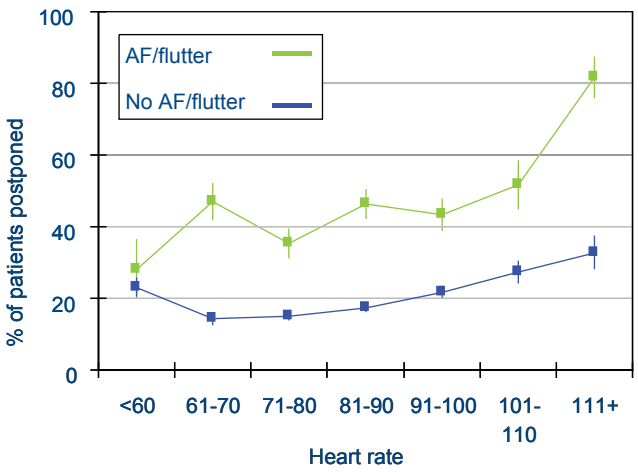
Simple plotting of postponement rates for combinations of conditions show that conditions may have had an additive effect, e.g. higher postponement rates for a given heart rate if the patient had angina or AF/flutter (Fig. 15).

Fig. 15: Percentage of patients who were postponed at first theatre assessment in relation to heart rate and presence/absence of angina and AF/flutter

a) Angina



b) AF/flutter



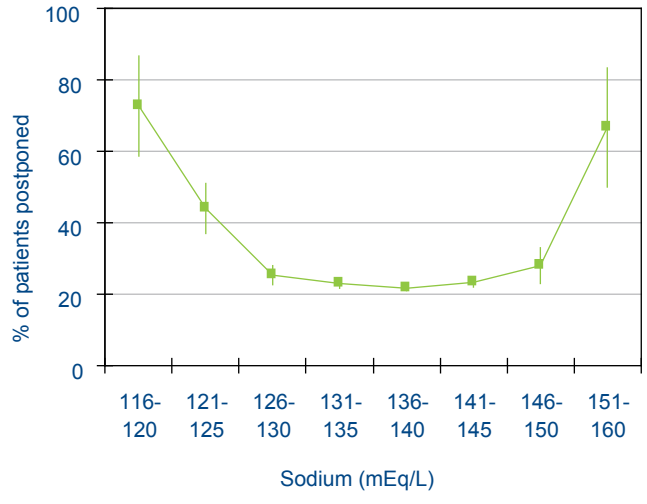
Bars represent +/- 1 standard error.

Sodium and haemoglobin

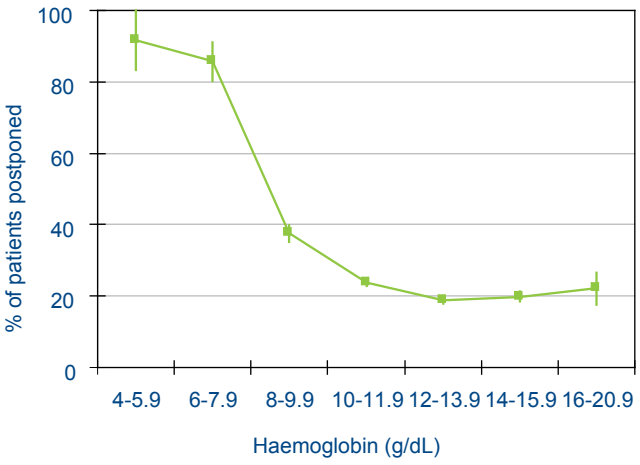
Patients with abnormal blood tests clearly had higher rates of postponement at first assessment. Fig. 16 shows two clear examples of variation in postponement rate associated with sodium and haemoglobin levels. Interestingly, significant numbers of patients proceeded to surgery with abnormal results (e.g. 60% of patients with haemoglobin 8-9.9).

Fig. 16: Percentage of patients who were postponed at first theatre assessment in relation to blood sodium and haemoglobin levels

a) Sodium



b) Haemoglobin



Bars represent +/- 1 standard error.

