British Orthopaedic Association

The **National Hip Fracture** Database
Preliminary National Report 2009

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The **National Hip Fracture** Database Preliminary National Report 2009

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Further copies of this report and details of how the charts were produced, can be found at **www.nhfd.co.uk** accessed using the Username: nhfd demouser; Password: password

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Foreword

Hip fracture is a common, serious and costly injury, and, as the UK population ages, its numbers will rise from around 70,000 a year now to around 100,000 by 2020. The impact of hip fracture on patients' lives can be great, ranging from temporary loss of mobility to permanent loss of home; and mortality – particularly for the frailest – remains high. The cost of hip fracture care is great – £1.4Bn per annum – and its quality is demonstrably uneven across the NHS.

Improving the care of hip fracture and reducing its incidence are therefore important goals. In recognition of this, the British Orthopaedic Association (BOA) and the British Geriatrics Society (BGS) have, via a formal Memorandum of Understanding set up in 2007, together established the National Hip Fracture Database (NHFD), a collaborative initiative developed by orthopaedic surgeons, elderly care physicians, and other clinicians.

The NHFD, by documenting case-mix, care and outcomes, and auditing care – which includes implementation of proven prevention strategies – against the evidence-based care standards set out in BOA/BGS Blue Book on the care of patients with fragility fractures, allows clinicians and services to benchmark their performance against national data, and to track progress as they seek to improve the care they provide.

Optimum care of patients with hip fracture is complex and involves many professional disciplines. Delivering high quality care – with prompt surgery, good medical care, early rehabilitation, effective care for the preventive of further fractures and an early return home – depends critically on clinical teamwork that focuses on the patient's experience. By providing standards and models of care, together with reliable local and comparative data, NHFD and the Blue Book have the power to support effective teamwork, improve the quality of care and make it more cost-effective too.

This preliminary report demonstrates the progress made since the launch of the NHFD and the Blue Book in September 2007. As it acknowledges, full NHFD participation is challenging, and the challenge of providing complete, high-quality data on hip fracture care is not to be underestimated; but the scope and detail of casemix, care and outcomes presented is most impressive, and the promise it shows for future progress most encouraging.

We therefore welcome this report, with its clear demonstration of how clinically-led audit can address complex care challenges, deliver useful comparisons, and thus contribute to the improvement of care for a large and often vulnerable group of patients.

Professor Graham Mulley
President BGS

Miss Clare Marx
President BOA

Introduction

Background

The National Hip Fracture Database was set up as a collaborative venture by the British Orthopaedic Association and the British Geriatrics Society in order to improve hip fracture care and secondary prevention. It was launched, along with the jointly produced Blue Book on the care of patients with fragility fracture[1], in September 2007.

This publication, the NHFD's Preliminary National Report, documents the considerable progress made since then. It provides details of case-mix, care and outcomes on 12,983 cases of hip fracture from 64 hospitals that submitted more than 60 cases over the year 1st October 2007 to 30th September 2008 and shows how the care provided matches up to the standards set out in the Blue Book; and thus sets out a substantial but still incomplete picture of hip fracture care in England, Wales and Northern Ireland in 2008.

Work towards the establishment of NHFD started in 2004, when a series of meetings of clinicians drawn mainly from the British Orthopaedic Association and the British Geriatrics Society began to examine the experience of a range of existing hip fracture audits with a view to building a preliminary national database and establishing a nationally agreed dataset. By 2007 – with the support of the NHS Information Centre, and using the web-based data collection, analysis and feedback methods of the highly successful Myocardial Infarction National Audit Project (MINAP) – NHFD was able to provide participating trauma services with a comprehensive and technically advanced national audit that could help them monitor and improve the care they provide for their hip fracture patients.

Integral to this effort, and proceeding in parallel with it, was the development of the Blue Book. A multi-disciplinary authorship group that included anaesthetic, orthogeriatric, general practice, nursing, orthopaedic and pharmacological expertise reviewed the current evidence on fragility fracture care, with a particular emphasis on the stages of hip fracture care and on prevention, and summarised these in a concise and practical 75-page handbook.

The group, together with the NHFD Executive, also agreed six standards for hip fracture care. These are: prompt admission to orthopaedic care; early surgery; prevention of pressure ulcers; access to acute orthogeriatric care; assessment for bone protection therapy; and falls assessment - the latter two standards reflecting the importance of secondary prevention in reducing the risk of subsequent fractures.

