Royal College of Physicians

AAGBI FOUNDATION
Association of Anaesthetists of Great Britain and Ireland

National Hip Fracture Database
Anaesthesia Sprint Audit of Practice (ASAP)

In partnership with:

HQIP
Healthcare Quality Improvement Partnership

NIAA National Institute of Academic Anaesthesia
HSRC Health Services Research Centre

British Orthopaedic Association

British Geriatrics Society

Falls and Fragility Fracture Audit Programme
National Hip Fracture Database
Anaesthesia Sprint Audit of Practice 2014

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Executive summary

Hip fracture is the commonest reason for a frail older person to need an anaesthetic and operation.

Its outcome serves as a marker of the quality of hospital care across the many disciplines and departments who will collaborate before, during and after this operation. However, the immediate physiological stress experienced by these patients is the pain and blood loss associated with the fracture. High quality anaesthetic care is crucial to the effective management of both stresses.

The aim of this Anaesthetic Sprint Audit of Practice (ASAP) was to profile individual hospitals' compliance with standards for peri-operative care described in the Association of Anaesthetists of Great Britain and Ireland (AAGBI) guideline *The Management of Proximal Femoral Fracture*[1].

We aimed to prospectively collect data on all patients aged over 60 who underwent hip fracture surgery in hospitals across England, Wales and Northern Ireland between 1 May and 31 July 2013.

Data for 16,904 patients treated for a hip fracture in 182 hospitals were submitted to the NHFD.

Nearly all patients (97.6%) underwent anaesthesia and operation.

Data for 80% of these patients were collected by teams including anaesthetists in each hospital, and submitted using the existing online reporting system of the National Hip Fracture Database (NHFD).

Twelve hospitals (CHE, CHS, HIN, NOB, NTH, OHM, PET, RFH, SCA, SHH, UCL and WDH) submitted ASAP data on every patient in their NHFD submission, and 95 hospitals submitted data on over 80% of their patients. A detailed analysis was based on these 11,130 (67.5%) cases in hospitals with high case ascertainment with the objective of describing current practice and variation in care – to inform the ongoing development of an consensus regarding best anaesthesia practice.

Hospitals which returned a lower proportion of cases were excluded from this analysis, to maximise its reliability. However, data for all but 23 hospitals (who did not participate in ASAP) are reported so that clinicians and managers in individual departments and hospitals can review their performance against the ASAP standards, and against that of other units in their region and throughout England, Wales and Northern Ireland (Appendix 2).

Anaesthetic Sprint Audit of Practice standards

Based on the guideline *The Management of Proximal Femoral Fracture*, Association of Anaesthetists of Great Britain and Ireland, 2012

Standard 1	Patients should be anaesthetised by a consultant or specialist with similar clinical experience.
Standard 2	Spinal/epidural anaesthesia should be considered for all patients
Standard 3	Spinal anaesthetics should be administered using hyperbaric bupivacaine (< 10mg) with the patient positioned laterally (bad hip down)
Standard 4	Co-administration of intrathecal opioids should be restricted to fentanyl
Standard 5	If sedation is required this should be midazolam or propofol
Standard 6	Supplemental oxygen should always be provided
Standard 7	Inhalational agents should be considered for the induction of general anaesthesia
Standard 8	Spontaneous ventilation should be used in preference to mechanical ventilation
Standard 9	Consider intraoperative nerve blocks for all patients undergoing surgery
Standard 10	Neuraxial and general anaesthesia should not be combined
Standard 11	Hypotension should be avoided
Standard 12	Patients should be routinely assessed for the occurrence of Bone Cement Implantation Syndrome

Key findings

Where the seniority of both the surgeon and the anaesthetist present in theatre was recorded, it is encouraging to find that in over 90% of cases both were consultants or specialists, and that in only 0.4% of cases were both unsupervised trainees. However, we cannot exclude the possibility of an element of reporting bias here and there certainly remains substantial inter-hospital variation in the seniority of staff dealing with these high-risk cases.

Pain relieving nerve blocks were administered to 56% of patients. This indicates an impressive adoption of this technique during recent years, particularly since its recommendation in the 2011 NICE Guidance on Hip Fracture[2]. However in this audit, nearly half of patients still do not receive a nerve block. The marked variation in provision of nerve blocks between different hospitals could suggest that this is more a reflection of organisational differences, than of individual patient need or preference.

There was striking inter-hospital variation in the proportion of patients being given spinal and general anaesthesia. Some units administered spinal anaesthesia in over 80% of cases, while others used this approach in less than 10%. This would suggest that the mode of anaesthesia is often determined by local departmental or individual anaesthetist preference, rather than being a response to the needs, comorbidities and preferences of individual patients.

Considerable inter-hospital variation is similarly noted in the use of intrathecal opioids, of sedation, of supplemental oxygen, and in the dose of hyperbaric bupivacaine administered during spinal anaesthesia.

Despite the seniority of anaesthetic expertise, the prevalence of low blood pressure during hip fracture surgery is a major concern. Relative hypotension (systolic BP reduction >20% from pre-operative value) occurred in 89% of patients, and absolute hypotension (lowest intraoperative systolic BP <100 mmHg) in 77%. Hypotension was consistently less prevalent among patients receiving spinal anaesthesia, compared to those receiving general anaesthesia.

Finally, ASAP supports previous work indicating that Bone Cement Implantation Syndrome (BCIS) is not uncommon after the insertion of cemented prostheses[3]. Possible BCIS events were recorded in 19% of cases, with reactions involving severe hypoxia and/or hypotension, or cardiovascular collapse in 2.7% and 0.5% of operations respectively.

Key recommendations

These recommendations highlight the areas where ASAP identified substantial variation in practice against those standards for which evidence base is most robust.

- Peri-operative nerve blocks should be offered to all patients who suffer hip fracture [Standard 9]
- The reduced incidence of hypotension observed with spinal anaesthesia supports the AAGBI recommendation that this approach should be considered for all cases. [Standard 2]
- Departments of anaesthesia should develop evidence based standardized approaches to spinal anaesthesia, to reduce inconsistency in the dose of bupivacaine, and in the administration of sedatives, oxygen and intrathecal opioids. [Standards 3,4,5, and 6]
- Departments of anaesthesia should develop protocols to raise awareness of Bone Cement Implantation Syndrome and specific training for its recognition, avoidance and management. [Standard 12]

The AAGBI plans to hold a series of meetings to promote the findings of the ASAP audit. Those involved in collecting the data will be asked to share examples of good practice with other departments. There will be a dedicated ASAP session at the Annual Congress of the AAGBI in Harrogate in 2014. This will be recorded for the video library of the AAGBI. This will enable all members to see the results and presentation of the data.

These ASAP findings need to be linked to the NHFD outcome measures – so that continuation of this work can establish whether outcome is affected by the anaesthetic approach, by hypotension during surgery, or by Bone Cement Implantation Syndrome.

We believe that the level of participation in ASAP demonstrates that a collaborative approach to data collection by local teams including an anaesthetist can improve the scope and integrity of data submitted to NHFD. Consideration should be given to inclusion of key fields such as anaesthetist seniority and occurrence of hypotension when planning future development of the NHFD dataset.

Introduction

Hip fracture is the commonest reason for a frail older person to need surgery and anaesthesia.

The average age of people sustaining a hip fracture is 83 years. One in six of the UK population is aged over 65 years, and the rapidly expanding over 85 year old age group already numbers half a million people[4]. The age-specific risk of suffering a hip fracture is reducing, but the total number of cases continues to rise in line with expansion of this age group[5].

In the UK, hip fracture is estimated to carry an annual health and social care cost of one and a half billion pounds. Patients recovering from this injury occupy 4,000 NHS beds at any one time.

The 2013 annual report of the National Hip Fracture Database (NHFD) identified that 8.2% of patients died within 30 days of hip fracture, and that only 46.2% of those admitted from home were able to return there within the same time period[6].

Surgical management of hip fracture is the default treatment, as it ensures effective analgesia and facilitates rehabilitation thus reducing the risk of complications related to immobility[7].

The last half a century has seen a quest to identify the best anaesthetic practices to improve survival and reduce morbidity in these patients. Randomised controlled trials in this area have suffered from serious design, implementation and recruitment difficulties[8]. Large-scale audits have the potential to explore links between structure and process measures and outcome, through comparison of data on large numbers of patients between different centres.

Collaboration between the Association of Anaesthetists of Great Britain and Ireland (AAGBI) and the National Hip Fracture Database (NHFD), led to the development and completion of the Anaesthesia Sprint Audit of Practice (ASAP). This document reports the results and analysis of this project, and attempts to provide a picture of current approaches to peri-operative care across England, Wales and Northern Ireland.

Background

The rehabilitation of frail elderly patients with hip fractures was pioneered in the 1940s by Cosin. Successful surgeon-physician collaboration between Devas and Irvine in the 1960s revolutionised the care and outcomes of these patients[9]. However, in 2000, the Audit Commission published a follow up to their 1995 report *United They Stand*[10,11], which identified the high prevalence of severe inadequacies in the management of hip fracture patients.

In 2001 the National Service Framework for Older People[12] encouraged close cooperation between surgeons, anaesthetists and geriatricians in the care of these patients. In 2007 the British Geriatrics Society (BGS) and British Orthopaedic Association (BOA) collaborated in writing the 'Blue Book'[13], to set standards for the hip fracture patient care.

At the same time they established the NHFD, which is the largest hip fracture database in the world. This includes surgical and mortality data on a third of a million patients. It captures 95% of all cases of hip fracture, collects data from all hospitals in England, Wales, Northern Ireland and the Channel Islands, and provides an ideal infrastructure for large audits.

The Scottish Intercollegiate Guidelines Network (SIGN), and the National Institute for Health and Care Excellence (NICE) have also issued clinical guidelines[14,2] which reinforce the Blue Book's message. The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) publication of *An Age Old Problem*[15] in 2010 advanced the issue higher on the government agenda.

The NHFD is a component of the Falls and Fragility Fracture Audit Programme (FFFAP), managed by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians (RCP). The work is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP).

During the same period, evidence was growing indicating how anaesthetic management influences outcomes in these patients[16,17,18,19,20]. Clinicians interested in promoting better anaesthetic management of these patients established the Hip Fracture Anaesthesia Network (HIPFAN) in 2007, and this was renamed to Hip Fracture Perioperative Network (HipPeN) in 2011.

The network produced its first report in 2010 highlighting wide variations in anaesthetic practice[21]. It has since completed several projects enquiring into existing anaesthetic practices, and into the management and consequences of key perioperative issues such as anaesthetic technique, blood transfusion, and hypotension. These developments led to publication of the AAGBI guidelines on the anaesthetic management of the hip fractures[1] in 2012.

A number of anaesthetists were part of the collaboration that developed the Blue Book, but anaesthetic management was not specifically addressed by the six standards set in the Blue Book[13], and as a result the initial NHFD dataset did not attempt to profile details of anaesthetic care.

In 2011 HipPeN and NHFD developed a dataset that would allow eight new anaesthetic fields to be incorporated into the NHFD.

Later in the same year the Anaesthetic Sprint Audit of Practice (ASAP) was planned and a project steering group of representatives from the NHFD, the AAGBI and the National Institute of Academic Anaesthesia (NIAA) Health Services Research Centre was established.

Methods

The aim of the audit was to profile individual hospitals' compliance with the guidelines for peri-operative care set by the AAGBI[1] in 2012, and we set out to collect data on all patients over the age of 60 years, who underwent hip fracture surgery between 1st May and 31st July 2013.

An audit data set was agreed for this purpose, and after pilot studies in 2012 a final data collection sheet was agreed (Appendix 1).

Each of the 182 hospitals which routinely contribute to the NHFD was invited to form a local team comprising of trauma anaesthetists, coordinators, nurses and local NHFD representatives. The composition of a team varied from place to place.

The teams liaised with colleagues involved in trauma anaesthesia to encourage audit form completion by the attending anaesthetist(s) for every case of hip fracture surgery. They oversaw inputting of the data from completed forms into the NHFD's online data collection tool, with online data entry completed by 27 September 2013.

Staff responsible for uploading the data were registered for each site, and secure access was granted through the NHFD lead clinician for each site. Use of the NHFD's pre-existing website, with its security and confidentiality safeguards simplified the handling of anonymised data in respect of such a large number of patients.

Data were collected and processed with specific approval of the Secretary of State for Health on the recommendation of the Health Research Authority (HRA) Confidentiality Advisory Group (CAG)[22] under the Health Service (Control of Patient Information) Regulations 2002. This is more commonly referred to as section 251 approval and references to 'section 251 support or approval' actually refer to approval given under the authority of the Regulations.

Section 251 was established to enable the common law duty of confidentiality to be overridden to enable disclosure of confidential patient information for medical purposes, where it was not possible to use anonymised information and where seeking consent was not practical, having regard to the cost and technology available.

Personal confidential data items for this audit were processed by Crown Informatics under section 251 approval prior to anonymisation and transfer to Brighton & Sussex University Hospitals NHS Trust for analysis. Reported data and data files released under government transparency guidance[23] are managed in line with UK statistics authority guidance on the handling of small numbers[24] to prevent the identification of individuals. Data for English hospitals included in all provider level charts in this report can be found at http://www.data.gov.uk/

Key to participating hospitals

- Hospitals which contributed data on over 80% of cases – and were therefore eligible for inclusion in the charts used to defining current patterns of anaesthesia practice, and in tables of individual performance (appendix 2)
- Hospitals which contributed data to the overall report but captured less than 80% of patients – and were therefore reported in tables of individual performance (appendix 2)
- Non participating hospitals

ADD	Addenbrooke's Hospital, Cambridge
AIR	Airdale General Hospital
RED	Alexandra Hospital, Redditch
	Altnagelvin Hospital
WIR	Arrowe Park Hospital, Wirral
BNT	Barnet Hospital
BAR	Barnsley Hospital
BAS	Basildon and Thurrock University Hospital
BSL	Bassetlaw Hospital
	Bedford Hospital
EBH	Birmingham Heartlands Hospital
BRD	Bradford Royal Infirmary
BRI	Bristol Royal Infirmary
BRG	Bronglais Hospital, Aberystwyth
BFH	Broomfield Hospital, Chelmsford
CHS	Chase Farm Hospital
WES	Chelsea and Westminster Hospital
	Cheltenham General Hospital
CHE	Chesterfield Royal Hospital
COL	Colchester General Hospital
	Conquest Hospital, Hastings
COC	Countess of Chester Hospital
HCH	County Hospital, Hereford
CRG	Craigavon Hospital, Portadown
MAY	Croydon University Hospital, London
CMI	Cumberland Infirmary, Carlisle
DVH	Darent Valley Hospital, Dartford
DAR	Darlington Memorial Hospital
DER	Derbyshire Royal Infirmary, Derby
PLY	Derriford Hospital, Plymouth
GGH	Diana Princess of Wales Hospital, Grimbsy
DID	Doncaster Royal Infirmary,
WDH	Dorset County Hospital, Dorchester
	Ealing Hospital
	East & North Hertfordshire Hospital
ESU	East Surrey Hospital, Redhill
DGE	Eastbourne Hospital
FRY	Frenchay Hospital, Bristol
FRM	Frimley Park, Camberley
FGH	Furness General Hospital, Barrow-in-Furness
NUN	George Eliot Hospital, Nuneaton
CLW	Glan Clwyd Hospital, Rhyl
GLO	Gloucestershire Royal Hospital, Gloucester
GHS	Good Hope Hospital, Birmingham
GRA	Grantham and District Hospital
GWY	Gwynnedd Ysbyty, Bangor
HAR	Harrogate District Hospital
HIL	Hillingdon Hospital
HIN	Hinchingbrooke Hospital
HOM	Homerton Hospital, London
SLF	Hope Hospital, Salford
HOR	Horton Hospital, Banbury
HUD	Huddersfield Royal Infirmary
	Hull Royal Infirmary
IPS	Ipswich Hospital
SCM	James Cook University Hospital, Middlesbrough
JPH	James Paget University Hospital, Great Yarmouth
RAD	John Radcliffe Hospital, Oxford
KGH	Kettering General Hospital
KCH	King's College Hospital, London
KMH	King's Mill Hospital, Sutton in Ashfield
KTH	Kingston Hospital
LGI	Leeds General Infirmary
LER	Leicester Royal Infirmary
	Leighton Hospital, Crewe
LIN	Lincoln County Hospital
LDH	Luton and Dunstable Hospital
MAC	Macclesfield General Hospital
WRX	Maelor Hospital, Wrexham
MRI	Manchester Royal Infirmary
	Manor Hospital, Walsall
MDW	Medway Maritime Hospital
MKH	Milton Keynes General Hospital
MOR	Morriston Hospital, Swansea
MPH	Musgrove Park Hospital, Taunton
NEV	Nevill Hall Hospital, Abergavenny
NCR	New Cross Hospital, Wolverhampton