Development of new abnormalities after first assessment

Although postponement at first assessment often reflected the assessor's intention to treat existing conditions, there was also a risk of deterioration if the patient was postponed. From re-assessment data, this audit identified 151 major abnormalities (amongst 126 patients) that were not documented on first theatre assessment (Table 4). 69 (55%) of the 126 patients had no documented major abnormalities at first theatre assessment, 43 (34%) had one previous major abnormality, and 14 (11%) had two or more. 92% (116) of these patients had previously been postponed at first theatre assessment, but 10 were patients who were ready for theatre at first assessment that were subsequently postponed following re-assessment. Altogether, 9.3% (116/1254) of patients postponed at first assessment had new major abnormalities identified by subsequent re-assessment.

Patients who were assessed on the same day as admission were more likely to have new abnormalities identified, but this may again be linked to sicker patients being assessed quickly (and more likely to develop further abnormalities).

At least 111 (74%) of these new abnormalities developed after the first assessment, because exams/observations were documented as within normal limits when the first assessment was carried out. The remaining 40 abnormalities may have been present at first assessment, but the relevant exams/observations were not carried out/available during the first theatre assessment. Only two patients developing new abnormalities after the first assessment were originally postponed for purely investigative (PMH, casenotes, further tests) reasons.

Patients were less likely to be postponed if a major abnormality was identified at re-assessment, compared to the first assessment. Only 30% of the 69 patients with no previous major abnormalities were postponed when a major abnormality was identified at re-assessment, compared to 58% of all patients with a major abnormality at first assessment. This lower postponement rate was also reflected in the 57 patients who had further major abnormalities identified *in addition* to those on first assessment: 19 (33%) were postponed when the new major abnormality was identified. These 57 patients included four (17%) of 24 patients where the original major abnormality had been resolved, 15 (50%) of 30 patients where the original abnormality had not been resolved, and none of three where no further documentation of the abnormality had been documented. Anaesthetists again seem to be making a judgement in these cases that delay is proving more deleterious than progressing to surgery.

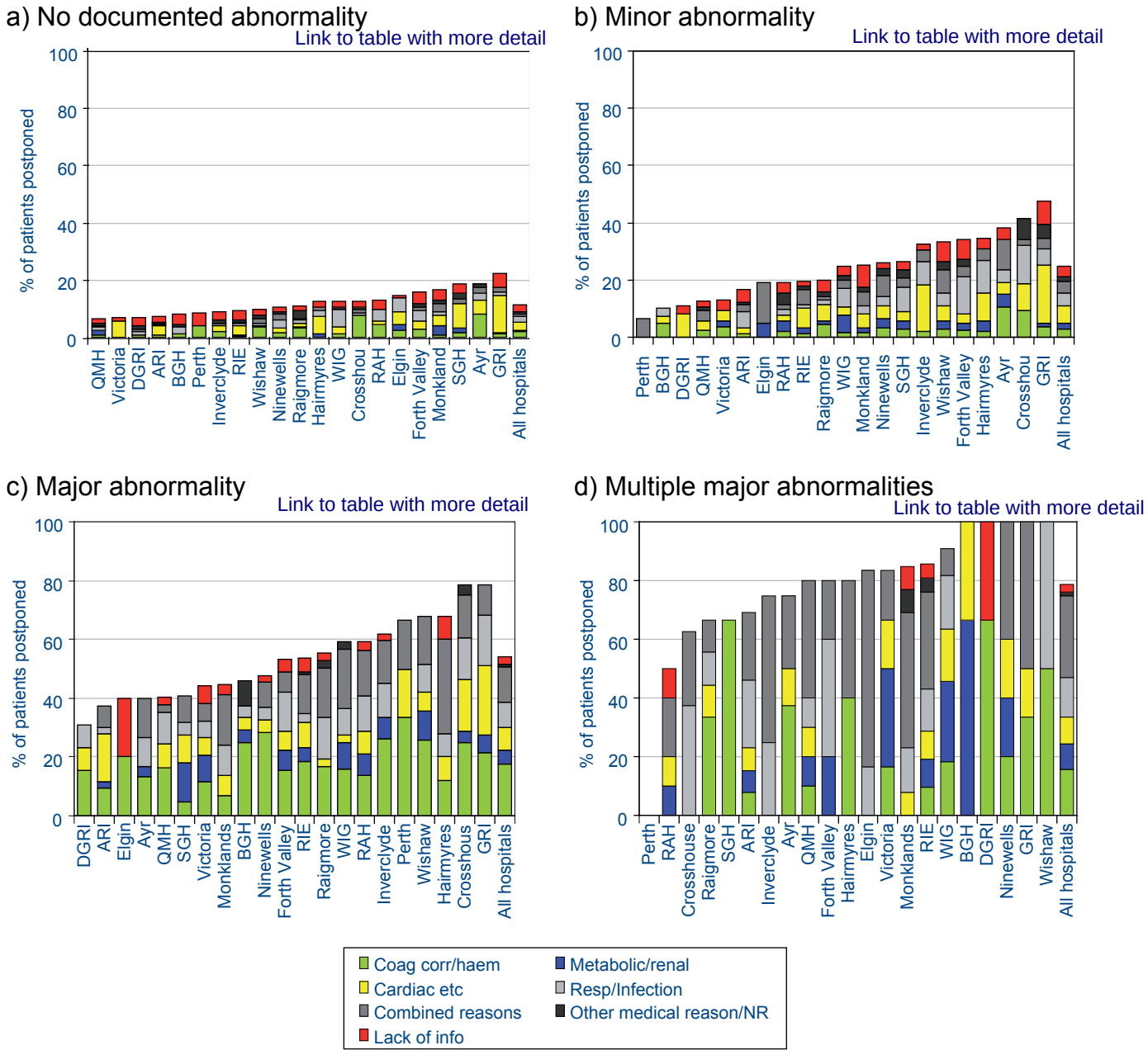
Table 4: Number and development of major abnormalities not identified on first theatre assessment, and subsequent surgical decision