Used together, NHFD and the Blue Book provide the synergy of audit, standards and feedback in the improvement of the care and prevention of hip fracture. Participating units can measure their own performance against the standards; benchmark the care they provide against national data; use NHFD as the basis of local audit to assess specific aspects of care; and evaluate the impact on care outcomes of local changes in clinical care and in service organisation.

Together, NHFD and the Blue Book aim to raise the quality and reduce the costs of hip fracture care; and it should be clearly noted that in hip fracture care quality and cost-effectiveness are not in conflict. Prompt surgery, good medical care, early rehabilitation and robust early supported discharge arrangements will all serve to increase patient satisfaction and lower cost per case. Conversely, delay at any stage, poor medical care, and inadequate rehabilitation arrangements will diminish quality and can greatly increase costs.

Participation

Following the NHFD launch, press coverage, presentations at relevant national meetings, and word of mouth ensured that the rate of recruitment was rapid. By 31st January 2009, 136 hospitals had registered interest in participating in NHFD – some 69% of those eligible – and 92 were contributing cases to the NHFD database. Encouragingly, the rate of growth of the audit over these months approaches that of MINAP at a comparable stage in its development. The total number of records submitted since July 2007 is 22,213. However, there are concerns about both the completeness and the quality of data that have to be acknowledged. These will be addressed in more detail below.

Data collection

A few hospitals already carrying out hip fracture audit were able to upload substantial numbers of cases. The majority, however, were auditing hip fracture for the first time. They registered with NHFD and use the web-based technology to upload their data as cases accumulated. In hospitals now participating, the reaction – from both clinical and management staff – has been broadly favourable, with local audit data and comparative national data seen as helpful from the start.

Full participation in NHFD requires commitment and resources. Web-based technology facilitates information transfer, data handling, analysis and feedback; and advice and user support are available from the project team. But the responsibility for the funding and organisation of data collection lies with the participating hospital; and although NHFD provides detailed advice on the practicalities of participation in the form of a downloadable 'toolkit', the progression from interest to organisation and eventual full participation is not automatic – a fact reflected in the discrepancy between the number of centres registering interest and the number currently contributing data.

Continuous and comprehensive data capture is challenging, and hard to achieve using already busy clinical staff with inevitably conflicting priorities. In particular, rigorous documentation of time of arrival to orthopaedic care on an orthopaedic ward (Standard 1) proved difficult; as did telephone or other follow-up at 30 and 120 days. This preliminary NHFD report reflects these difficulties, along with some more general concerns about data completeness (See chart on page 12). While many participating units appear to have gone to great efforts to ensure that all eligible cases of hip fracture were recorded and that all data fields were completed, there is no doubt that some units, particularly those with more informal arrangements for data capture, were not able to document all cases. Other problems arose in relation to apparent inaccuracies in (e.g.) the recording of fracture types or nature of surgery – sometimes quite complex in terms of precise definition. Follow-up at 30 days also presented problems, and the nature and duration of care after discharge from the acute orthopaedic unit – important in terms both of patient outcomes and overall cost of care – sometimes proved elusive. And it should be noted that, paradoxically, sub-optimal data collection may produce apparently better results, as when patients in poor clinical condition are omitted – with spuriously good mortality data emerging; or when little attention is paid to pressure area care, and ulcers are simply not reported.

Experience in previously established hip fracture audits – in particular those in Scotland and Northern Ireland – has shown that impressive levels of data completeness, including that of follow-up data, can best be achieved by staff with a clinical background (usually nursing) who are employed and trained with hip fracture audit data collection as a specific commitment.

Although the cost of reliable data collection is estimated at around £50-60 per case, that cost should be seen in relation to the overall cost of hip fracture care: Recent evidence suggests that each hip fracture costs the NHS alone (i.e. excluding social care costs) £12,137, over £7,000 more than the figure used in the earlier estimates[2]. The cost of audit amounting to 0.5% of this total.

The cost of high-quality audit data should therefore be seen as an investment in clinical governance information essential to the improvement of the quality and the cost-effectiveness of hip fracture care.

Reporting

Prompt and reliable feedback to participating units is an essential feature of successful audit. Web-based technology, and the support provided by NHS Information Centre (IC) staff, has made possible from the start the provision of local and comparative – nationally benchmarked – feedback to clinicians and managers involved in NHFD. Such feedback not only promotes and maintains interest in the audit, but allows clinical teams to monitor case volume, case-mix, details of care provided, and outcomes of that care. In this respect alone, NHFD represents a considerable advance on all pre-existing UK hip fracture audits.