NWG	Newham General Hospital, London
NOB	Nobles Hospital, Isle of Man
NOR	Norfolk and Norwich University Hospital
NDD	North Devon District Hospital, Barnstaple
NHH	North Hampshire Hospital, Basingstoke
NMG	North Manchester General Hospital
	North Middlesex Hospital
NTY	North Tyneside General Hospital, North Shields
NTH	Northampton General Hospital
NGS	Northern General Hospital, Sheffield
NPH	Northwick Park Hospital, London
PET	Peterborough District Hospital
PIL	Pilgrim Hospital, Boston
PIN	Pinderfields General Hospital, Wakefield
PGH	Poole General Hospital
PCH	Prince Charles Hospital, Merthyr Tydfil
POW	Princess of Wales Hospital, Bridgend
	Princess Royal Hospital, Telford
BRO	Princess Royal University Hospital, Bromley
QAP	Queen Alexandra Hospital, Portsmouth
QEB	Queen Elizabeth Hospital, Birmingham
QEG	Queen Elizabeth Hospital, Gateshead
QKL	Queen Elizabeth Hospital, King's Lynn
	Queen Elizabeth Hospital, Woolwich
QEQ	Queen Elizabeth the Queen Mother Hospital, Margate
BRT	Queens Hospital, Burton upon Trent
	Queens Hospital, Romford
ROT	Rotherham District General Hospital
AEI	Royal Albert Edward Infirmary, Wigan
RBE	Royal Berkshire Hospital, Reading
BLA	Royal Blackburn Hospital
BOL	Royal Bolton Hospital
RDE	Royal Devon & Exeter Hospital, Exeter
RFH	Royal Free Hospital, London
RGH	Royal Glamorgan Hospital, Llantrisant
GWE	Royal Gwent Hospital, Newport
RHC	Royal Hampshire County Hospital, Winchester
	Royal Lancaster Infirmary
RLU	Royal Liverpool University Hospital
OHM	Royal Oldham Hospital
RPH	Royal Preston Hospital
RSS	Royal Shrewsbury Hospital
RSU	Royal Surrey County Hospital, Guildford
RSC	Royal Sussex County Hospital, Brighton
BAT	Royal United Hospital, Bath
	Royal Victoria Hospital, Belfast
RVN	Royal Victoria Infirmary, Newcastle
RUS	Russells Hall Hospital, Dudley
SAL	Salisbury District Hospital
SAN	Sandwell General Hospital
SCA	Scarborough General Hospital
SCU	Scunthorpe General Hospital
STD	South Tyneside District Hospital, South Shields
SGH	Southampton General Hospital
SEH	Southend Hospital
	Southport & Formby Hospital
GEO	St George's Hospital, London
SHC	St Helier Hospital, Carshalton
SPH	St Peter's Hospital, Chertsey
STR	St Richard's Hospital, Chichester
STH	St Thomas' Hospital, London
	St. Mary's Hospital, Isle of Wight
STM	St. Mary's Hospital, Paddington
	Staffordshire General Hospital
SHH	Stepping Hill Hospital, Stockport
SMV	Stoke Mandeville Hospital, Aylesbury
SUN	Sunderland Royal Hospital
TGA	Tameside General Hospital, Manchester
PMS	The Great Western Hospital, Swindon
PAH	The Princess Alexandra Hospital, Harlow
RCH	The Royal Cornwall Hospital, Treliske
LON	The Royal London Hospital
TOR	Torbay District General Hospital
	Trafford Hospital
	Tunbridge Wells Hospital
NUH	Ulster Hospital, Belfast
UCL	University College Hospital London
STO	University Hosp. of North Staffordshire, Stoke on Trent
FAZ	University Hospital Aintree
UHC	University Hospital Coventry
DRY	University Hospital Of North Durham, Darlington
NTG	University Hospital of North Tees, Stockton on Tees
UHW	University Hospital of Wales, Cardiff
LEW	University Hospital, Lewisham
UHN	University Hospital, Nottingham
VIC	Victoria Hospital, Blackpool
ASH	Wansbeck Hospital
WDG	Warrington Hospital
	Warwick Hospital
WAT	Watford General Hospital
WMU	West Middlesex University Hospital, Isleworth
WSH	West Suffolk Hospital, Bury St. Edmunds
	West Wales Hospital, Carmarthen
WGH	Weston General Hospital, Weston-Super-Mare
WEX	Wexham Park Hospital, Slough
WHC	Whipps Cross University Hospital
WHI	Whiston Hospital, Prescot
WHT	Whittington Hospital, London
WHH	William Harvey Hospital, Ashford
WYB	Withybush Hospital, Haverford West
WRC	Worcestershire Royal Hospital, Worcester
WRG	Worthing & Southlands Hospital
WYT	Wythenshawe Hospital, Manchester
YEO	Yeovil District Hospital
YDH	York Hospital

Findings

Ascertainment of cases

During the three-month ASAP study period routine NHFD data entry continued as normal in all 182 hospitals in England, Wales and Northern Ireland. This identified 16,904 patients that were treated for a hip fracture and 16,498 that underwent surgery between 1 May and 31 July 2013.

ASAP data were submitted for 11,186 (67.8%) and analysed for 11,130 (67.5%) of these operations.

The median case ascertainment rate (the percentage of patients undergoing hip fracture surgery for whom ASAP data were submitted) was 80.6% (interquartile range 51.2 – 92.4% [range 0–100%]).

Twelve hospitals (6.5%) achieved a 100% case ascertainment rate – CHE, CHS, HIN, NOB, NTH, OHM, PET, RFH, SCA, SHH, UCL and WDH. Twenty-three hospitals (12.5%) did not submit any ASAP data.

A key objective of ASAP was to develop a national consensus regarding the optimal anaesthetic management of patients with hip fracture. A picture of variation in practice across the country will be key to the discussion and debate that will be generated when ASAP findings are reported to anaesthetists at national, regional and local scientific and clinical governance meetings over the coming year.

To minimise the effect of selective reporting the charts that illustrate key findings were therefore based on those hospitals which provided the most complete data. 95 hospitals (51.6%) achieved a case ascertainment rate of greater than 80%, and these units were therefore used to develop the charts reported here.

Hospitals with less complete case ascertainment carry the potential for bias and were excluded from such analysis, though their performance against the ASAP standards is reported in detail in the regional tables (Appendix 2).

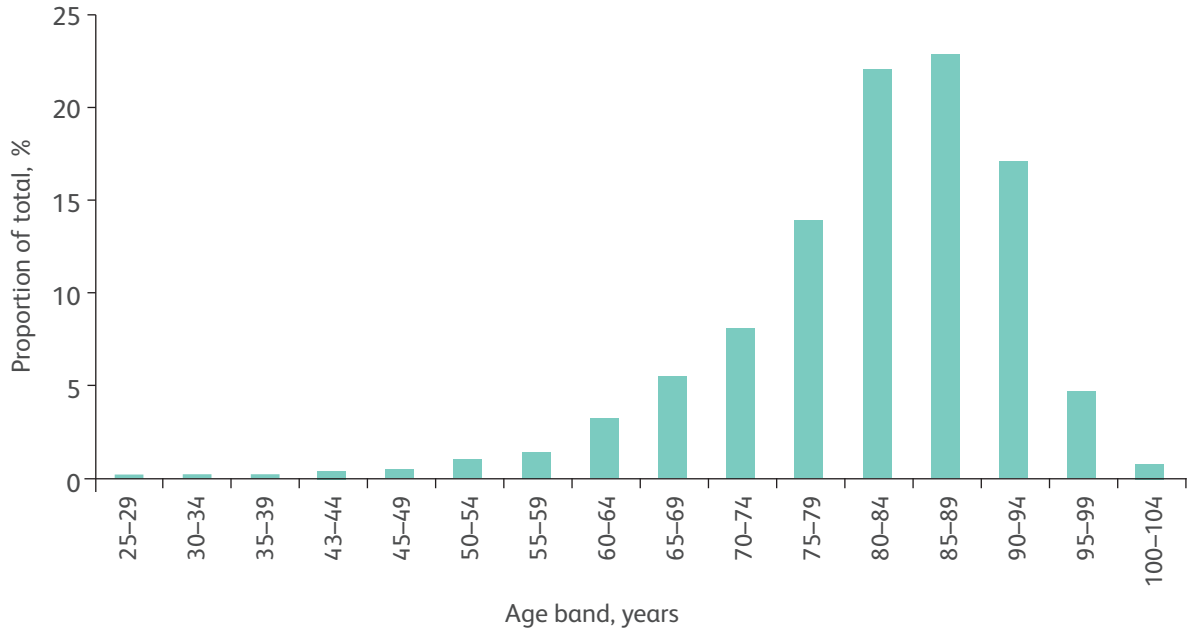
Patient characteristics

The age, sex and American Society of Anesthesiologists (ASA) grade distributions of ASAP patients were similar to previously published NHFD data (table 1). Sex was recorded for 11,129 (99.9%) patients; 71.9% were female, 28.1% male. Age was reported for 11,110 (99.8%) patients. The median age of patients was 83 years (interquartile range 7789 years [range 24–104]), with a negatively skewed distribution (figure 1). Only data for patients aged >60 years are included, in line with NHFD reports.

Table 1. Characteristics of ASAP cases. The ASA grade distribution within each 5-year age band over 60 years was similar to that of all ASAP patients.

Characteristic		NHFD		ASAP
		2011/12	2012/13	2013
Gender, %	Male	26.0	26.8	28.1
	Female	74.0	73.2	71.9
Age in years, %	60–69	8.3	8.7	8.8
	70–79	22.2	21.7	22.5
	80–89	48.2	47.4	46.2
	90+	21.3	22.1	22.4
ASA grade, %	ASA 1	2.4	2.2	3.0
	ASA 2	30.7	29.7	30.0
	ASA 3	55.1	55.5	55.1
	ASA 4	11.4	12.2	11.7
	ASA 5	0.4	0.4	0.2

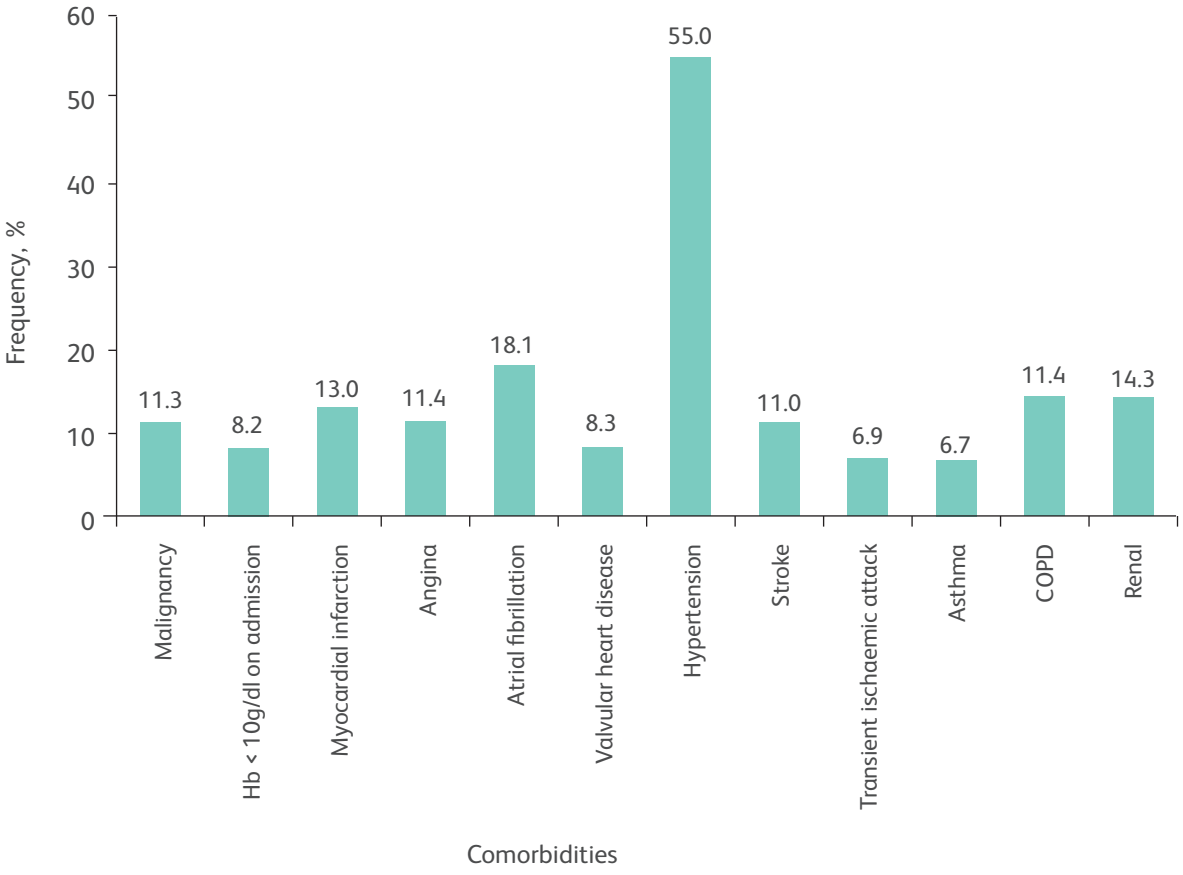
Figure 1. Age distribution of ASAP cases.



Comorbidities

Comorbidity data were recorded for 10,387 (93.3%) of patients; 8,752 (84.3%) of patients had at least one recorded comorbidity and 2,696 (26.0%) had three or more recorded comorbidities. The frequencies of the types of comorbidity recorded are shown in figure 2.

Figure 2. Frequency distribution of recorded comorbidities.



Standard 1: Patients should be anaesthetised by a consultant or specialist with similar clinical experience.

ASAP finding: A consultant or specialist anaesthetist was present in theatre for 95% of hip fracture operations

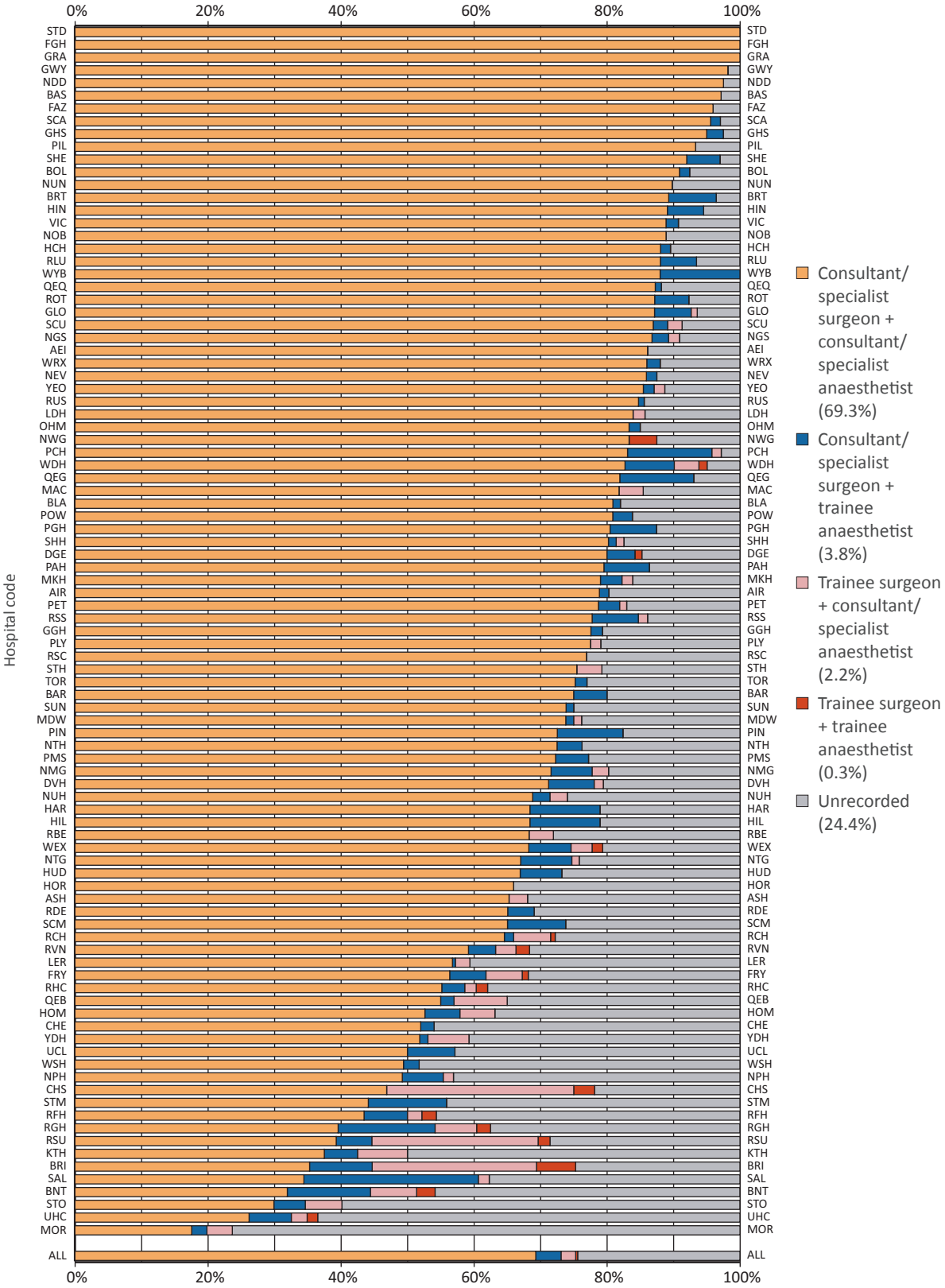
- There was considerable national variation in the seniority of surgeons and anaesthetists recorded as present in theatre during each hip fracture operation (figure 3).
- There may be a recording bias obscuring senior involvement within the 24 % of cases in which either grade of surgeon or anaesthetist were not recorded. However, it is encouraging that of the operations in which the seniority of both surgeon and anaesthetists were recorded very few (0.4 %) were performed by unsupervised trainees.
- The specialist expertise of each anaesthetist relating to hip fracture care irrespective of grade was not assessed in the current project.