New abnormality	Number of abnormalities	Developed since first assessment		Further postponed	
		N	%	N	%
Blood pressure	14	14	100%	8	57%
Rate and rhythm	9	8	89%	6	67%
Infection/pneumonia	1	1	100%	1	100%
Chest pain	13	10	77%	5	38%
Congestive heart failure	38	17	45%	10	26%
Respiratory failure	37	29	78%	15	41%
INR	5	2	40%	2	40%
Electrolytes	24	20	83%	7	29%
Glucose	0	0	-	0	-
Urea/creatinine	8	8	100%	1	12%
Anaemia	2	2	100%	1	50%
Total	**151**	**111**	**74%**	**56**	**37%**

Delays by Hospital

Although there is variation in postponement rates between hospitals (Fig. 6), some of this may be explained by differences in casemix, for example differences between hospitals in the proportion of patients who have major or minor abnormalities. Postponement rates for different degrees of abnormality indicate that there is also variation in postponement rates between hospitals irrespective of casemix (Fig. 17).

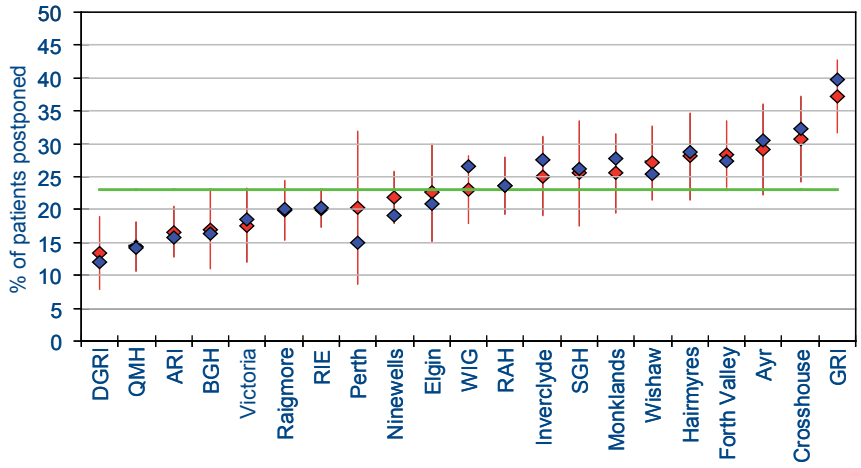
Fig. 17: Proportion of patients postponed at first theatre assessment in relation to degree of medical abnormality



There were strong positive correlations between hospitals' postponement rates on the above graphs: hospitals that had high rates of postponement for patients with major abnormalities were also more likely to postpone more patients with minor abnormalities.