However, there remains also a need for published reports – which provide a permanent record of progress, and can serve to raise the profile of NHFD and bring it to the notice of non-participating units, commissioners of hip fracture care, relevant professional bodies, and strategic health authorities.

In June 2008 NHFD published a limited report based on the work of the 26 participating hospitals entering 50 or more case records over the period the 1st July 2007 to 31st March 2008. Data was presented anonymously, though specific hospital reports were also prepared in order to allow participants to compare local with national data. Using a star system based on performance against the six standards ranked by quartiles, it was possible to derive overall hospital performance rankings, and to indicate these in individual hospital reports. This publication met with considerable interest and appears to have contributed to recent recruitment to NHFD of more centres.

The sequence of presentation in this report is broadly that of case-mix, process and outcome, and charts relating to compliance with the six standards are clearly identified as such. Data is presented predominantly in the form of horizontally displayed bar charts, generally with a national average bar appended for comparison purposes. Casemix-adjusted outcome data relating to death within 30 days and return home within 30 days are displayed in the form of funnel plots.

As with the June 2008 publication, hospital identities and case-mix, process and outcome data are anonymised as it was felt that this properly recognised the emergent status of the audit, and thus also acknowledged concerns about aspects of data completeness and quality. However, details of hospital facilities for hip fractures care have been presented in an identifiable form.

It is anticipated that data quality issues can be addressed in the near future by well-funded and therefore greatly improved data collection, and by the use of data quality checking mechanisms similar to those developed for MINAP; and that future NHFD national reports will, in accordance with established practice for national audits, fully identify all hospitals.

NHFD: an emerging national audit

Structure and governance

NHFD is run by an Executive representing the core clinical specialties, and also including representation from a patient group. A larger and more broadly-based Steering Group provides advice; and a smaller Implementation Group, based in the BGS headquarters, deals with project development, data analysis, and the generation of reports. Recruitment and support of participating centres, and day-to-day organisational matters, are in the hands of a project manager and two project coordinators. A data set subgroup is responsible for the monitoring and further development of the NHFD standard data set. Links with the Information Centre are close, with senior IC presence on the Implementation Group, and the support of an IC software developer working half-time with NHFD. Details of current membership of the above groups are available.[Appendix A]

Funding

The development of NHFD since 2004 has depended hitherto upon the support of the BOA, the BGS and other relevant professional groups; and on generous funding from the ABPI and ABHI, the professional bodies of the pharmaceutical and devices industries respectively.[Appendix A] In addition, a substantial development grant from the Department of Health has supported regional meetings, publications, and statistical consultancy inputs to case-mix adjusted outcome reporting.

Total income for 2007/2008 was £519,605 with a total expenditure for the same period of £458,188.

Such funding has been much appreciated and was appropriate to NHFD's development stage; but, with the recent growth of the audit, a more secure source of funding was seen as necessary. It was therefore encouraging to learn in December 2008, following the clarification of processes supporting the selection and funding of national clinical audits, that NHFD had been identified by Health Quality Improvement Partnership (HQIP) for recognition as one of 11 new national clinical audits. Subject to a bid currently under discussion, central HQIP funding for NHFD will/may be secured from April 2009 for a period of two years.

Difficulties remain with the funding of data collection locally. However, in the context of Lord Darzi's second stage review[3] and the growing emphasis within the Department of Health on metrics that reflect the quality of care provided, the potential contribution of NHFD is increasingly recognised. At least one NHS Strategic Health Authority (South West) has included in its strategic vision a commitment to meet Blue Book standards; and the NHS Institute for Innovation and Improvement has adopted participation in NHFD as a requirement for Trusts participating in its 2008-2010 programme of improvement in hip fracture care.

In addition, hip fracture care has been selected as a condition for which service improvements are to be sought through Payment by Results▲ as part of the Best Practice Tariffs▲ initiative in England. This brings with it the need for specific and reliable information on quality and cost-effectiveness of care – a need that NHFD can readily meet if reliable data collection is assured. And from the point of view of the Primary Care Trusts that commission hip fracture care, the ability of NHFD to provide information on case volume, quality of care and outcomes is in itself an argument for including NHFD participation – including, adequately funded data collection – in the contract through which hip fracture care is commissioned.

Future developments

With growing participation, a steadily enlarging national database, improving data quality, and casemix-adjusted reporting of outcomes such as return home and mortality, NHFD will in future make a powerful and robust contribution to the clinical governance of an important and costly injury. In addition, its research potential should be recognized. Important and unresolved issues in hip fracture care - relating to anaesthesia, surgery, thromboprophylaxis, and rehabilitation – can and should be addressed via large observational studies and specifically organised and funded large-scale clinical trials.