The grade of the most senior surgeon and the most senior anaesthetist were both recorded for 75.6% of operations. The most senior personnel present during these operations are shown in table 2, and by hospital in figure 3.

Table 2. Seniority of most senior surgeon and anaesthetist present in theatre during 8,417 hip fracture operations. Figures are given as percentages.

		Most senior surgeon present in theatre	
		Consultant/specialist	Trainee
Most senior anaesthetist present in theatre	Consultant/specialist	91.7	2.9
	Trainee	5.0	0.4

Figure 3. Grade of most senior anaesthetist and surgeon present in theatre, by hospital.



Standard 2: Spinal/epidural anaesthesia should be considered for all patients

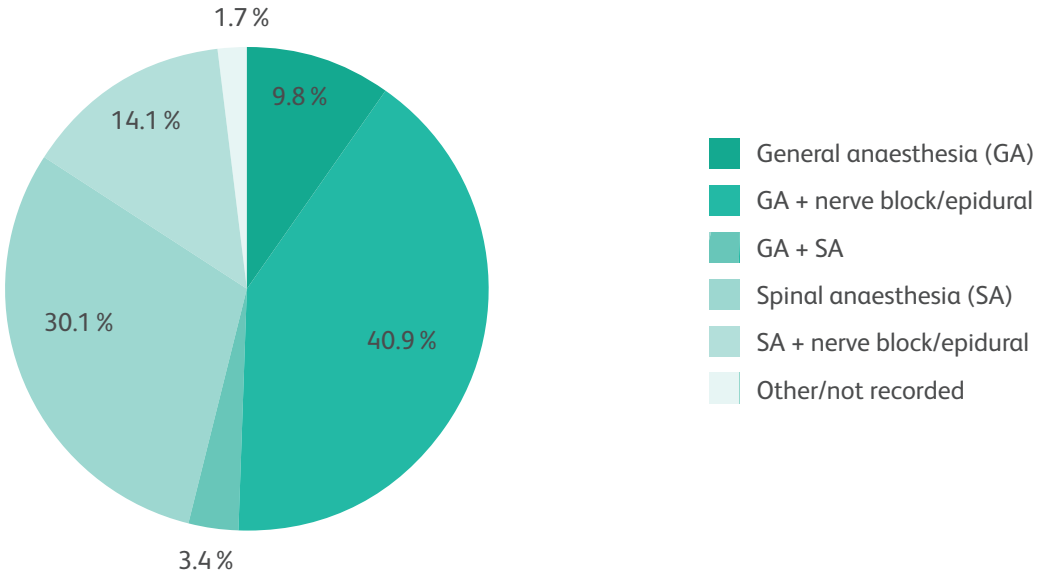
ASAP finding: Only 44% of patients were administered spinal, and only 0.2% epidural anaesthesia

- There was very striking variation across the country with some units administering spinal anaesthesia in over 80 % of cases, while others used this approach in less than 10 %. This suggests that the mode of anaesthesia is often determined by local departmental or individual anaesthetist preference, rather than being a response to the needs, comorbidities and preferences of individual patients.
- Questions of patient preference could not be directly addressed in our audit. We did not record whether spinal or epidural anaesthesia was 'considered' by the anaesthetist and patient, but a substantial number of units were using general anaesthesia in over three-quarters of cases suggesting that this approach is routinely selected in some hospitals.

Mode of anaesthesia was recorded by NHFD data collectors for 10,876/11,130 (97.7%) patients, and by ASAP data collectors for 10,936 (98.3%) of patients. There was concordance between the mode of anaesthesia recorded by NHFD and ASAP data collectors for 7,173 (64.5%) patients.

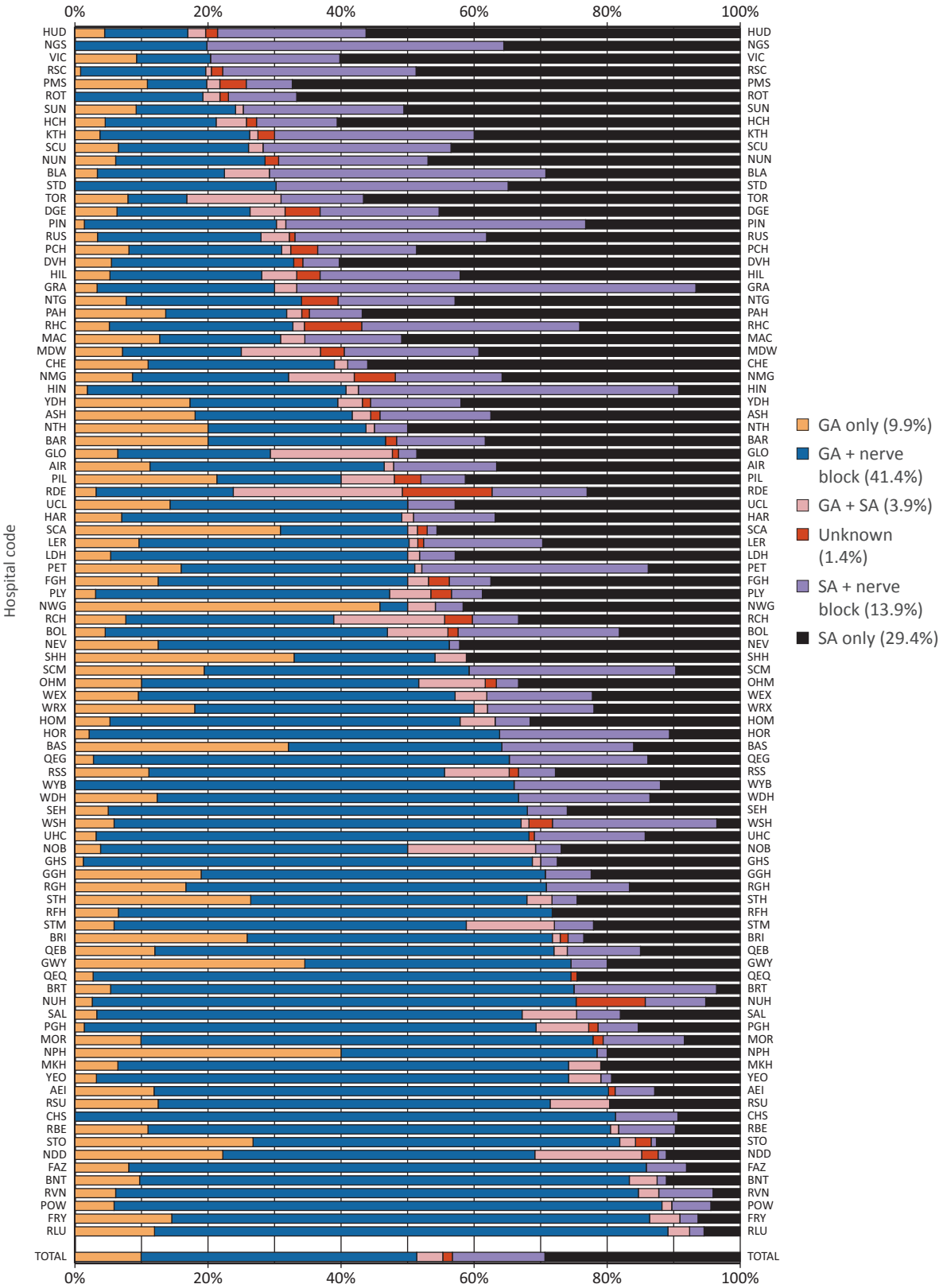
In the ASAP recorded data, general anaesthesia (+/- nerve block/epidural) was administered to 5,640 (50.7%) of the ASAP patient group, spinal anaesthesia (+/- nerve block/epidural) to 4,916 (44.2%), and both general and spinal anaesthesia (+/- nerve block/epidural to 380 (3.4%) patients; 194 patients (1.7%) had 'other' anaesthesia, mainly repair under local anaesthesia (figure 4). Epidural anaesthesia was administered to 21 (0.2%) patients.

Figure 4. Modes of anaesthesia administered as a proportion of all patients with ASAP data recorded.



The mode of anaesthesia varied markedly between hospitals (figure 5). General anaesthesia was administered to between 19.6% and 92.4% of patients. Nerve blocks were administered to between 8.3% and 91.1% of patients.

Figure 5. Mode of anaesthesia by hospital.



Standard 3: Spinal anaesthetics should be administered using hyperbaric bupivacaine (< 10mg) with the patient positioned laterally (bad hip down)

ASAP finding: Nearly 80% of patients receiving spinal anaesthesia were administered over 1.9mls (9mg) of 0.5% hyperbaric bupivacaine, the median dose being 2.5mls (12.5mg).

- Evidence suggests that lower doses of 0.5 % hyperbaric bupivacaine are associated with lower degrees of relative intraoperative hypotension.
- Further work is planned to analyse this association, and to establish whether the use of lower doses of bupivacaine are associated with an increased rate of failed spinal anaesthesia, and whether the use of lower doses, or other agents (eg isobaric bupivacaine) confers benefit in terms of intraoperative blood pressure.

Spinal anaesthesia was administered to 5,638 (50.7%) patients, but failed in 342 (6.1%). The most frequently used local anaesthetic agent was 0.5% hyperbaric bupivacaine, which was administered to 3,336 (59.2%) patients receiving spinal anaesthesia.

The median volume of 0.5% hyperbaric bupivacaine administered intrathecally was 2.5mls (interquartile range 2.22.8 [range 0.65–4.7]), with 79.5% of patients receiving more than 1.9mls (figure 6).

Figure 6. Frequency distribution of volume of subarachnoid 0.5 % hyperbaric bupivacaine administered.

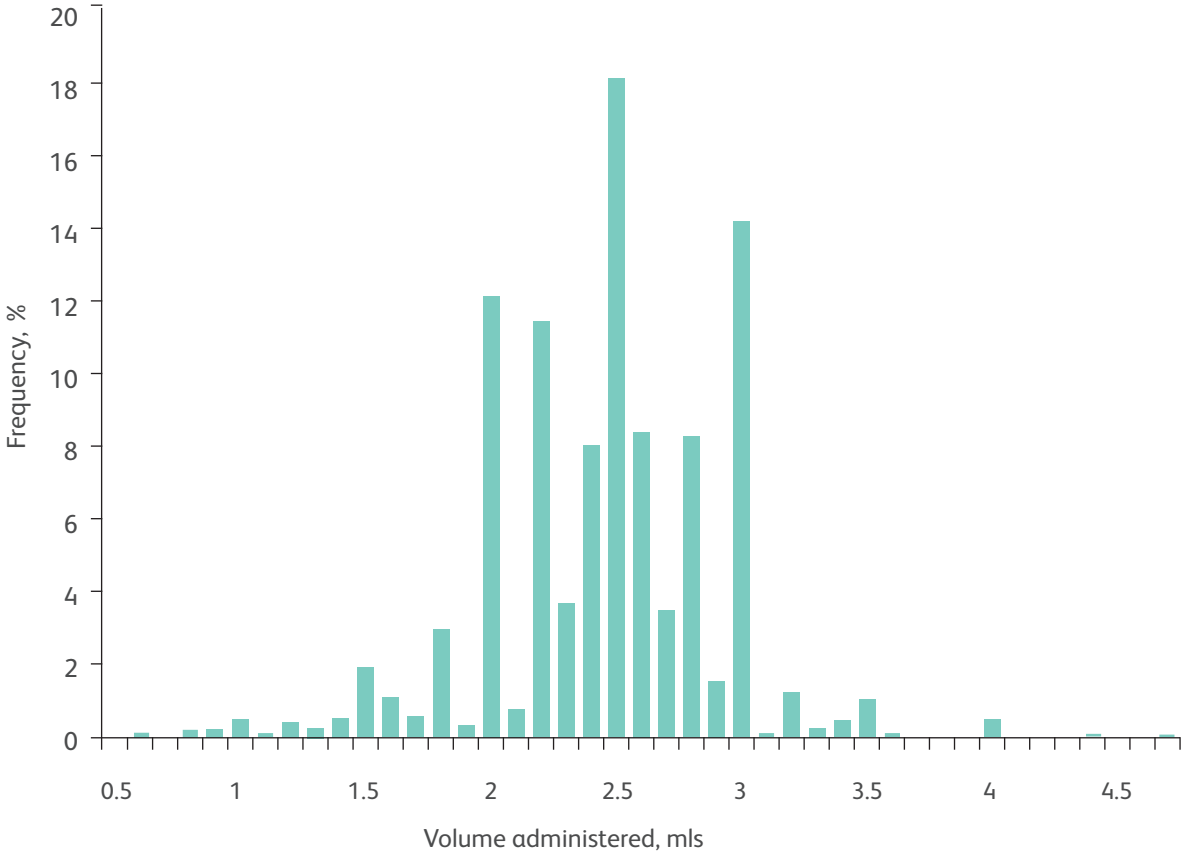
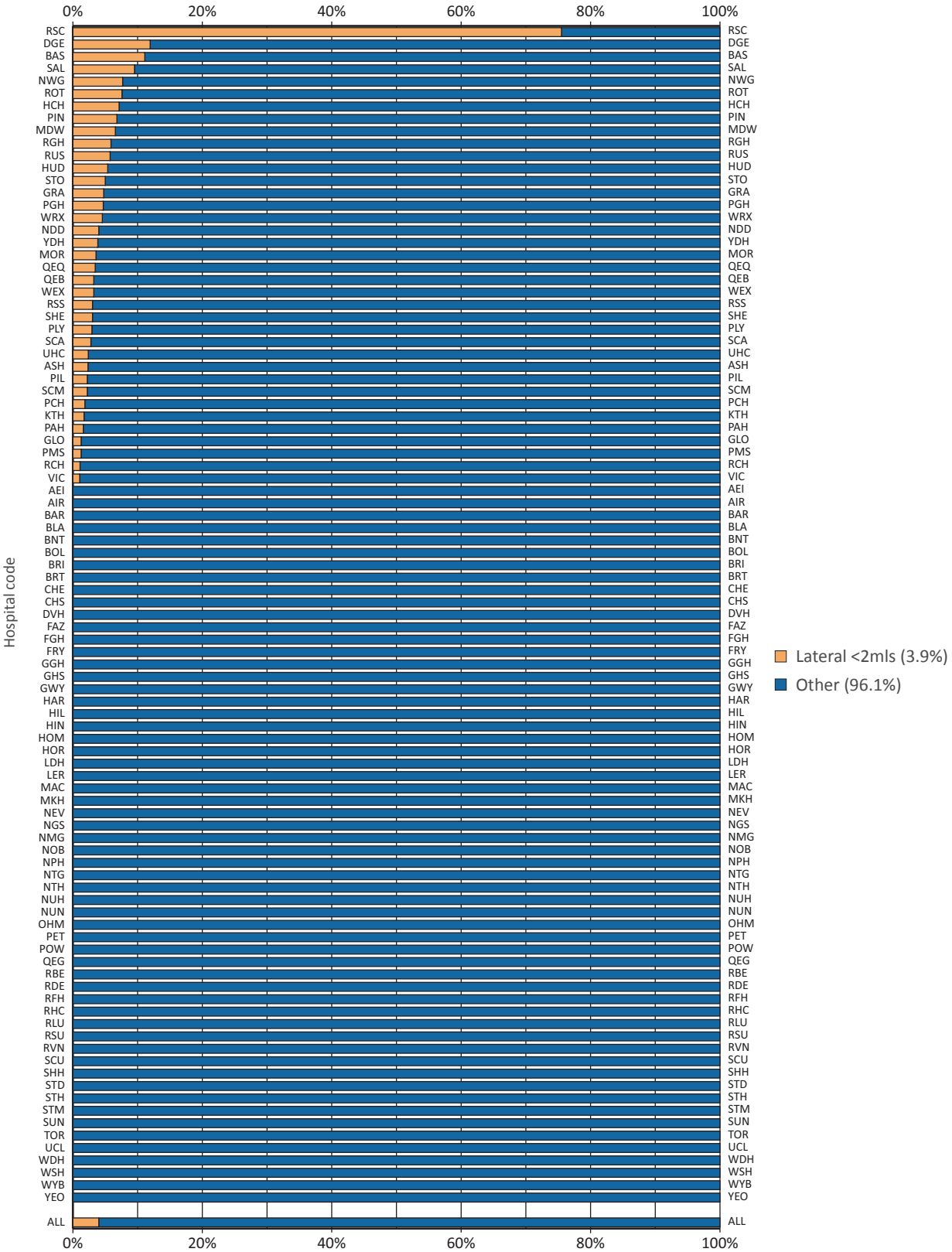


Figure 7. Proportion of patients administered spinal anaesthesia in the lateral dependent position using less than 2mls 0.5 % hyperbaric bupivacaine, by hospital