This simple stratification of postponements according to McLaughlin abnormality depends on the large difference in postponement rates between patients with major, minor or no abnormalities (Fig. 11). However, there were further differences in postponement rate *within* degree of abnormality – for example, INR > 1.6 and HCO3 < 18 are both defined as major abnormalities, but had 95% and 37% associated postponement rates respectively (see Appendix 2 for further breakdown of postponement rates by type of abnormality). We further casemix-adjusted by calculating the postponement rates for all individual medical problems (see Appendix 2) and used this to calculate a standardised rate for each hospital. This casemix adjustment brought most hospitals' overall postponement rate slightly closer to the national average, but there was still significant variation in postponement rates between hospitals (Fig. 18).

Fig. 18: Actual and casemix-adjusted rates of postponement at first theatre assessment



Link to table with more detail

Actual (blue) and casemix-adjusted (red) percentages of patients postponed at each hospital. Red bars (95% Confidence Intervals) that do not cross the green national average line (23%) differ significantly from the national average.

We also looked at postponement rates in relation to overall length of time to theatre for postponed patients to see whether hospitals that were more likely to postpone patients tended to get these postponed patients to theatre more quickly. However, although not statistically significant, the opposite pattern was observed: hospitals that had high postponement rates were less likely to take postponed patients to theatre by the day after assessment.

Bigger Picture

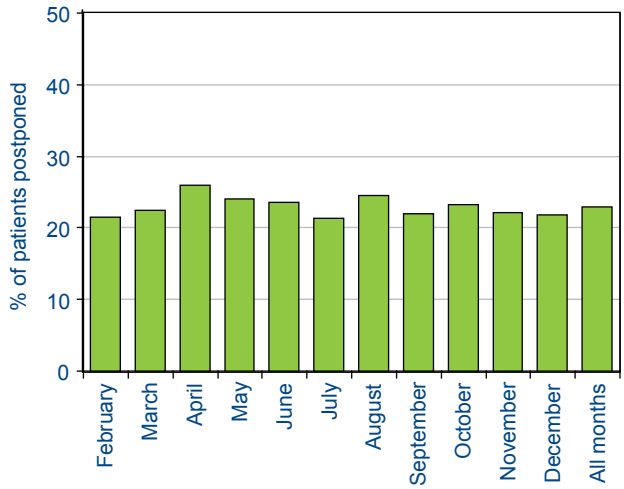
This audit took place alongside the Scottish Government Health Delivery Directorate's target that:

The Operational Standard:

By December 2007, 98% of all hip fracture patients are to be operated on within 24 hours of admission to an orthopaedic unit, subject to medical fitness and during safe operating hours (8 am – 8 pm, 7 days a week).

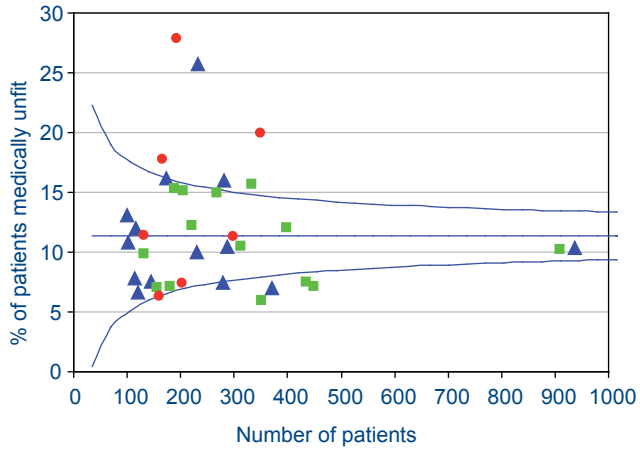
Nationally, there has been no indication that hospitals have been more likely to postpone patients for medical reasons at first assessment (so removing patients from the requirement to meet the target) as the pressure to meet the Time to Theatre target increased towards the end of the year (Fig. 19). This consistency within the year also suggests that the Fitness for Theatre audit itself did not affect practice, and is a reliable indicator of current theatre decision-making.