This first NHFD Preliminary National Report demonstrates both the progress and further potential of NHFD; and shows how – together with the Blue Book on fragility fracture care – it can utilise the synergy of audit, standards and feedback in the improvement of the care and prevention of hip fracture.

This will benefit patients and the NHS alike, since quality and cost-effectiveness are not in conflict. In the words of the Blue Book: 'Looking after hip fracture patients well is cheaper than looking after them badly'.[1]

Main findings and recommendations

The National Hip Fracture Database was established in 2007 to provide health communities with the means of auditing the care given to hip fracture patients against recognised professional standards, with the aim of improving the provision of care to fragility fracture patients across the United Kingdom.

It is twenty years since the Royal College of Physicians produced their seminal report, Fractured Neck of Femur: Prevention and Management[5], which set out the then 'best practice' in hip fracture care. Since 1989 there have been considerable advances in fragility fracture management, particularly in the realm of osteoporosis diagnosis and treatment. The intervening years have also seen reports from The Audit Commission[6,7], the National Confidential Enquiry into Perioperative Deaths[8] and the National Health Service Institute for Innovation and Improvement[9], and the publication of Performance Indicators[10], all recognising the importance of hip fracture as a tracer condition for the care of the frail elderly surgical patient. In 2003 and 2007 the British Orthopaedic Association and British Geriatrics Society produced guidelines on the care of the patient with fragility fracture – the 'Blue Books'[1,11]. However, the current report documents widespread shortcomings in the provision of acute care and the availability of the resources needed to initiate the secondary prevention of fragility fractures.

Main findings

1. The time from presentation to A&E to surgery is the best documented part of the hip fracture pathway. There is a consensus that this should take less than 24 hours for the majority of patients and that beyond 48 hours there is evidence to show that there is an increase in morbidity and mortality. In 1995 the Audit Commission showed that half of patients waited for more than 24 hours and 18% waited for more than 48 hours[6]. The current report shows a significant deterioration in these times with only 35% having surgery within 24 hours and 69% having their operation within 48 hours.
2. Preoperative assessment by a geriatrician is seen as an important step in the multidisciplinary care of the frail elderly patient[1], and yet this only happens for 58% of patients, and 12% of hospitals have no geriatrician specialising in the care of orthopaedic patients.
3. A fragility fracture should trigger an assessment of risk of further falls, and an assessment of bone health[1], to reduce the possibility of future injury. 40% of patients left hospital without an adequate assessment of their osteoporosis and 56% did not have a falls assessment.

Recommendations

All hospitals treating hip fractures:

1. Should enter the details of ALL their patients on the National Hip Fracture Database. Accurate data will allow for broader comparison and increasingly useful output.
2. Should work with their commissioners to reduce medically unnecessary waits for surgery. Aiming to deliver a service that treats 95% of all fit trauma patients within 24 hours, will ensure that the frailest patients do not become 'fillers', waiting for theatre capacity to become available once paediatric injuries, high energy fractures and 'complex cases' have been operated on. Experience shows that a trauma service that aims to treat its hip fracture patients well, will treat ALL of its patients well.
3. Should provide sufficient senior (middle grade or consultant) orthogeriatric care to ensure the routine preoperative assessment of elderly hip fracture patients, five days a week. Formal arrangements for the preoperative assessment of patients at weekends and on holidays by the 'on call' medical team should be in place.
4. Should develop protocols to ensure that all patients sustaining fragility fractures have a full evaluation of their bone health, either through the fracture liaison service or by the orthogeriatrician. Access to DXA scanning should be readily available.
5. Should ensure that all patients who sustain a fracture as a result of a fall are properly assessed for falls prevention.

Hospitals that provide 'tertiary' orthopaedic care should ensure that such care is properly resourced and organised so that the high caseload associated with tertiary care does not detrimentally affect the care given to patients with fragility fractures.

Much has been written on the care of patients with hip fractures. Now is the time to act. The publication of hospital identifiable data that can be benchmarked nationally will allow for a fully informed development of local services with a national impact on standards.