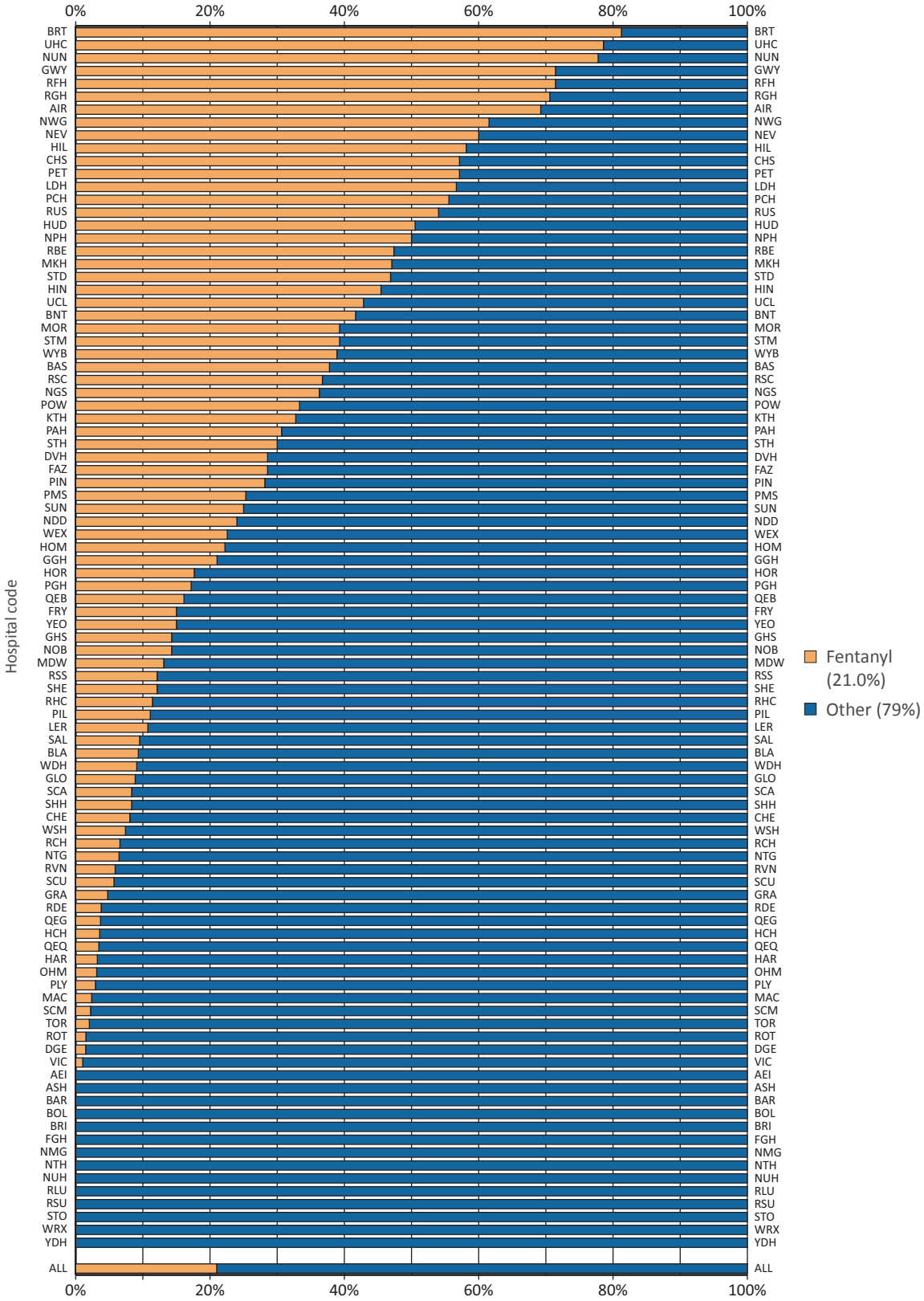
Standard 4: Co-administration of intrathecal opioids should be restricted to fentanyl

ASAP finding: 22% of patients successfully administered spinal anaesthesia received intrathecal fentanyl

> There is very little evidence concerning the use of intrathecal opioids for hip fracture patients. Fentanyl appears to have a bupivacaine-sparing effect, reducing intraoperative hypotension[7], but there is no specific evidence for the use of other opioids in these patients. There is concern that higher doses of intrathecal diamorphine and morphine do not extend the duration of postoperative analgesia, but are associated with additional side-effects[25] (postoperative confusion, respiratory depression, itching), particularly in the age group sustaining hip fracture.

In the 3,617/5,296 (68.2%) successfully administered spinal anaesthetics for which opioid co-administration was recorded, fentanyl was used in 31.9%, diamorphine in 49.7% and morphine in 3.9% (14.5% other opioid or no opioid used), but there was wide variation between hospitals in the type of opioid used (figure 8).

Figure 8. Proportion of patients with spinal opioid who were administered fentanyl, by hospital.



Standard 5: If sedation is required this should be midazolam or propofol

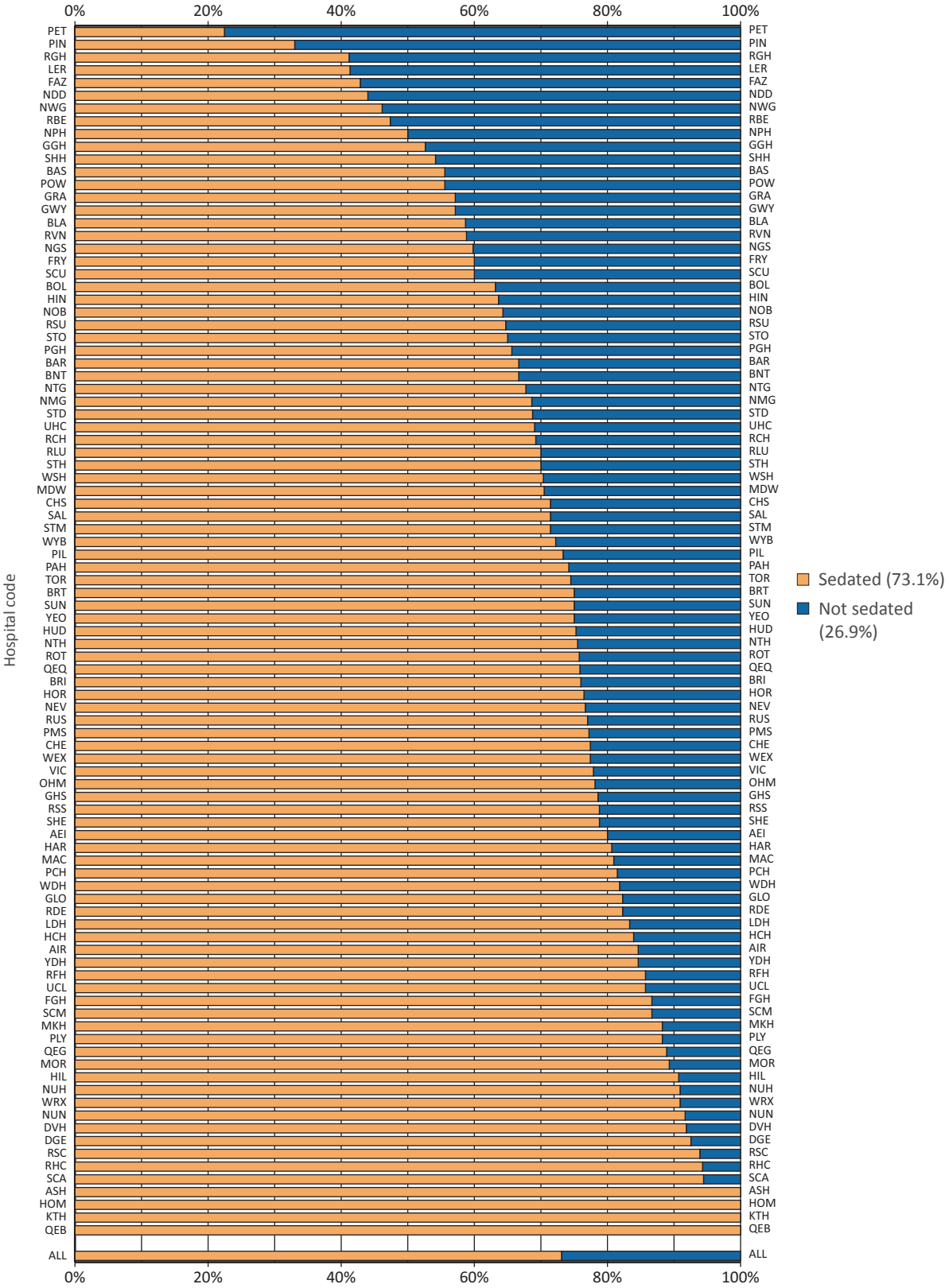
ASAP finding: Midazolam and propofol were administered as single sedative agents to around 15% and 25% of patients receiving sedation during spinal anaesthesia, respectively

- Sedation was administered to 74 % of patients having spinal anaesthesia. There was marked variation between different units with sedation being given to less than a quarter of patients in some units, and to all patients in others (Figure 9).
- Over-sedation is relatively common during hip fracture repair under spinal anaesthesia, and might contribute both to intraoperative hypotension, and to postoperative confusion and delayed rehabilitation.
- The use of propofol is associated with reduced postoperative confusion when compared to benzodiazepines and opioids.
- At low doses ketamine is analgesic, but it is unclear whether it has any additional clinical analgesic benefit when spinal anaesthesia is used. At higher doses, its use is associated with postoperative confusion.

Of the 5,638 patients receiving spinal anaesthesia, 4,195 (74.4%) were sedated with one (53.6% cases), two (40.7%), three (5.4%) or four (0.3%) sedative agents.

A benzodiazepine was administered in 33.2% of cases, propofol in 29.0%, ketamine in 22.0% and an opioid in 15.9% of all those who were sedated. Information about the mode of administration (single-dose, infusion) was not collected.

Figure 9. Proportion of patients receiving sedation during spinal anaesthesia, by hospital.



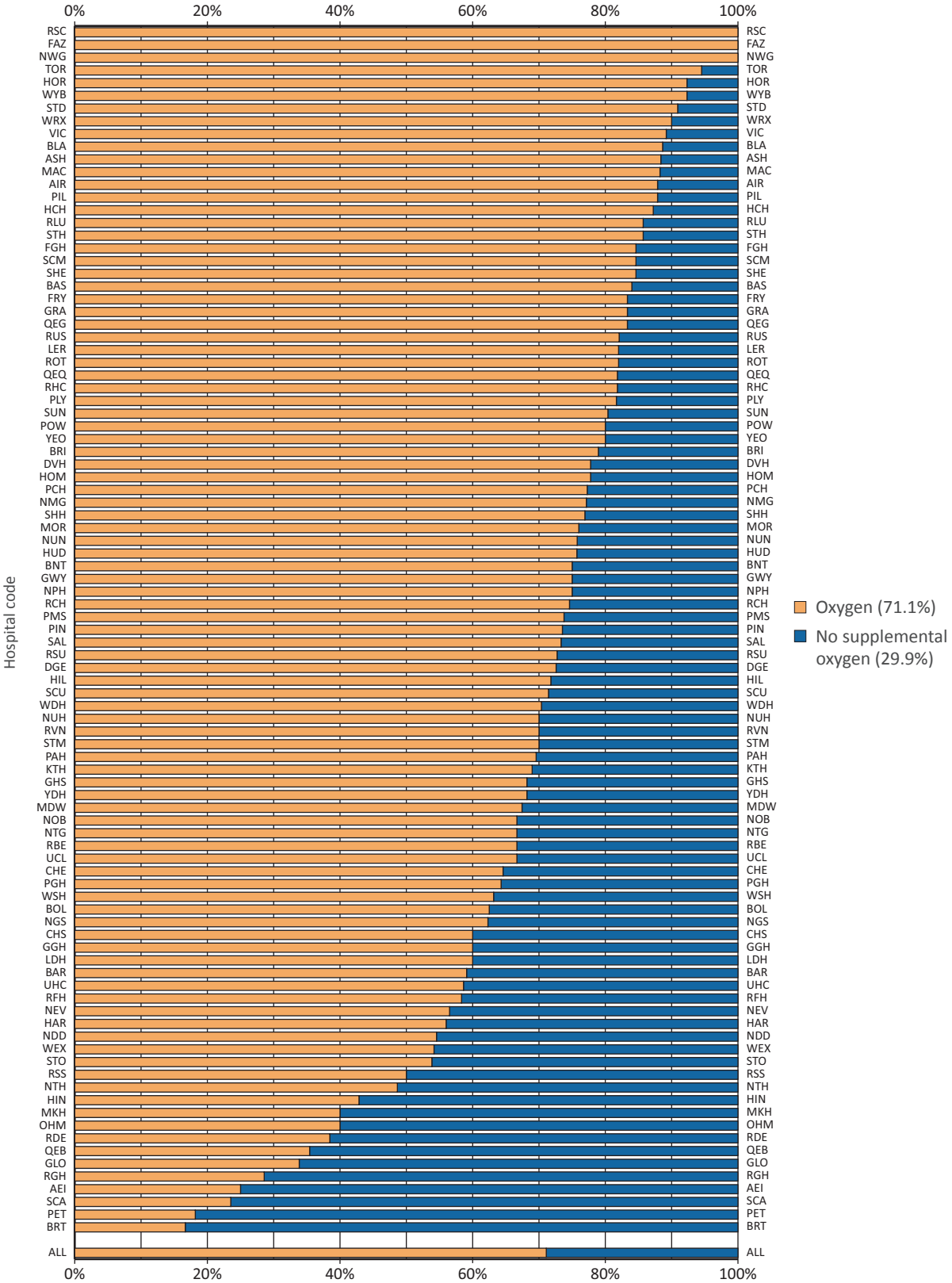
Standard 6: Supplemental oxygen should always be provided

ASAP finding: Supplemental oxygen was administered to 71% of patients receiving sedation during spinal anaesthesia

- Age-related reductions in pulmonary gas transfer when supine suggest that supplemental oxygen should routinely be administered to patients receiving sedation, although there is little evidence to support this standard.
- Hypoxia can contribute to postoperative confusion and delayed recovery, but whether supplemental oxygen is necessary provided the arterial oxygen saturations exceeds a monitored 95 % requires further investigation.

Supplemental oxygen was provided for 71.1% of patients administered sedation during spinal anaesthesia (figure 10).

Figure 10. Proportion of patients administered spinal anaesthesia who were sedated and received or did not receive supplemental oxygen, by hospital.



Standard 7: Inhalational agents should be considered for the induction of general anaesthesia

ASAP finding: Inhalational agents were used to induce general anaesthesia in around 5% of hip fracture patients

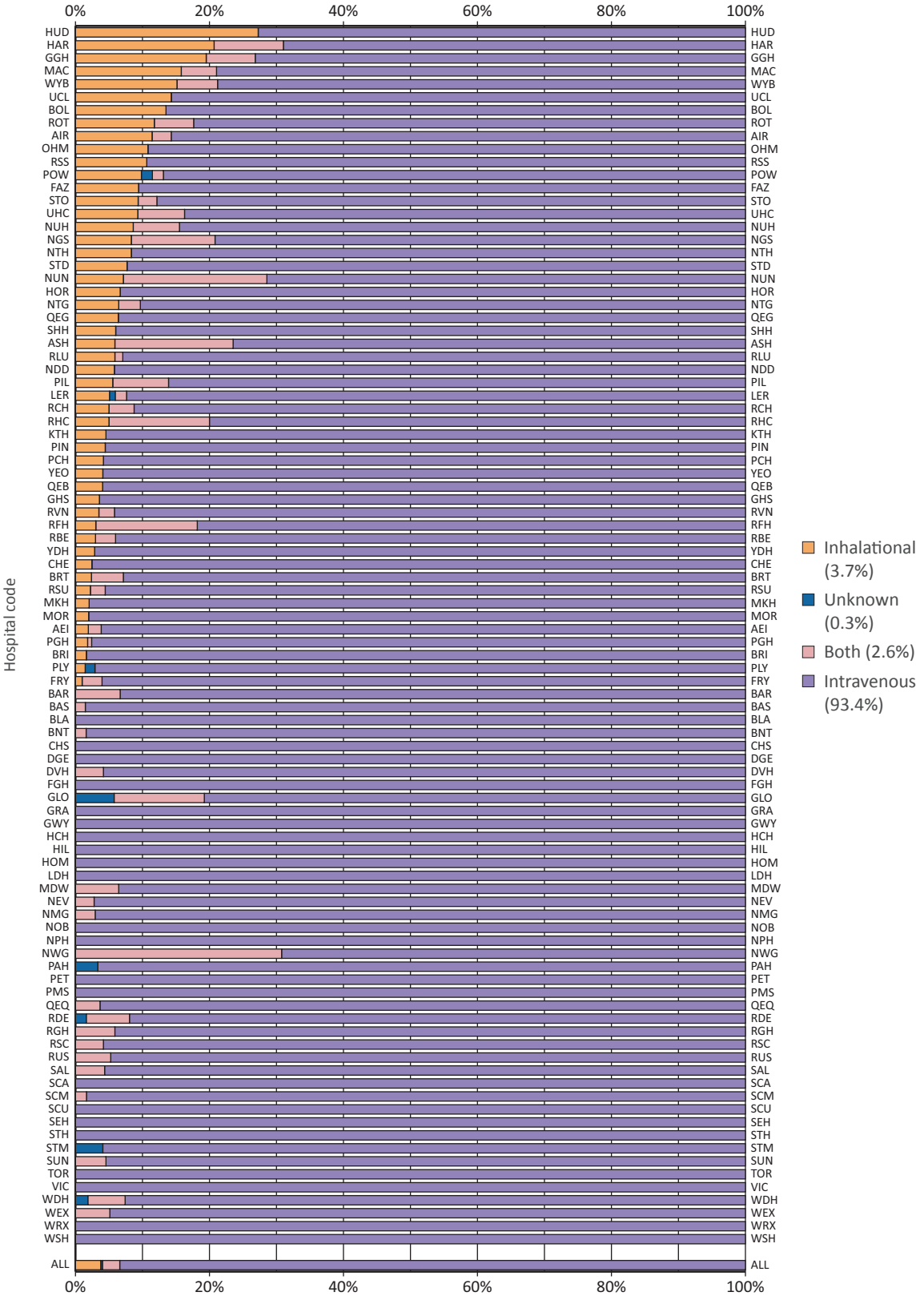
- General anaesthesia was administered to more than half (54.1 %) of patients, although there was a marked range of prevalence between hospitals.
- Inhalational induction with sevoflurane, particularly at lower inspired concentrations, reduces mean arterial pressure less than occurs with intravenous propofol induction, and may confer greater cardiostability in this patient group.
- It remains uncertain whether it is the dose or rate of administration of inhalational or intravenous anaesthesia during induction that is of the greater importance.
- The AAGBI 2014 guidelines Peri-operative Care of the Elderly[26] advocate the use of a Lerou nomogram (or similar dosage chart) in order to guide age-adjusted delivery of inhalational anaesthetic agents to maintain general anaesthesia (as received by 88 % of patients administered GA in this audit), and so avoid relative overdose.