Fig. 19: Postponement rates at first assessment during this audit



This consistency of medical assessment is also apparent when comparing the proportion of patients unfit for theatre within 24 safe hours in 2006 (before target projectories were finalised) and 2007 (when pressure for compliance was increased). 2007 data for individual hospitals that contributed to the audit in both years remained close to the 2006 average (Fig. 20).

Fig. 20: Percentage of patients treated surgically but documented as unfit for theatre within 24 safe operating hours of ward admission



Blue & funnel – participating hospitals in 2006
Green – 2007 data for hospitals participating in 2006
Red – 2007 data for 'new' hospitals in 2007
Each point represents a different hospital.

Compliance with the Time to Theatre target increased from 86% nationally in 2006 to 95% in 2007. This indicates that targets have reduced waiting times for medically fit patients. Reassuringly, there is no evidence that this improvement has had a consequential adverse increase in waiting times of patients who were ineligible for the target because they were originally documented as medically unfit for surgery (Table 5c). This pattern is also evident at RIE, which has seen the largest increase in compliance between years.

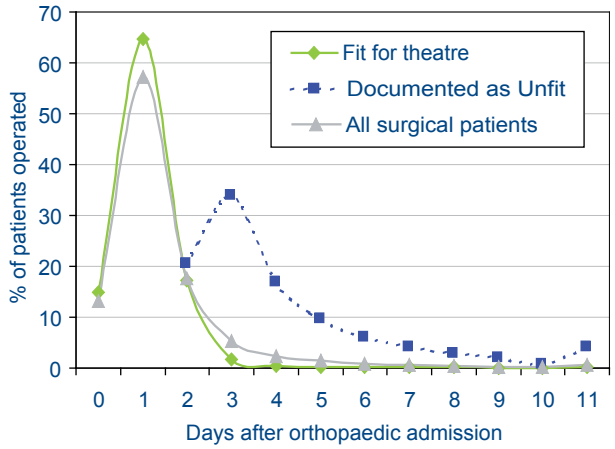
Table 5: Timing of patients to theatre in 2006 and 2007

		All participating hospitals		**Hospitals participating both years, excluding RIE**		**RIE**	
		2006	2007	2006	2007	2006	2007
a)	All patients, % to theatre by next day	63	70	73	74	35	55
b)	Fit patients, % to theatre by next day	71	80	83	83	39	61
c)	Unfit patients, % to theatre on 2nd day	19	20	20	21	14	27
	Unfit patients, % to theatre by 4th day	69	71	67	69	74	89

Consistent with other figures in this report, times to theatre in this table are presented in a different format from the 24 safe-operating hours compliance figures given in SHFA Real-time Reports.

There was also little evidence that medically fit patients who *missed* the 24 safe hours target for surgery were likely to be further postponed more than necessary (Fig. 21) – less than 2% of medically fit patients who missed the 24 safe hours target for surgery were delayed beyond three days post-admission, and only 15% of these were associated with theatre unavailability.

Fig. 21: Timing of surgery in relation to whether or not the patient was medically fit



Data for 2007, all patients.

As expected, surgical patients who were medically unfit for surgery within 24 safe hours had higher mortality rates than fit patients. However, delay beyond 24 safe hours appeared to have little effect on subsequent mortality of fit patients (Table 6).

Table 6: Survival in relation to surgical management, medical fitness and delay.