Participating Hospitals

(*indicates inclusion in 1st Preliminary National Report)

Addenbrooke's Hospital, Cambridge
Airedale General Hospital, Keighley
Barnet General Hospital*
Barnsley District General Hospital*
Basildon University Hospital*
Bradford Royal Infirmary*
Bronglais General Hospital
Chelsea & Westminster Hospital
Cheltenham General Hospital*
Countess of Chester Hospital*
County Hospital Hereford
Cumberland Infirmary*
Derby Royal Infirmary*
Dewsbury District Hospital
Diana, Princess of Wales Hospital, Grimsby*
Doncaster Royal Infirmary
Frenchay Hospital, Bristol*
Friarage Hospital, Northallerton*
Gloucestershire Royal Hospital
Good Hope General Hospital, Sutton Coldfield*
Great Western Hospital, Swindon
Hillingdon Hospital, London*
Hope Hospital, Salford*
Hull Royal Infirmary*
Ipswich Hospital*
James Cook University Hospital, Middlesborough*
John Radcliffe Hospital, Oxford*
Kent & Sussex Hospital
King's College Hospital, London*
Luton & Dunstable Hospital
Leicester Royal Infirmary*
Leighton Hospital*
Leeds General Infirmary
Maelor Hospital, Wrexham*
Maidstone General Hospital*
Manchester Royal Infirmary*
Medway Maritime Hospital, Gillingham*
Milton Keynes General Hospital*
Musgrove Park Hospital, Taunton*
New Cross Hospital, Wolverhampton
Noble's Hospital, Isle of Man*
Norfolk and Norwich Hospital*
North Middlesex Hospital*
Northampton General Hospital*
North Tyneside Hospital
Pilgrim Hospital, Boston*
Pindersfield General Hospital
Princess Royal Hospital, Haywards Heath
Princess Royal Hospital, Telford*
Queen Alexandra Hospital, Portsmouth*
Queen Elizabeth Hospital, Gateshead*
Queen Elizabeth Hospital King's Lynn*
Queen Elizabeth Hospital, Woolwich*
Queen Elizabeth the Queen Mother Hospital, Margate
Queens Hospital, Romford*
Queens Medical Centre, Nottingham*
Royal Albert Edward Infirmary, Wigan*
Royal Berkshire Hospital*
Royal Bolton Hospital*
Royal Devon & Exeter Hospital
Royal Free Hospital, London
Royal Hampshire County Hospital
Royal Lancaster Infirmary
Royal Shrewsbury Hospital*
Royal Surrey County Hospital*
Royal United Hospital Bath*
Royal Victoria Hospital, Belfast*
Russells Hall Hospital, Dudley
St Mary's Hospital, Paddington*
St Peter's Hospital, Chertsey
St Richards Hospital, Chichester
St Thomas Hospital, London*
Scarborough General Hospital
Scunthorpe General Hospital*
Selly Oak Hospital, Birmingham
Southend Hospital
Southport and Formby District General
Stepping Hill Hospital, Stockport*
Stoke Mandeville Hospital*
Sunderland Royal Hospital*
Tameside General Hospital*
Trafford General Hospital
University Hospital Aintree, Mersey
University College Hospital, London
University Hospital of North Durham
University Hospital of North Staffordshire*
University Hospital of North Tees*
University Hospital of Wales*
University Hospital Lewisham*
Victoria Hospital, Blackpool*
Walsgrave Hospital, Coventry*
Warwick Hospital*
Watford General Hospital*
West Cumberland Infirmary
Weston General Hospital, Weston Super Mare
Whipps Cross Hospital, London*
Whittington Hospital, London*
William Harvey Hospital, Ashford
Worthing Hospital
Wythenshawe Hospital
York District Hospital*
Ysbyty Gwynedd Hospital, Bangor