General anaesthesia was administered to 6,020 (54.1%) of patients. Modes of general anaesthesia induction and maintenance are summarised in table 3.

Table 3. Modes of general anaesthesia induction and maintenance. Figures are given as percentages

	Induction of general anaesthesia	Maintenance of general anaesthesia
Intravenous	93.0	5.4
Inhalational	3.9	88.4
Intravenous and inhalational	2.6	0.7
Not recorded	0.5	6.2

Figure 11. Proportion of inhalational/intravenous general anaesthesia induction, by hospital.



Standard 8: Spontaneous ventilation should be used in preference to mechanical ventilation

ASAP finding: 44% of patients breathed spontaneously throughout general anaesthesia

- Endotracheal intubation reduces the risk of aspirating gastric contents into the lungs. Mechanical ventilation permits control of end-tidal carbon dioxide levels, but may contribute to pulmonary and systemic inflammation even if lung protective ventilation strategies are used[27].
- Evidence specific to the hip fracture population is very limited[27], and it remains uncertain whether the balance of benefits and risks favours mechanical or spontaneous ventilation.

The airway was maintained using an endotracheal tube in 44.2% and a laryngeal mask airway in 51.1% of patients administered general anaesthesia (both/not recorded 4.7%).

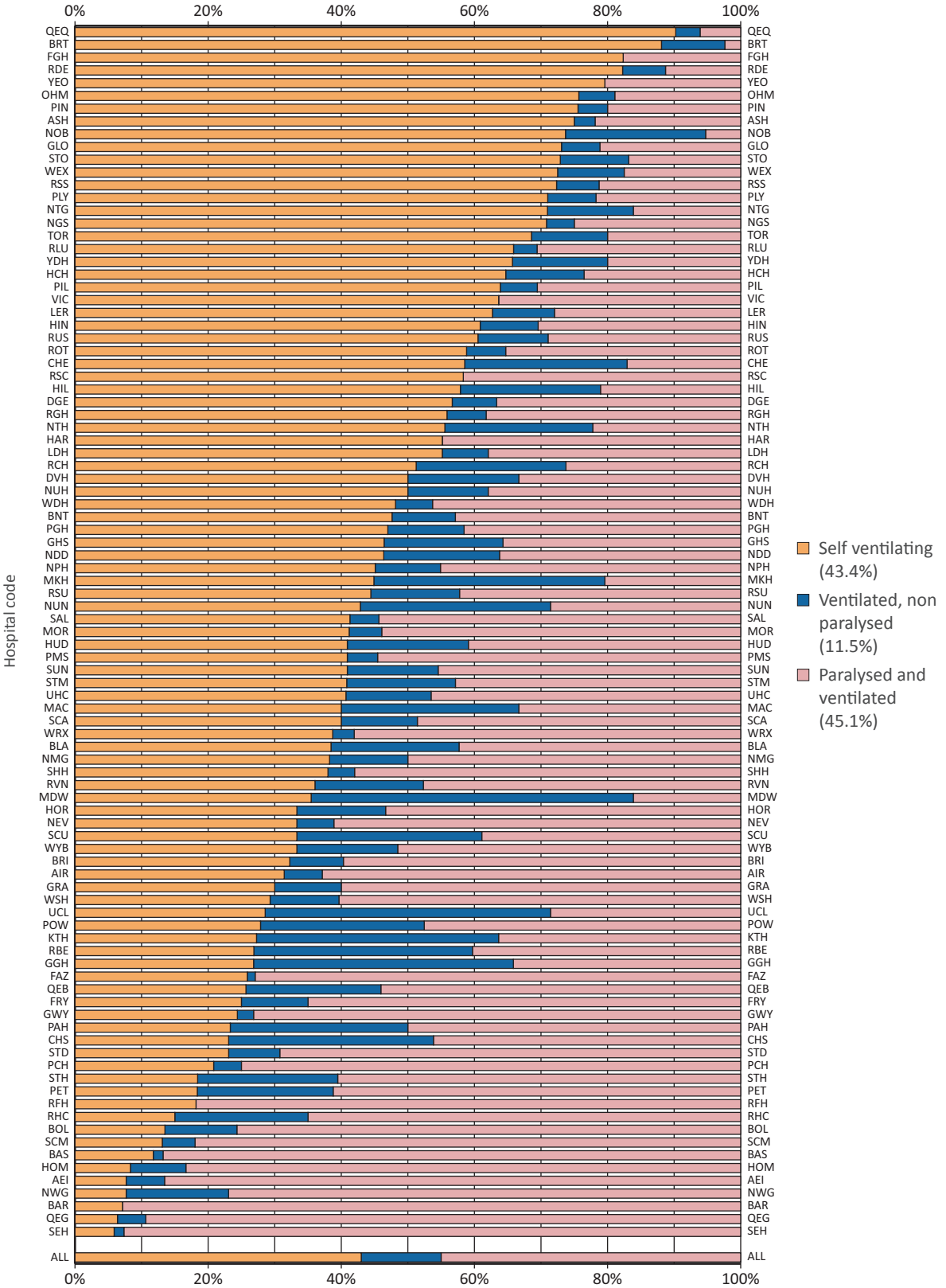
The mode of ventilation and degree of neuromuscular paralysis administered to patients receiving general anaesthesia are summarised in table 4.

Table 4. The mode of ventilation and degree of neuromuscular paralysis administered to patients receiving general anaesthesia. Figures are given as percentages.

	Airway device used	
	Endotracheal tube	Laryngeal mask airway
Paralysed, mechanical ventilation	81.3	8.6
Non-paralysed, mechanical ventilation	9.1	13.0
Spontaneous ventilation	0.0	73.0
Other	9.3	5.4

The mode of ventilation and degree of paralysis varied considerably by hospital (figure 12), with between 2 and 93% of patients being paralysed and mechanically ventilated.

Figure 12. Proportion of patients receiving general anaesthesia that were paralysed and ventilated, by hospital.



Standard 9: Consider intraoperative nerve blocks for all patients undergoing surgery

ASAP finding: Nerve blocks were administered to 56% of patients.

- Most nerve blocks (54 %) were administered without ultrasound-guidance or peripheral nerve stimulation. However, 56 % of patients received a fascia iliaca block, which can be performed relatively safely using a non-guided landmark technique.
- There are relatively few contraindications to nerve blocks, particularly femoral nerve or fascia iliaca compartment blockade. Supplemental nerve blockade helps to control acute and perioperative pain and to reduce the need for perioperative opioid, both of which are considerations when seeking to prevent post-operative delirium.
- The administration of a functional nerve block may also avoid the use of sedation when moving a patient into the lateral or sitting position for administering spinal anaesthesia, and may reduce the volume of intrathecal bupivacaine necessary for anaesthesia.

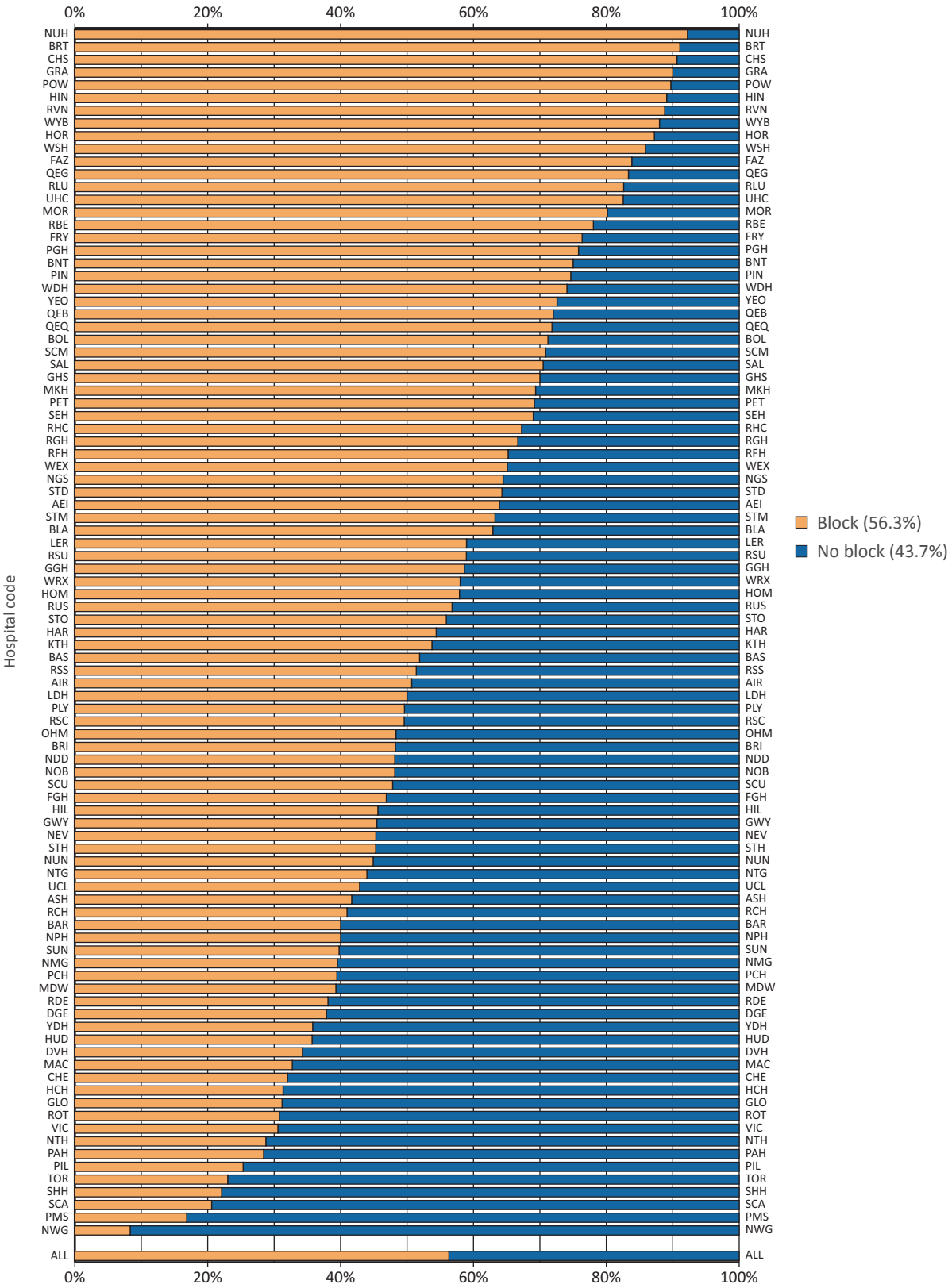
Analgesic peripheral nerve block was administered to 6,233 (56.0%) patients; 7,332 blocks were performed. More than one block was performed in 1,073 (17.2%) patients. Peripheral blocks were established before anaesthesia in 15.5% of cases.

Ultrasound guidance only was used in 26.4% of cases, peripheral nerve stimulation only in 13.4%, both in 6.0% and neither in over half (54.1%) of patients.

The most frequently performed single peripheral nerve blocks were the fascia iliaca compartment block (55.9%) and the femoral nerve block (26.6%).

The proportion of all patients receiving a peripheral nerve block varied from eight to 92% between hospitals (figure 13).

Figure 13. The proportion of all patients receiving a peripheral nerve block by hospital.



Standard 10: Neuraxial and general anaesthesia should not be combined

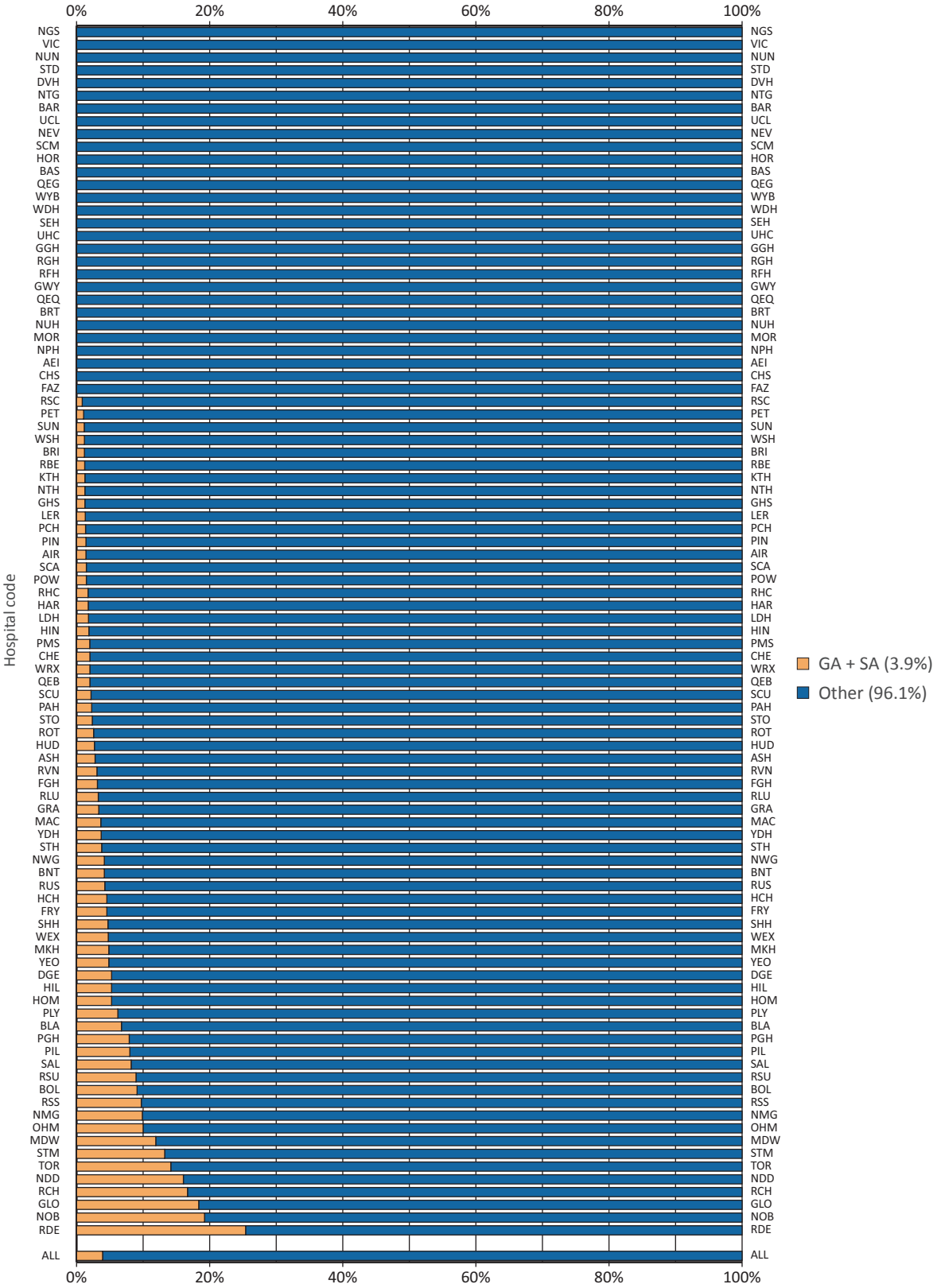
ASAP finding: General and spinal (neuraxial) anaesthesia were given in combination to 3.4% of hip fracture patients

> Use of a combination of both spinal and general anaesthesia was associated with the highest prevalence of hypotension, possibly reflecting the combined effect of reduced heart rate, contractility and blood vessel tone in people without the reserve to cope with such stresses.

Reported rates of combined general and spinal anaesthetic varied from 0 to 25.4% across the hospitals shown in figure 14.

The combined technique is more popular for elective hip arthroplasty, which tends to be a fitter and younger patient group. Figure 11 shows that only in a small number of units is the combination technique popular. In units where only a few combined techniques were recorded, this may reflect a failed or inadequate spinal anaesthetic being converted into a general anaesthetic.

Figure 14. The proportion of all patients receiving a combination of both spinal and general anaesthesia by hospital.