		2004		2005		2006		2007	
		%	N	%	N	%	N	%	N
Survival to 30 days									
a)	Conservative	47%	215	40%	177	56%	127	57%	201
	Surgical	92%	4659	91%	3449	91%	2497	93%	3979
b)	Surgical, fit or op'd within 24 safe hours	93%	4074	92%	2987	92%	2190	93%	3490
	Surgical, unfit, not op'd within 24 safe hours	87%	585	83%	462	85%	307	88%	489
c)	Fit, delayed	94%	236	92%	209	92%	156	96%	156
	Fit, not delayed	92%	3802	92%	2764	92%	2024	93%	3327
Survival to 120 days									
a)	Conservative	34%	199	27%	143			38%	201
	Surgical	80%	4461	79%	3233			82%	3920
b)	Surgical, fit or op'd within 24 safe hours	81%	3905	81%	2823			83%	3437
	Surgical, unfit, not op'd within 24 safe hours	70%	556	64%	410			73%	483
c)	Fit, delayed	84%	194	83%	167			89%	153
	Fit, not delayed	81%	3678	81%	2647			82%	3277

Sample sizes in this table reflect the extent of outcomes data gathered by SHFA and changing hospital participation in SHFA, NOT changes in national incidence of hip fractures: 2006 data was only collected for 9 months, and outcome data was only collected to 42 days post-admission; outcomes data for 2007 was only available for January to October when the report was compiled. The high survival rate in 'fit, delayed' patients may reflect the growing tendency to treat subgroups of patients including those who are younger and fitter by semi-elective total hip replacement.

There was always a danger that inappropriate concentration on a target could distort clinical priorities. Taking unstable patients to theatre before appropriate treatment, or prioritising new patients over a patient who had already 'breached' the target were possible adverse outcomes. We were particularly concerned to ensure this did not happen, and tried to maintain good lines of communication with all participating units to minimise the risk.

These data seem to confirm that units did not disadvantage delayed patients in any way, and that more expeditious surgery is not associated with increased mortality.

Appendix 1: Comparison of data collected by Medical Staff and Local Audit Co-ordinators

Medical staff directly completed 56% of all patients' first assessment forms, whilst the remaining 44% were completed retrospectively from casenotes by SHFA's network of Local Audit Co-ordinators (LACs). Given this overall ratio, LACs completed a higher than expected proportion of first assessment forms of patients who were postponed at first theatre assessment (56%), or who had major abnormalities (51%). However, LACs also completed a higher proportion of forms for first assessments originally carried out by orthopaedic staff, and orthopaedic staff were only asked to complete an assessment form when they were postponing the patient as medically unfit for theatre.

Assessment carried out by	**First assessment form completed by**	**Number of patients**	**Postponed**		**Major abnormality**	
			N	%	N	%
Anaesthetist	Anaesthetist	2864	383	13%	380	13%
	Local Audit Co-ordinator	1896	288	15%	265	14%
Orthopaedic staff	Orthopaedic staff	182	160	88%	72	40%
	Local Audit Co-ordinator	361	335	93%	168	47%

None of the above four comparisons of proportions (Medical staff v LAC) are statistically significant.

Appendix 2: Rates of postponement at first theatre assessment by type of abnormality

The following table shows postponement rates associated with the patient's highest-listed medical abnormality (including Concerns; see definition of Concerns in section titled 'Postponed, but no abnormality'). The highest-listed abnormality was that which had the highest probability of postponement when analysed nationally. To reduce the effect of combinations of abnormalities influencing postponement rates, types of abnormality are listed in descending order of postponement. Postponement rates for types of abnormality that were lower on the list were only calculated after excluding patients who had abnormalities higher on the list with higher rates of associated postponement. For example, patients with INR > 1.6 are excluded from calculation of the postponement rates for patients with Hb <= 7.5, but not vice versa.

Many anaesthetists will find this snapshot of decision-making across the country particularly interesting. There are few surprises at the top of the list, where conditions with known serious effects on outcome predominate, and postponement is virtually universal, but the conditions where postponement rates are close to 50% may reflect an area where the choice to proceed or delay is very personal.