Standard 11: Hypotension should be avoided

ASAP finding: Intraoperative hypotension occurred for the majority of hip fracture patients; in 56–89%, depending on which of several commonly used definitions was used

- Despite the widespread presence of senior anaesthetic expertise in theatre, the prevalence of intraoperative varied markedly between units. The mean prevalence of relative hypotension (systolic blood pressure reduction >20 % from pre-operative value) was 90 % and that of absolute (lowest intraoperative SBP <100 mmHg) hypotension was 77 % .
- Hypotension was consistently less prevalent among patients receiving spinal anaesthesia, compared to those receiving general anaesthesia.
- When interpreting these figures it is important to remember that they were derived from two single measures of perioperative BP, immediately before administration of anaesthesia and at the lowest recorded blood pressure. As a result they do not provide information about the rate of decline of blood pressure, frequency of measurement, duration of hypotension, repeated episodes of hypotension, fluid status or use of vasopressors/invasive arterial blood pressure monitoring.
- This high prevalence of hypotension indicates that this is an important area for future consideration. A consistent definition of 'hypotension' is urgently required[20].

Data were recorded for pre-induction and lowest recorded intra-operative systolic (SBP) and diastolic (DBP) blood pressures for 10 244 (92.0%) patients. Mean arterial pressures (MAP) were calculated from these data as a (third of the pulse pressure + diastolic blood pressure).

Mean (SD) pre-induction blood pressures were 147(25)/74(14) (MAP 97(16)) and lowest intraoperative blood pressure 88(18)/47(11) (MAP 60 (12)).

The mean (SD) fall in SBP for all patients in which type of anaesthesia was also known was 38(14)%, 40(14)% for patients administered general anaesthesia, 34(13)% for patients administered spinal anaesthesia and 41(13)% for patients administered general and spinal anaesthesia.

The prevalence of hypotension was analysed according to a variety of criteria, there being no commonly agreed definition of 'hypotension':

Absolute values

- Lowest intraoperative SBP < 100 mmHg
- Lowest intraoperative SBP < 90 mmHg
- Lowest intraoperative MAP < 70 mmHg
- Lowest intraoperative MAP < 55 mmHg

Relative changes

- SBP reduction > 20% from pre-operative value
- SBP reduction > 30% from pre-operative value
- MAP reduction > 20% from pre-operative value
- MAP reduction > 30% from pre-operative value

Table 5 summarises the prevalence of hypotension according to definition and type of anaesthesia used.

Table 5. The prevalence of hypotension according to definition and type of anaesthesia used. Figures are given as percentages.

	Type of anaesthesia			
	All	**GA**	**GA + SA**	**SA**
Fall SBP > 20%	88.9	92.3	92.8	84.6
Fall SBP > 30%	71.3	78.2	81.8	62.3
Lowest SBP < 90mmHg	56.2	66.6	74.9	42.7
Lowest SBP < 100mmHg	77.0	85.2	92.2	66.3
Fall MAP > 20%	87.8	90.8	93.1	83.9
Fall MAP > 30%	69.2	76.1	81.0	60.3
MAP < 70mmHg	79.2	86.1	91.1	70.3
MAP < 55mmHg	32.4	40.3	47.3	21.9

The prevalence of recorded hypotension varied from 68.3% to 100.0% for relative hypotension (figure 15) and from 36.6% to 96.2% for absolute hypotension (figure 16) between hospitals, according to the 'least bad' definitions of hypotension used (SBP reduction > 20% from pre-operative value, and lowest intraoperative SBP < 100 mmHg, respectively).

Figure 15. Prevalence of relative hypotension (SBP reduction >20% from pre-op. value), by hospital.

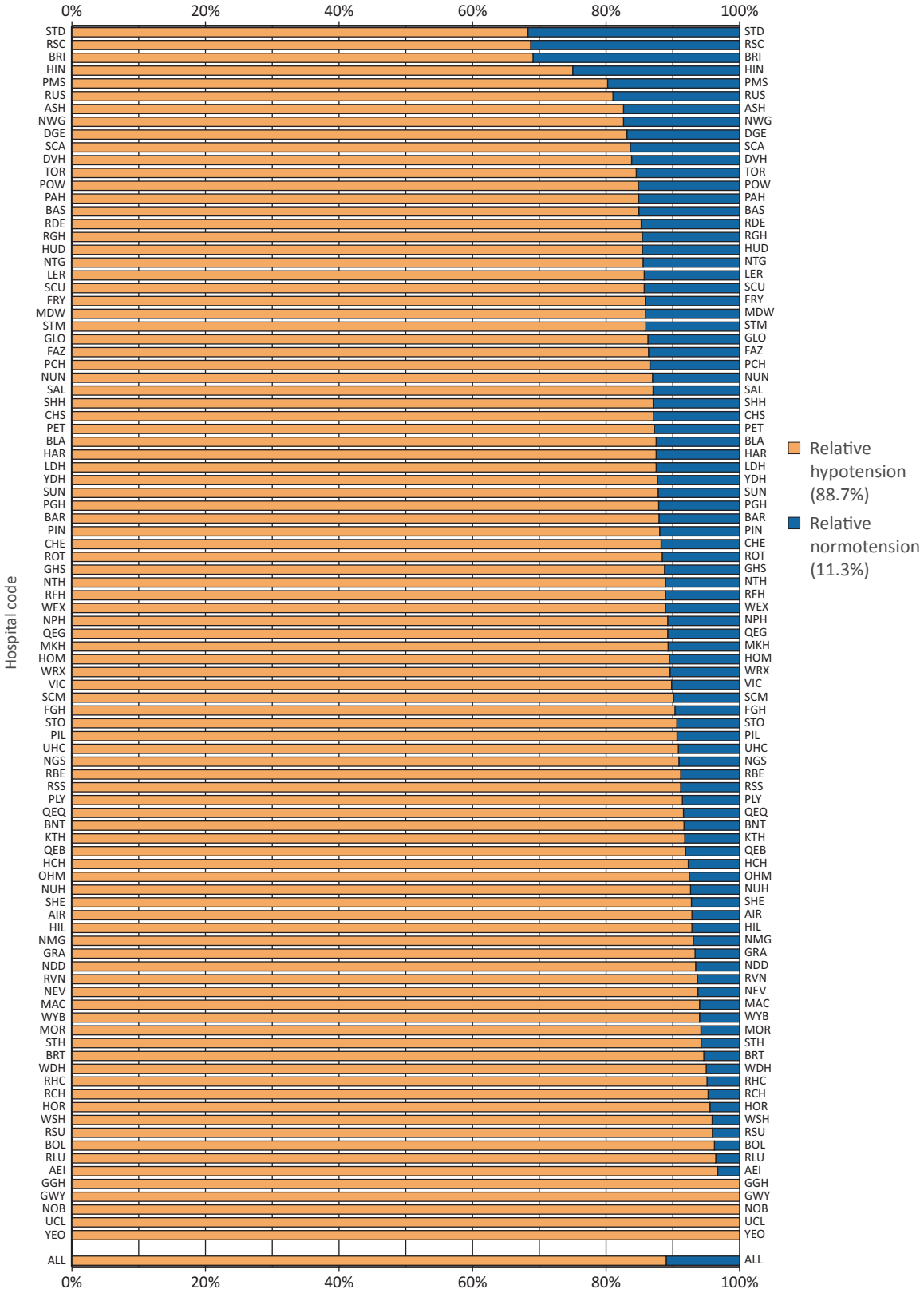
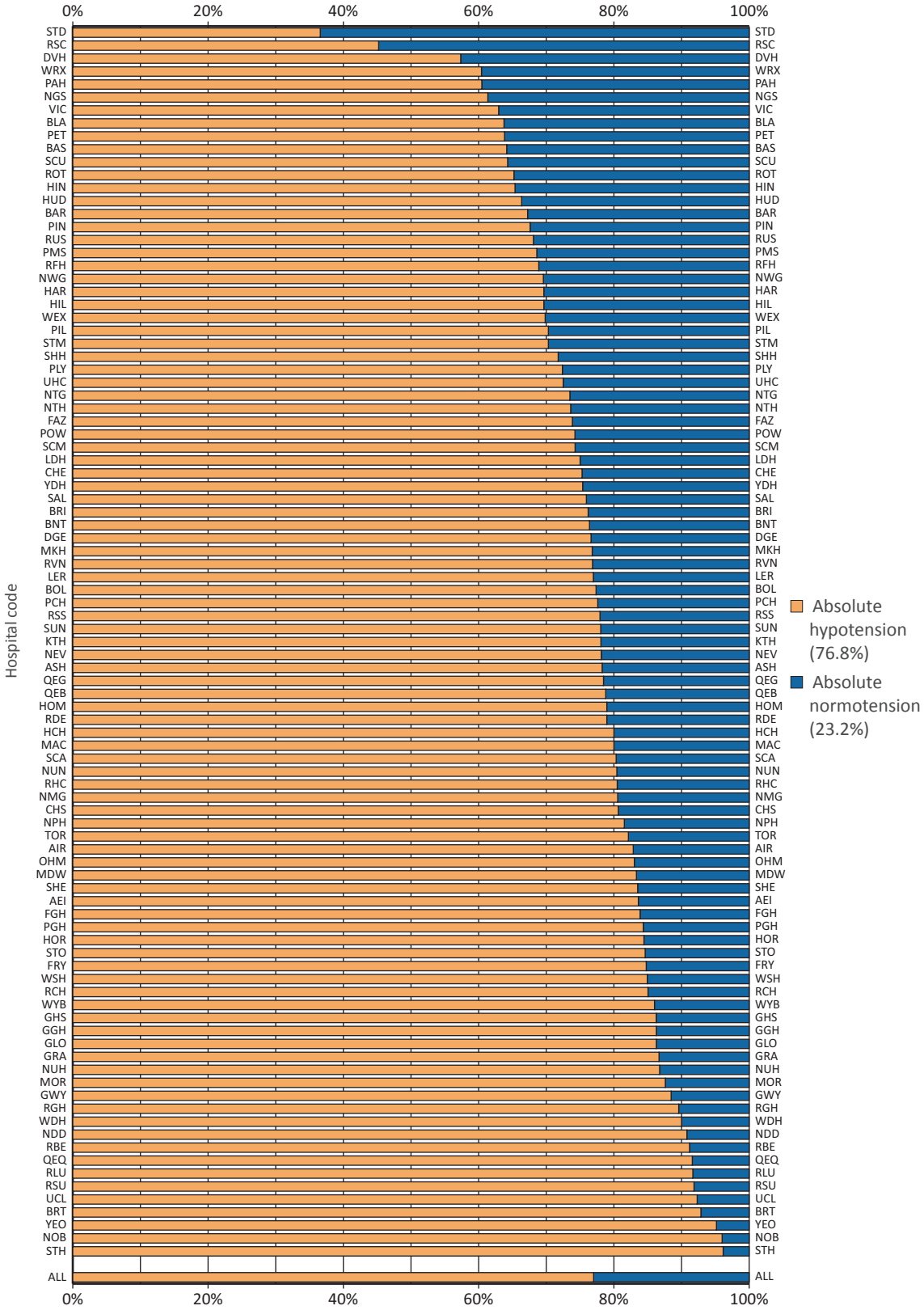


Figure 16. Prevalence of absolute hypotension (lowest intraoperative SBP < 100mmHg), by hospital.



Standard 12: Patients should be routinely assessed for the occurrence of Bone Cement Implantation Syndrome (BCIS)

ASAP finding: Data about the possible occurrence of BCIS were recorded for 84% of operations in which a cemented prosthesis was inserted

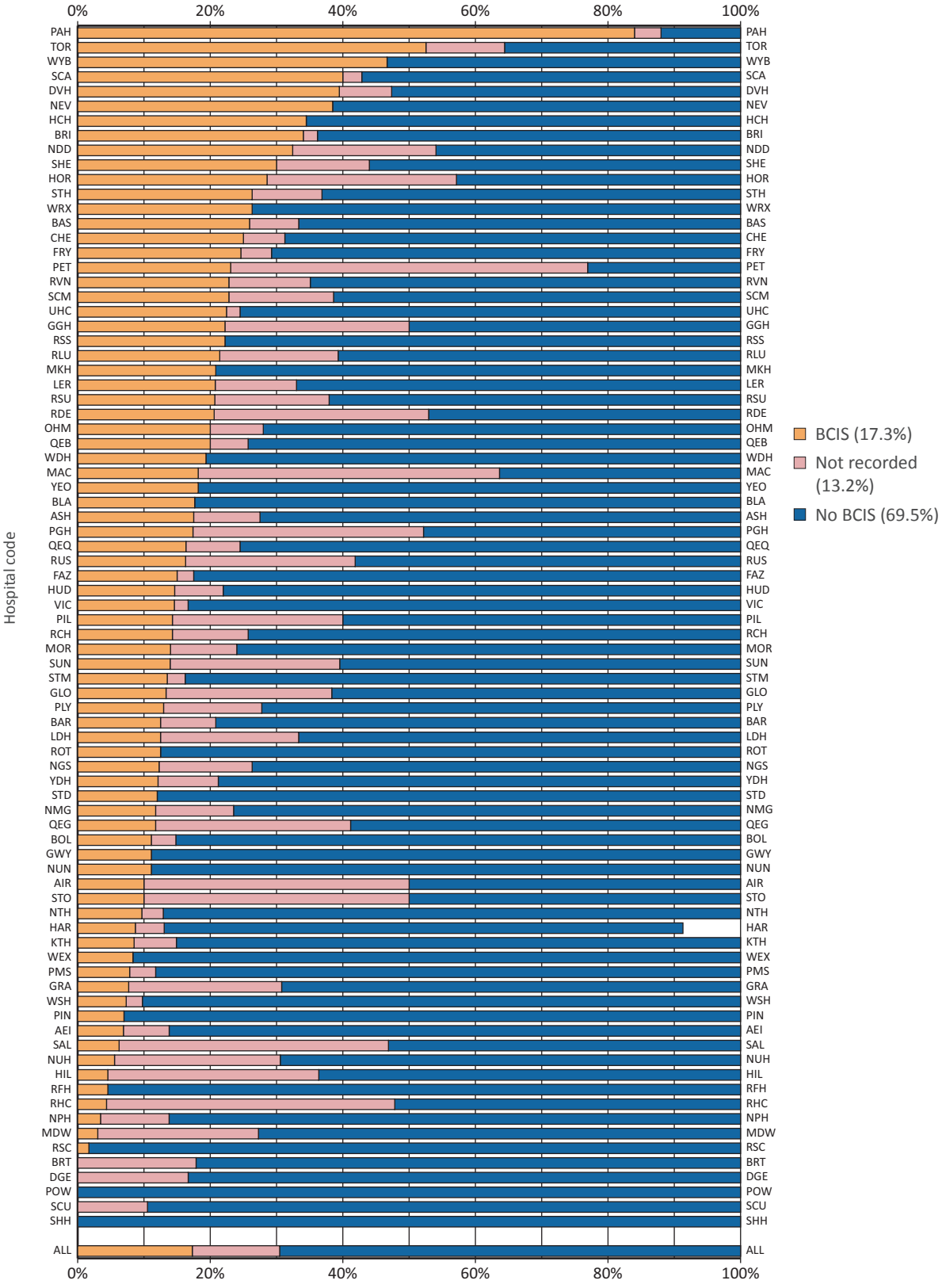
- Possible Bone Cement Implantation Syndrome – shortly after cement or reaming was reported in 19 % of these cases
- Possible reactions involving severe hypoxia and/or hypotension, or cardiovascular collapse, were less prevalent – occurring in 2.7 % and 0.5 % of operations respectively.

Cemented prostheses (hemi- or total arthroplasty) were used in 4,487/11,120 (40.4%) of recorded operations. Data about possible Bone Cement Implantation Syndrome (BCIS) reactions were recorded for 3,757 (83.7%) of these.

Possible BCIS occurred in 19.0% of operations in which a cemented prosthesis was used. The severity of the reaction was recorded as moderate (hypoxia <94% SpO_2 or hypotension >20% fall in systolic blood pressure) in 15.8% of operations, severe (hypoxia <88% SpO_2 or hypotension > 20% fall in systolic blood pressure or loss of consciousness) in 2.7%, and resulting in cardiovascular collapse (requiring cardiopulmonary resuscitation) in 0.5%.

The prevalence of possible BCIS was similar between patients receiving cemented hemiarthroplasty and total arthroplasty for hip fracture repair, but varied between hospitals (figure 17).

Figure 17. Proportion of cemented prosthesis insertions with possible Bone Cement Implantation Syndrome reactions, by hospital. (Eligible hospitals performing less than 1 such insertion per week excluded from this chart: BNT, CHS, FGH, GHS, HIN, HOM, NOB, NTG, NWG, PCH, RBE, RGH, UCL).



Conclusion

The relative contribution of anaesthesia to outcome after hip fracture repair remains uncertain[28], but experience across medicine suggests that better outcomes are associated with standardisation of practice.

ASAP has highlighted great variability in adherence to its standards; reflecting the paucity of high quality research in this field. A key objective of ASAP has been to define current practice – so as to develop a consensus regarding best practice. These results will help individual anaesthetists and departments of anaesthesia to understand the standards described in the AAGBI guideline.