Abnormality:	Total number of patients with abnormality	Total number of patients where this is the highest-listed abnormality	Total number of patients postponed if highest listed	% postponed if highest listed
Major, T >= 38.5 & Infection/ pneumonia on CXR	5	5	5	100%
Major, Pulmonary oedema	7	7	7	100%
Major, K < 2.5	2	2	2	100%
Major, INR > 1.6	191	190	180	95%
Major, Hb <= 7.5	42	40	35	88%
Minor, Hb 7.6-8.0	14	13	11	85%
Major, Pulse >= 121 & AF/ flutter	29	24	20	83%
Major, Na > 155	4	4	3	75%
Major, Pulse >= 121 & Arr/ Br/Tach/Blocks	8	8	5	63%
Major, pO2 < 8.0	76	69	42	61%
Major, New MI	38	34	21	62%
Major, pCO2 >= 7.4	27	25	15	60%
Major, SBP <= 90	53	41	24	59%
Minor, Angina + Pacemaker	17	16	9	56%
Minor, K 2.5-2.9	40	37	19	51%
Minor, Na 151-155	4	4	2	50%

Abnormality:	Total number of patients with abnormality	Total number of patients where this is the highest-listed abnormality	Total number of patients postponed if highest listed	% postponed if highest listed
Major, Angina + ST Dep/ Elev	4	2	1	50%
Major, Urea >= 18	137	100	49	49%
Minor, ‘Infection’ but T normal/Not Recorded	167	129	63	49%
Major, Na < 126	61	59	29	49%
Major, Pleural effusion (no infection)	32	23	11	48%
Concern, pCO2 3.5-4.5	43	19	9	47%
Concern, WCC 0-3.5	21	15	7	47%
Concern, Hb 8.1-8.9	130	105	46	44%
Minor, Pulse 101-120 & AF/flutter	79	55	24	44%
Minor, T >= 38.5, no infection documented	26	24	10	42%
Major, Complete heart block	6	2	1	50%
Concern, WCC 25-100	37	27	10	37%
Concern, Ischaemia plus some other concern	64	40	13	32%
Major, HCO3 < 18	47	28	9	32%
Minor, Urea 14.5-17.9 & Creatinine 186-225	29	16	5	31%
Minor, INR 1.4-1.6	38	29	9	31%
Minor, Pulse 101-120 & Arr/Br/Tach/Blocks	67	44	13	30%
Concern, INR = 1.3	27	20	6	30%
Minor, pCO2 6.2-7.3	35	17	5	29%
Minor, ‘Other’ infection but T normal/Not Recorded	34	22	6	27%
Concern, pO2 13.6-32	54	16	6	37%
Major, Pulse <= 45	9	7	2	29%
Minor, Pulse 121, no other problem	20	18	5	28%
Major, ‘Other’ CHF problem	19	11	3	27%
Concern, Glucose 15.1-24.9	46	33	9	27%
Concern, Heart murmur	621	448	121	27%
Concern, Added heart sounds	190	132	33	25%
Major, CXR=Failure	96	32	7	22%

Abnormality:	Total number of patients with abnormality	Total number of patients where this is the highest-listed abnormality	Total number of patients postponed if highest listed	% postponed if highest listed
Concern, T 38-38.4	145	83	18	22%
Minor/Concern, HCO3 18-20	158	84	16	19%
Minor, Angina + Arr/Br/Tach/ Blocks	155	53	9	17%
Minor, SBP >= 181	278	139	24	17%
Minor, Angina + ischaemia	200	82	13	16%
Concern, SBP 91-100	173	87	14	16%
Concern, Hb 9-9.9	327	137	21	15%
Major/Minor, Creatinine > 186	93	31	5	16%
Concern, Pulse 111-120	119	36	5	14%
Concern, AF/flutter	668	177	26	15%
Major, O2 Sat < 90%	139	50	7	14%
Minor, Angina +/- abnormal ECG/ectopics	506	227	30	13%
Concern, Creatinine 126-185	582	178	21	12%
Minor, Na 126-128	125	49	6	12%
No major/minor abnormality or concern on the above list	2042	2042	127	6%
Total	**5447**	**5447**	**1254**	**23%**

'Concerns' are described in the 'Postponed, but no abnormality' section. Major/minor abnormalities and concerns were not included in this table if their associated postponement rate (after excluding patients with higher-listed abnormalities/concerns) was less than 10%. Associated postponement rates do not form an exact descending order because some comparisons were circular – the order given provided the best fit.

See Appendix 6 for list of abbreviations

Appendix 3: SHFA Local Audit Co-ordinators

Participating Hospitals	Local Audit Co-ordinator in 2007
Aberdeen Royal Infirmary	Davina Grant
Ayr Hospital	Gillian Ward
Borders General Hospital	Amanda Streets
Crosshouse Hospital	Gillian Ward
Dr Gray's Hospital, Elgin	Jean Moore
Dumfries and Galloway Royal Infirmary	Alison Strawbridge
Forth Valley Acute Hospitals	Jean Brewster
Hairmyres Hospital, East Kilbride	Sheena Frew
Glasgow Royal Infirmary	Diane Whiteside
Inverclyde Royal Hospital, Greenock	Mairi Galbraith
Monklands Hospital	Liz Rundell
Ninewells Hospital, Dundee	Karen Scrimgeour
Perth Royal Infirmary	Lorna O'Donnell
Queen Margaret Hospital, Dunfermline	Jane Ferguson
Raigmore Hospital, Inverness	Floma Mackinnon
Royal Alexandra Hospital, Paisley	Jacqueline McStay
Royal Infirmary of Edinburgh	Jenny Farquhar / Fiona Neary
Southern General Hospital, Glasgow	Eileen Rennie
Victoria Infirmary, Glasgow	Diane Whiteside
Western Infirmary, Glasgow	Eileen Rennie
Wishaw General Hospital	Fiona Baker

Appendix 4: Current Membership of the SHFA Steering Group

Chairman	
Dr Damien Reid	Medicine of the Elderly; Hairmyres Hospital, East Kilbride
Vice-Chairman	
Mr Alberto Gregori *	Orthopaedic Surgery; Hairmyres Hospital, East Kilbride
Orthopaedic Surgery	
Mr Clark Dreghorn Mr Tim White	Victoria Infirmary, Glasgow Royal Infirmary Edinburgh
Medicine of the Elderly/Rehabilitation	
Dr Ian Lennox Dr Liz Burleigh	Victoria Infirmary, Glasgow Southern General Hospital, Glasgow
Anaesthesia	
Dr Heather Hosie * Dr Dermot McKeown *	Southern General Hospital and SASM Royal Infirmary Edinburgh
Public Health	
Dr Rod Muir	Information Services Division (ISD)
Project Management Team	
Ms Diana Beard Mrs Kathleen Duncan * Mr Rik Smith * Ms Sadia Majid	Project Manager Clinical Co-ordinator Statistician Data Co-ordinator
Information Services Division (ISD)	
Mr Graham Mitchell	Head of Clinical Governance Programme
Allied Health Professionals	
Ms Norma Goodfellow Ms Susan Dewar Sister Angela Greener	Physiotherapy Occupational therapy Rehabilitation nursing
Patient Representative	
Awaiting re-appointment	

** SHFA Fitness for Theatre Audit 2007 Subgroup members contributing to this report.*

Appendix 5: Contacts

If you require further information please contact:

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Appendix 6: List of abbreviations

AF	Atrial Fibrillation
ARI	Aberdeen Royal Infirmary
BGH	Borders General Hospital
BP	Blood Pressure
BUN	Blood Urea Nitrogen
CHF	Congestive Heart Failure
CO2	Carbon Dioxide
CXR	Chest X-Ray
DGRI	Dumfries & Galloway Royal Infirmary
ECG	Electrocardiogram
ECHO	Echocardiogram
ESRD	End Stage Renal Disease
GI	Gastrointestinal
GRI	Glasgow Royal Infirmary
Hb	Haemoglobin
HCO3	Bicarbonate
INR	International Normalised Ratio
K	Potassium
LAC	Local Audit Co-ordinator
MI	Myocardial Infarction
NR	Not Recorded
NWTU	National Waiting Times Unit
O2	Oxygen
PMH	Previous Medical History
QMH	Queen Margaret Hospital, Dunfermline
RAH	Royal Alexandra Hospital, Paisley
RIE	Royal Infirmary Edinburgh
SBP	Systolic Blood Pressure
SGH	Southern General Hospital, Glasgow
SHFA	Scottish Hip Fracture Audit
SVT	Supraventricular Tachycardia
T	Temperature
WCC	White Cell Count
WIG	Western Infirmary Glasgow