Research in the complex, heterogeneous hip fracture population is difficult, making it difficult to formulate evidence-based guidelines. The AAGBI guidelines resulted from review of current evidence by specialists in the perioperative care of hip fracture patients. However, in some instances, the guidelines were based only on expert opinion, and ASAP standards were proposed to focus attention on an important clinical question. Until specific peer-reviewed evidence is published to the contrary, the guidelines and standards describe a minimum standard of care to which all hip fracture anaesthetists should aspire.

The ASAP dataset includes over 11,000 patients, and is the largest prospective, multicentre collection of anaesthesia-specific data about hip fracture patients ever collected. Data were entered contemporaneously by anaesthetists to improve accuracy compared to routine audit work, which normally relies on non-anaesthetists to retrospectively collate operative and anaesthetic details.

Despite the scale, and comprehensive coverage achieved in ASAP it is important not to over interpret the meaning of observational and audit data – these are not a replacement for scientific research studies that can be designed to formally test an hypothesis.

However, there are some striking findings, most notably the high prevalence of intraoperative hypotension, the limited use of nerve blockade in addition to spinal and/or general anaesthesia and the wide inter-hospital variation in type of anaesthesia administered. Furthermore, this work supports previous studies indicating that Bone Cement Implantation Syndrome[3] is not uncommon after the insertion of cemented prostheses.

Future work

Brighton and Sussex University Hospitals, who analysed data for this report are currently seeking approval for a further piece of work linking ASAP data with NHFD measures of outcome, including mortality and return to residence. This will seek to establish how the approach to anaesthesia, and the occurrence of intraoperative hypotension or BCIS might affect outcome. This work will also consider whether the Nottingham Hip Fracture Score is an accurate risk score for case-mix adjustment. The results of this extension to ASAP will be submitted for publication in a peer reviewed journal.

Appendix 1

ASAP audit data collection sheet

AAGBI / BOA / BGS / NATIONAL HIP FRACTURE DATABASE

HIP FRACTURE ANAESTHESIA SPRINT AUDIT PROJECT (ASAP)–2013

2.01 General Anaesthesia		
Induction	Intravenous	
	Inhalational	
Maintenance	Intravenous	
	Inhalational	
Airway	Endotracheal tube	
	Laryngeal mask	
Ventilation	Spontaneous	
	Mechanical	
Muscle relaxant used?		
Not applicable		

2.02 Nerve block	
Femoral	
Fascia Iliaca	
Lateral Cutaneous Nerve Thigh	
Psoas/Lumbar Plexus	
Epidural	
Local to skin	
Peri-articular	
Ultrasound guided	
Peripheral nerve stimulator used	
Inserted before anaesthesia	
Not applicable	

2.03 Spinal anaesthesia		
No sedation		
Sedation	Propofol	
	Benzodiazepine	
	Ketamine	
	Opioid	
Supplemental oxygen administered		
Patient position (for spinal insertion)	sitting up	
	lateral bad side down	
	lateral bad side up	
Failed spinal		
Not applicable		

2.04 Injectate (freehand)		
Spinal drug	Bupivacaine	
	Other (name)	
Concentration (%)		
Baricity	heavy	
	plain	
Volume (ml)		
Opioid added….		
Other drugs added…		
No Drugs given		

2.05 Co-morbidities	
Active malignancy in last 20 years	
Hospital admission [Hb] <10 g/dl	
Previous/current MI	
Angina	
Atrial fibrillation	
Valvular heart disease	
Hypertension	
Stroke	
Transient ischaemic attack	
Asthma	
COPD	
Renal disease	
Not applicable	

2.06 Specialist Grade in theatre			
Surgeon	Cons	SAS	ST3+
Operating			
Supervising			
Anaesthetist	Cons	SAS	ST3+
Anaesthetising			
Supervising			

2.07 Bone cement implantation syndrome - shortly after cement or reaming:	
Moderate hypoxia (SpO_2 < 94%) **or** hypotension (Systolic BP fall > 20%)	
Severe hypoxia (< 88%) **or** hypotension (Systolic BP fall > 40%) **or** loss of consciousness	
Cardiovascular collapse, requiring cardiopulmonary resuscitation	
No problems with cement	

2.08 Intraoperative BP		
Pre-induction	systolic	mmHg
	diastolic	mmHg
Lowest systolic		mmHg
Lowest diastolic		mmHg

Addressograph

Appendix 2

EAST MIDLANDS		CHE. Chesterfield Royal	DER. Royal Derby Hospital	GRA. Grantham And District General Hospital	KGH. Kettering General Hospital	KMH. Kings Mill Hospital	LER. Leicester Royal Infirmary	LIN. Lincoln County Hospital	NTH. Northampton General Hospital	PIL. Pilgrim Hospital	UHN. University Hospital Queens Medical Centre	EAST MIDLANDS	ASAP
Total number of ASAP cases submitted		100	83	30	46	66	230	55	80	76	97	863	11186
Percentage of eligible cases submitted		100	55	86	49	63	99	67	100	99	53	77	68
Consultant/specialist anaesthetist and surgeon (%)	**1**	52	74	100	72	58	57	83	73	93	61	72	62
Spinal or epidural anaesthesia (%)	**2**	59	82	67	30	56	48	56	55	48	48	55	40
Less than 10mg hyperbaric bupivicaine (%)	**3**	0	1	5	0	0	0	0	0	2	0	1	2
Fentanyl as intrathecal opioid (%)	**4**	8	76	5	0	24	11	40	0	11	24	20	19
Sedation with midazolam or propofol during spinal (%)	**5**	29	44	75	82	42	28	4	11	21	62	40	33
Supplemental oxygen during spinal (%)	**6**	65	77	83	64	75	82	77	49	88	54	71	62
Inhalational agent for GA induction (%)	**7**	2	7	0	6	7	5	0	8	6	12	5	4
Spontaneous ventilation during GA (%)	**8**	59	53	30	38	66	63	26	56	64	36	49	36
Nerve block provided (%)	**9**	32	42	90	74	48	59	62	29	25	84	54	49
General and neuraxial not combined (%)	**10**	98	100	97	100	100	99	100	99	92	99	98	97
Relative hypotension (%)	**11a**	88	97	93	91	97	86	89	89	91	91	91	88
Absolute hypotension (%)	**11b**	75	83	87	73	78	77	79	74	70	74	77	79
No suggestion of possible BCIS (%)	**12**	75	89	92	75	100	79	90	90	86	95	87	87

EAST OF ENGLAND		ADD. Addenbrooke's Hospital	BAS. Basildon Hospital	BED. Bedford Hospital	BFH. Broomfield Chelmsford	COL. Colchester General Hospital	ENH. East and North Herts Hospital	HIN. Hinchingbrooke Hospital	IPS. The Ipswich Hospital	JPH. James Paget Hospital	LDH. Luton & Dunstable Hospital	NOR. Norfolk and Norwich Hospital	PAH. Princess Alexandra Hospital	PET. Peterborough City Hospital	QKL. Queen Elizabeth Hospital (King's Lynn)	SEH. Southend Hospital	WAT. Watford General Hospital	WSH. West Suffolk Hospital	EAST OF ENGLAND	ASAP
Total number of ASAP cases submitted		61	107	0	87	60	0	55	43	37	56	162	88	94	70	100	15	85	1120	11186
Percentage of eligible cases submitted		60	99	–	76	44	–	100	36	34	97	72	95	100	69	93	14	93	64	68
Consultant/specialist anaesthetist and surgeon (%)	1	61	97	–	75	76	–	89	65	97	84	42	80	79	83	92	47	49	66	62
Spinal or epidural anaesthesia (%)	2	21	36	–	22	35	–	57	49	71	48	44	65	48	60	32	27	28	38	40
Less than 10mg hyperbaric bupivicaine (%)	3	8	11	–	0	0	–	0	0	0	0	0	2	0	0	3	0	0	1	2
Fentanyl as intrathecal opioid (%)	4	15	38	–	5	24	–	45	0	23	57	6	31	57	58	12	50	7	25	19
Sedation with midazolam or propofol during spinal (%)	5	78	48	–	55	32	–	33	25	31	32	73	65	45	42	62	100	37	45	33
Supplemental oxygen during spinal (%)	6	89	84	–	45	58	–	43	75	50	60	84	70	18	32	85	100	63	56	62
Inhalational agent for GA induction (%)	7	2	0	–	5	18	–	0	4	33	0	1	0	0	0	0	0	0	4	4
Spontaneous ventilation during GA (%)	8	28	12	–	23	21	–	61	57	22	55	46	23	18	54	6	9	29	27	36
Nerve block provided (%)	9	67	52	–	83	62	–	89	58	38	50	59	28	69	81	69	100	86	58	49
General and neuraxial not combined (%)	10	97	100	–	94	100	–	98	95	100	98	98	98	99	100	100	100	99	99	97
Relative hypotension (%)	11a	87	85	–	92	96	–	75	93	100	88	62	85	87	90	93	100	96	90	88
Absolute hypotension (%)	11b	85	64	–	84	77	–	65	73	85	75	82	60	64	77	84	73	85	78	79
No suggestion of possible BCIS (%)	12	81	74	–	91	81	–	100	93	78	88	93	16	77	73	70	89	93	82	87

LONDON		BNT. Barnet General Hospital	BRO. Princess Royal University Hospital (Bromley)	CHS. Chase Farm Hospital	GEO. St George's Hospital	GWH. Queen Elizabeth Hospital, Woolwich	HIL. Hillingdon Hospital	HOM. Homerton Hospital	KCH. King's College Hospital	KTH. Kingston Hospital	LEW. University Hospital Lewisham	LON. Royal London Hospital	MAY. Mayday University Hospital	NMH. North Middlesex Hospital	NPH. Northwick Park Hospital	NWG. Newham General Hospital	OLD. Queens Hospital Romford	RFH. Royal Free Hospital	SHC. St Helier Hospital	STH. St Thomas Hospital	STM. St Marys Hospital, Paddington	UCL. University College Hospital	WES. Chelsea & Westminister Hospital	WHC. Whipps Cross Hospital	WHT. Whittington Hospital	WMU. West Middlesex University Hospital	LONDON	ASAP
Total number of ASAP cases submitted		72	76	32	35	0	57	19	31	80	20	15	39	0	65	27	0	46	69	53	68	14	32	45	24	46	965	11186
Percentage of eligible cases submitted		96	78	100	55	–	97	90	79	94	53	52	61	–	89	87	–	100	69	91	85	100	76	56	77	78	71	68
Consultant/specialist anaesthetist and surgeon (%)	1	32	73	47	56	–	68	53	73	38	35	53	51	–	49	83	–	43	91	75	44	50	31	60	38	67	49	62
Spinal or epidural anaesthesia (%)	2	13	76	19	46	–	63	37	43	70	25	13	44	–	22	46	–	28	28	28	28	50	65	4	75	70	36	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	4	0	0	–	0	0	23	2	0	0	12	–	0	8	–	0	5	0	0	0	15	0	0	3	3	2
Fentanyl as intrathecal opioid (%)	4	42	9	57	25	–	58	22	23	33	0	0	59	–	50	62	–	71	21	30	39	43	20	0	20	16	28	19
Sedation with midazolam or propofol during spinal (%)	5	13	65	0	33	–	15	0	80	21	0	0	15	–	13	0	–	17	11	36	40	50	25	0	64	63	22	33
Supplemental oxygen during spinal (%)	6	75	63	60	73	–	72	78	40	69	100	100	92	–	75	100	–	58	83	86	70	67	80	100	50	79	67	62
Inhalational agent for GA induction (%)	7	0	4	0	29	–	0	0	5	5	0	0	17	–	0	0	–	3	0	0	0	14	0	0	0	0	3	4
Spontaneous ventilation during GA (%)	8	48	54	23	24	–	58	8	5	27	0	7	29	–	45	8	–	18	24	18	41	29	33	14	0	7	21	36
Nerve block provided (%)	9	75	28	91	57	–	46	58	26	54	70	73	56	–	40	8	–	65	32	45	63	43	28	84	29	80	46	49
General and neuraxial not combined (%)	10	96	89	100	94	–	95	95	83	99	100	93	95	–	100	96	–	100	100	96	87	100	94	98	100	98	96	97
Relative hypotension (%)	11a	92	66	87	79	–	93	89	94	92	89	86	73	–	89	83	–	89	72	94	86	100	58	77	70	98	86	88
Absolute hypotension (%)	11b	76	75	81	59	–	70	79	80	78	60	46	76	–	82	70	–	69	85	96	70	92	65	81	86	78	78	79
No suggestion of possible BCIS (%)	12	100	100	100	92	–	95	100	100	91	100	100	94	–	97	100	–	95	80	74	86	100	100	68	100	74	94	87

NORTHERN IRELAND		ALT. Altnagelvin Hospital	CRG. Craigavon Area Hospital	NUH. Ulster Hospital	RVB. Royal Victoria Hospital	NORTHERN IRELAND	ASAP
Total number of ASAP cases submitted		0	44	77	0	121	11186
Percentage of eligible cases submitted		–	73	93	–	42	68
Consultant/specialist anaesthetist and surgeon (%)	**1**	–	95	69	–	41	62
Spinal or epidural anaesthesia (%)	**2**	–	48	14	–	16	40
Less than 10mg hyperbaric bupivicaine (%)	**3**	–	0	0	–	0	2
Fentanyl as intrathecal opioid (%)	**4**	–	57	0	–	14	19
Sedation with midazolam or propofol during spinal (%)	**5**	–	6	40	–	11	33
Supplemental oxygen during spinal (%)	**6**	–	61	70	–	33	62
Inhalational agent for GA induction (%)	**7**	–	13	9	–	5	4
Spontaneous ventilation during GA (%)	**8**	–	38	50	–	22	36
Nerve block provided (%)	**9**	–	93	92	–	46	49
General and neuraxial not combined (%)	**10**	–	98	100	–	99	97
Relative hypotension (%)	**11a**	–	77	93	–	92	88
Absolute hypotension (%)	**11b**	–	90	87	–	94	79
No suggestion of possible BCIS (%)	**12**	–	76	94	–	93	87

NORTH EAST		ASH. Wansbeck General Hospital	DAR. Darlington Memorial Hospital	DRY. University Hospital of North Durham	NTG. University Hospital of North Tees	NTY. North Tyneside Hospital	QEG. Queen Elizabeth Hospital, Gateshead	RVN. Royal Victoria Infirmary	SCM. James Cook University Hospital	STD. South Tyneside District Hospital	SUN. Sunderland Royal Hospital	NORTH EAST	ASAP
Total number of ASAP cases submitted		72	37	50	94	37	72	100	103	42	88	695	11186
Percentage of eligible cases submitted		84	45	57	90	41	80	93	90	88	85	75	68
Consultant/specialist anaesthetist and surgeon (%)	1	65	92	15	67	41	82	59	65	100	74	66	62
Spinal or epidural anaesthesia (%)	2	54	53	36	60	67	35	12	41	70	75	50	40
Less than 10mg hyperbaric bupivicaine (%)	3	2	5	0	0	0	0	0	2	0	0	1	2
Fentanyl as intrathecal opioid (%)	4	0	11	0	6	0	4	6	2	47	25	10	19
Sedation with midazolam or propofol during spinal (%)	5	23	56	43	29	48	17	40	64	32	31	38	33
Supplemental oxygen during spinal (%)	6	88	25	64	67	57	83	70	85	91	80	71	62
Inhalational agent for GA induction (%)	7	6	47	10	6	0	6	3	0	8	0	9	4
Spontaneous ventilation during GA (%)	8	75	47	29	71	47	6	36	13	23	41	39	36
Nerve block provided (%)	9	42	81	58	44	57	83	89	71	64	40	63	49
General and neuraxial not combined (%)	10	97	94	100	100	92	100	97	100	100	99	98	97
Relative hypotension (%)	11a	83	97	92	86	68	89	94	90	68	88	85	88
Absolute hypotension (%)	11b	78	81	76	73	61	78	77	74	37	78	71	79
No suggestion of possible BCIS (%)	12	83	94	74	100	75	88	77	77	88	86	84	87

NORTH WEST		AEI. Royal Albert Edward Infirmary	BLA. Royal Blackburn Hospital	BOL. Royal Bolton Hospital	CMI. Cumberland Infirmary	COC. Countess of Chester Hospital	FAZ. University Hospital Aintree	FGH. Furness General	LGH. Leighton Hospital	MAC. Macclesfield District General Hospital	MRI. Manchester Royal Infirmary	NMG. North Manchester General Hospital	NOB. Noble's Hospital	OHM. Royal Oldham Hospital	RLI. Royal Lancaster Infirmary	RLU. Royal Liverpool University Hospital	RPH. Royal Preston Hospital	SHH. Stepping Hill Hospital	SLF. Hope Hospital	SOU. Southport and Formby District General	TGA. Tameside General Hospital	TRA. Trafford General Hospital	VIC. Victoria Hospital	WDG. Warrington District General Hospital	WHI. Whiston Hospital	WIR. Arrowe Park Hospital	WYT. Wythenshawe Hospital	NORTH WEST	ASAP
Total number of ASAP cases submitted		73	89	66	46	55	99	33	0	56	27	82	28	60	0	92	29	86	32	0	17	0	108	74	50	72	35	1309	11186
Percentage of eligible cases submitted		87	94	80	42	66	99	97	–	98	73	84	100	100	–	91	29	100	52	–	33	–	89	79	54	65	50	64	68
Consultant/specialist anaesthetist and surgeon (%)	1	86	81	91	98	63	96	100	–	82	100	72	89	83	–	88	78	80	88	–	94	–	89	73	64	48	0	67	62
Spinal or epidural anaesthesia (%)	2	19	71	42	54	82	14	44	–	65	48	52	31	37	–	8	69	41	66	–	94	–	80	18	16	30	49	40	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	0	0	0	4	0	0	–	0	0	0	0	0	–	0	0	0	0	–	0	–	1	0	13	0	1	1	2
Fentanyl as intrathecal opioid (%)	4	0	9	0	28	4	29	0	–	2	23	0	14	3	–	0	0	8	5	–	0	–	1	23	0	14	5	7	19
Sedation with midazolam or propofol during spinal (%)	5	25	55	46	5	31	33	62	–	26	14	60	56	36	–	0	7	31	69	–	23	–	69	44	29	73	6	31	33
Supplemental oxygen during spinal (%)	6	25	89	63	91	79	100	85	–	88	86	77	67	40	–	86	33	77	75	–	77	–	89	78	57	55	4	58	62
Inhalational agent for GA induction (%)	7	2	0	14	10	0	9	0	–	16	0	0	0	11	–	6	0	6	0	–	0	–	0	8	5	6	4	4	4
Spontaneous ventilation during GA (%)	8	8	38	14	62	9	26	82	–	40	13	38	74	76	–	66	100	38	50	–	0	–	64	32	19	45	7	35	36
Nerve block provided (%)	9	64	63	71	13	15	84	47	–	33	59	40	48	48	–	83	52	22	94	–	24	–	31	47	82	81	49	44	49
General and neuraxial not combined (%)	10	100	93	91	100	98	100	97	–	96	96	90	81	90	–	97	97	95	97	–	100	–	100	97	98	96	43	94	97
Relative hypotension (%)	11a	97	88	96	95	96	86	90	–	94	92	93	100	92	–	96	100	87	10	–	100	–	90	94	91	69	33	88	88
Absolute hypotension (%)	11b	84	64	77	73	67	74	84	–	80	81	81	96	83	–	92	86	72	89	–	100	–	63	76	79	74	0	80	79
No suggestion of possible BCIS (%)	12	93	82	89	94	100	85	100	–	82	33	88	100	80	–	79	100	100	71	–	88	–	85	51	100	93	100	88	87

SOUTH CENTRAL		HOR. Horton General Hospital	IOW. St Mary's Hospital, Newport	MKH. Milton Keynes General Hospital	NHH. North Hampshire Hospital	QAP. Queen Alexandra Hospital	RAD. John Radcliffe Hospital	RBE. Royal Berkshire Hospital	RHC. Royal Hampshire County Hospital	SGH. Southampton General Hospital	SMV. Stoke Mandeville Hospital	WEX. Wexham Park Hospital	SOUTH CENTRAL	ASAP
Total number of ASAP cases submitted		47	0	62	37	125	111	82	59	78	24	63	688	11186
Percentage of eligible cases submitted		81	–	86	77	70	78	86	91	52	27	85	67	68
Consultant/specialist anaesthetist and surgeon (%)	1	66	–	79	76	61	57	68	55	47	44	68	56	62
Spinal or epidural anaesthesia (%)	2	36	–	21	70	60	57	18	57	54	50	38	42	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	–	0	0	0	0	0	0	0	11	3	1	2
Fentanyl as intrathecal opioid (%)	4	18	–	47	65	13	70	47	11	10	11	23	29	19
Sedation with midazolam or propofol during spinal (%)	5	54	–	53	85	82	26	11	67	27	0	38	40	33
Supplemental oxygen during spinal (%)	6	92	–	40	85	84	44	67	82	78	100	54	66	62
Inhalational agent for GA induction (%)	7	7	–	2	0	8	0	3	5	8	0	0	3	4
Spontaneous ventilation during GA (%)	8	33	–	45	36	51	39	27	15	24	67	73	37	36
Nerve block provided (%)	9	87	–	69	49	52	38	78	67	53	58	65	56	49
General and neuraxial not combined (%)	10	100	–	95	100	99	98	99	98	97	100	95	98	97
Relative hypotension (%)	11a	96	–	89	43	86	92	91	95	55	29	89	79	88
Absolute hypotension (%)	11b	84	–	77	90	76	77	91	80	85	83	70	83	79
No suggestion of possible BCIS (%)	12	71	–	79	90	92	100	100	96	100	86	92	91	87

SOUTH EAST COAST		CGH. Conquest Hospital	DGE. Eastbourne DGH	DVH. Darent Valley Hospital	ESU. East Surrey Hospital	FRM. Frimley Park Hospital	MDW. Medway Maritime Hospital	QEQ. Queen Elizabeth the Queen Mother Hospital	RSC. Royal Sussex County Hospital	RSU. Royal Surrey County Hospital	SPH. St Peter's Hospital	STR. St Richards Hospital	TUN. Tunbridge Wells Hospital	WHH. William Harvey Hospital	WRG. Worthing Hospital	SOUTH EAST COAST	ASAP
Total number of ASAP cases submitted		0	95	73	55	31	86	110	117	56	37	78	0	76	102	916	11186
Percentage of eligible cases submitted		–	88	92	44	29	98	92	90	82	44	78	–	67	77	63	68
Consultant/specialist anaesthetist and surgeon (%)	1	–	80	71	87	52	74	87	77	39	72	92	–	57	89	63	62
Spinal or epidural anaesthesia (%)	2	–	63	66	13	61	60	25	78	20	25	74	–	73	42	43	40
Less than 10mg hyperbaric bupivicaine (%)	3	–	12	0	0	0	7	3	76	0	0	0	–	0	19	8	2
Fentanyl as intrathecal opioid (%)	4	–	1	29	0	16	13	3	37	0	13	0	–	15	10	10	19
Sedation with midazolam or propofol during spinal (%)	5	–	53	42	43	71	70	32	49	27	75	40	–	41	14	40	33
Supplemental oxygen during spinal (%)	6	–	73	78	86	86	67	82	100	73	75	89	–	41	76	66	62
Inhalational agent for GA induction (%)	7	–	0	0	2	9	0	0	0	2	0	0	–	5	20	3	4
Spontaneous ventilation during GA (%)	8	–	57	50	74	73	35	90	58	44	38	36	–	40	33	45	36
Nerve block provided (%)	9	–	38	34	93	58	39	72	50	59	62	28	–	16	66	44	49
General and neuraxial not combined (%)	10	–	95	100	100	100	88	100	99	91	100	97	–	100	98	98	97
Relative hypotension (%)	11a	–	83	84	87	87	86	92	69	96	55	70	–	86	94	85	88
Absolute hypotension (%)	11b	–	77	57	71	70	83	92	45	92	72	81	–	77	81	78	79
No suggestion of possible BCIS (%)	12	–	100	61	89	73	97	84	98	79	100	85	–	89	80	88	87

SOUTH WEST		BAT. Royal United Hospital Bath	BRI. Bristol Royal Infirmary	CHG. Cheltenham General Hospital	FRY. Frenchay Hospital	GLO. Gloucestershire Royal Hospital	MPH. Taunton & Somerset Hospital	NDD. North Devon District Hospital	PGH. Poole General Hospital	PLY. Derriford Hospital	PMS. The Great Western Hospital	RCH. Royal Cornwall Hospital	RDE. Royal Devon & Exeter Hospital	SAL. Salisbury District Hospital	TOR. Torbay Hospital	WDH. Dorset County Hospital	WGH. Weston General Hospital	YEO. Yeovil District Hospital	SOUTH WEST	ASAP
Total number of ASAP cases submitted		34	86	0	110	110	45	81	216	132	101	144	127	65	113	81	36	62	1543	11186
Percentage of eligible cases submitted		25	87	–	94	90	46	94	95	89	94	92	82	81	96	100	44	81	76	68
Consultant/specialist anaesthetist and surgeon (%)	1	30	35	–	56	87	91	98	80	78	72	65	65	34	75	83	97	85	67	62
Spinal or epidural anaesthesia (%)	2	58	26	–	9	51	53	12	21	43	74	40	37	25	69	33	31	21	36	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	0	–	0	1	0	4	5	3	1	1	0	10	0	0	0	0	1	2
Fentanyl as intrathecal opioid (%)	4	0	0	–	15	9	4	24	17	3	25	7	4	10	2	9	0	15	8	19
Sedation with midazolam or propofol during spinal (%)	5	77	32	–	33	26	33	36	24	50	54	29	63	67	48	59	50	20	41	33
Supplemental oxygen during spinal (%)	6	62	79	–	83	34	67	55	64	82	74	75	38	73	95	70	88	80	66	62
Inhalational agent for GA induction (%)	7	0	2	–	1	0	4	6	2	1	0	5	0	0	0	0	15	4	2	4
Spontaneous ventilation during GA (%)	8	50	32	–	25	73	48	46	47	71	41	51	82	41	69	48	37	80	50	36
Nerve block provided (%)	9	56	48	–	76	31	47	48	76	50	17	41	38	70	23	74	56	73	48	49
General and neuraxial not combined (%)	10	97	99	–	95	82	96	84	92	94	98	83	75	92	86	100	94	95	92	97
Relative hypotension (%)	11a	88	69	–	86	86	93	93	88	91	80	95	85	87	85	95	44	100	86	88
Absolute hypotension (%)	11b	78	76	–	85	86	73	91	84	72	69	85	79	76	82	90	73	95	82	79
No suggestion of possible BCIS (%)	12	94	66	–	75	87	91	68	83	87	92	86	79	94	47	81	90	82	82	87

WALES		BRG. Bronglais General Hospital	CLW. Glan Clwyd DGH Trust	GWE. Royal Gwent Hospital	GWY. Ysbyty Gwynedd Hospital	MOR. Morriston Hospital	NEV. Nevill Hall Hospital	PCH. Prince Charles Hospital	POW. Princess Of Wales Hospital	RGH. Royal Glamorgan	UHW. University Hospital of Wales	WRX. Maelor Hospital	WWG. West Wales General	WYB. Withybush General Hospital	WALES	ASAP
Total number of ASAP cases submitted		16	67	64	58	132	64	71	69	48	54	50	0	50	743	11186
Percentage of eligible cases submitted		70	72	74	81	94	97	96	92	94	41	82	–	98	76	68
Consultant/specialist anaesthetist and surgeon (%)	1	100	95	50	98	18	86	83	81	40	38	86	–	88	66	62
Spinal or epidural anaesthesia (%)	2	44	47	56	25	21	44	64	10	29	47	38	–	34	35	40
Less than 10mg hyperbaric bupivicaine (%)	3	14	0	0	0	4	0	2	0	6	0	5	–	0	2	2
Fentanyl as intrathecal opioid (%)	4	43	0	14	71	39	60	56	33	71	46	0	–	39	36	19
Sedation with midazolam or propofol during spinal (%)	5	40	4	31	25	8	22	27	20	14	62	20	–	15	22	33
Supplemental oxygen during spinal (%)	6	100	58	78	75	76	57	77	80	29	76	90	–	92	68	62
Inhalational agent for GA induction (%)	7	22	3	3	0	2	0	4	10	0	7	0	–	15	5	4
Spontaneous ventilation during GA (%)	8	22	29	34	24	41	33	21	28	56	41	39	–	33	31	36
Nerve block provided (%)	9	38	61	61	45	80	45	39	90	67	72	58	–	88	57	49
General and neuraxial not combined (%)	10	100	100	98	100	100	100	99	99	100	100	98	–	100	100	97
Relative hypotension (%)	11a	40	97	97	100	94	94	87	85	85	100	90	–	94	89	88
Absolute hypotension (%)	11b	40	81	87	88	88	78	78	74	90	78	60	–	86	79	79
No suggestion of possible BCIS (%)	12	100	70	67	89	86	62	100	100	100	83	74	–	53	83	87

WEST MIDLANDS		BRT. Queens Hospital	EBH. Birmingham Heartlands Hospital	GHS. Good Hope General Hospital	HCH. County Hospital Hereford	NCR. New Cross Hospital	NUN. George Eliot Hospital	QEB. Queen Elizabeth Hospital, Edgbaston	RED. The Alexandra Hospital	RSS. Royal Shrewsbury Hospital	RUS. Russells Hall Hospital	SAN. Sandwell District Hospital	SDG. Staffordshire General Hospital	STO. University Hospital of North Staffordshire	TLF. Princess Royal Hospital, Telford	UHC. University Hospital Coventry	WAR. Warwick Hospital	WMH. Manor Hospital	WRC. Worcestershire Royal Hospital	WEST MIDLANDS	ASAP
Total number of ASAP cases submitted		57	64	80	67	85	49	100	14	74	120	64	0	127	0	126	0	0	85	1112	11186
Percentage of eligible cases submitted		83	51	86	96	78	83	86	26	81	98	68	–	84	–	96	–	–	77	61	68
Consultant/specialist anaesthetist and surgeon (%)	1	89	53	95	88	80	90	55	29	78	85	77	–	30	–	26	–	–	71	53	62
Spinal or epidural anaesthesia (%)	2	25	25	30	73	26	69	26	36	33	67	73	–	13	–	31	–	–	56	32	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	0	0	7	5	0	3	0	3	6	2	–	5	–	2	–	–	2	2	2
Fentanyl as intrathecal opioid (%)	4	81	13	14	4	10	78	16	40	12	54	64	–	0	–	79	–	–	2	26	19
Sedation with midazolam or propofol during spinal (%)	5	75	33	27	19	35	27	29	0	46	25	27	–	46	–	41	–	–	29	26	33
Supplemental oxygen during spinal (%)	6	17	47	68	87	76	76	35	33	50	82	75	–	54	–	59	–	–	71	46	62
Inhalational agent for GA induction (%)	7	2	11	4	0	12	7	4	0	11	0	0	–	9	–	9	–	–	3	4	4
Spontaneous ventilation during GA (%)	8	88	41	46	65	12	43	26	88	72	61	12	–	73	–	41	–	–	78	41	36
Nerve block provided (%)	9	91	73	70	31	44	45	72	64	51	57	28	–	56	–	83	–	–	47	45	49
General and neuraxial not combined (%)	10	100	98	99	95	100	100	98	100	90	96	100	–	98	–	100	–	–	94	98	97
Relative hypotension (%)	11a	95	92	89	92	93	87	92	93	91	81	80	–	91	–	91	–	–	100	93	88
Absolute hypotension (%)	11b	93	77	86	80	77	80	79	71	78	68	84	–	85	–	73	–	–	80	84	79
No suggestion of possible BCIS (%)	12	100	67	100	66	92	89	80	50	78	84	84	–	90	–	78	–	–	91	86	87

YORKSHIRE AND THE HUMBER		AIR. Airedale General Hospital	BAR. Barnsley District General Hospital	BRD. Bradford Royal Infirmary	BSL. Bassetlaw District General Hospital	DID. Doncaster Royal Infirmary	GGH. Diana, Princess of Wales Hospital	HAR. Harrogate District Hospital	HRI. Hull Royal Infirmary	HUD. Huddersfield Royal Infirmary	LGI. Leeds General Infirmary	NGS. Northern General Hospital	PIN. Pinderfields General Hospital	ROT. Rotherham General Hospital	SCA. Scarborough General Hospital	SCU. Scunthorpe General Hospital	YDH. York District Hospital	YORKSHIRE AND THE HUMBER	ASAP
Total number of ASAP cases submitted		71	61	57	19	34	58	58	0	113	103	121	143	78	68	46	81	1111	11186
Percentage of eligible cases submitted		96	91	70	39	31	84	89	–	95	71	86	90	96	100	82	82	75	68
Consultant/specialist anaesthetist and surgeon (%)	1	79	75	60	79	100	78	68	–	67	48	87	73	87	96	87	52	71	62
Spinal or epidural anaesthesia (%)	2	52	52	64	95	62	29	49	–	79	49	80	68	77	47	72	56	58	40
Less than 10mg hyperbaric bupivicaine (%)	3	0	0	3	0	10	0	0	–	5	0	0	7	8	3	0	4	2	2
Fentanyl as intrathecal opioid (%)	4	69	0	6	0	10	21	3	–	51	4	36	28	2	8	6	0	15	19
Sedation with midazolam or propofol during spinal (%)	5	6	36	32	69	45	60	48	–	9	35	59	68	36	29	14	59	38	33
Supplemental oxygen during spinal (%)	6	88	59	71	69	64	60	56	–	76	86	62	74	82	24	71	68	63	62
Inhalational agent for GA induction (%)	7	11	0	0	0	0	20	21	–	27	6	8	4	12	0	0	3	7	4
Spontaneous ventilation during GA (%)	8	31	7	43	0	46	27	55	–	41	44	71	76	59	40	33	66	40	36
Nerve block provided (%)	9	51	40	51	5	65	59	54	–	36	49	64	75	31	21	48	36	43	49
General and neuraxial not combined (%)	10	99	100	98	100	100	100	98	–	97	97	100	99	97	99	98	96	99	97
Relative hypotension (%)	11a	93	88	95	100	100	100	88	–	85	76	91	88	88	84	86	88	91	88
Absolute hypotension (%)	11b	83	67	85	63	79	86	70	–	66	59	61	68	65	80	64	75	73	79
No suggestion of possible BCIS (%)	12	90	88	100	83	83	78	91	–	85	79	88	93	88	60	100	88	87	87

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