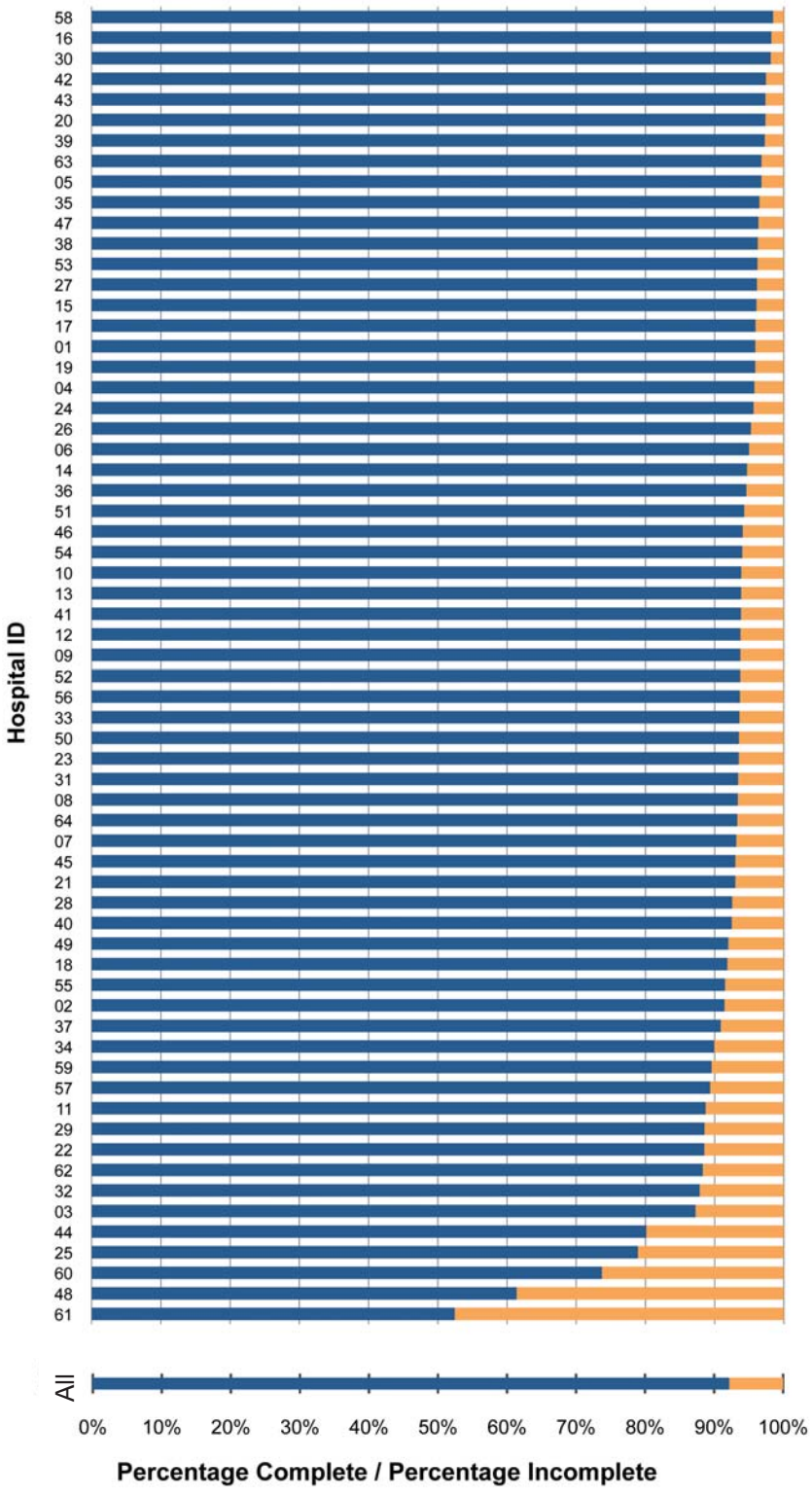
Hospital identification; inclusion

In all of the following charts hospitals have a unique identifying number. This is available to the hospital's NHFD clinical lead via the NHFD help desk. Not all hospitals contributing data appear in all of the following charts. This is because those submitting case numbers at or only slightly above the threshold of 60 will have very small and unrepresentative numbers of cases of individual fracture types and surgical interventions. In addition, where serious doubts arose about data quality (e.g. hospitals reporting almost all intracapsular fractures as undisplaced) such data was omitted.

Data completeness

Chart 1

This chart shows that there is variation in average field completion from 52% to 98%. This is calculated by considering all the fields used in compiling this document.[Appendix B]



Casemix

The following charts show five casemix factors▲ namely: age at admission, sex, place of residence, ASA grade and type of fracture.

Age at admission and sex
(Charts 2 & 3)

Both age and sex are important casemix factors, with significant influence on outcomes. In general terms, older and oldest patients have poorer outcomes in terms of return home if admitted from home, and of survival. Male patients, though generally presenting younger (average age Male: 83.1, Female: 83.5) tend to have greater co-morbidity▲ and hence poorer outcomes.[12] 75% of our cases were female.

Place of residence
(Chart 4)

Seventy six percent of patients were admitted from their own homes (this term is taken to include sheltered housing). Outcomes for such patients are generally better than those at admitted from other settings.

Patients admitted to orthopaedic care from other forms of hospital care, and patients from nursing and residential care homes, are as a rule all to some extent already disadvantaged, e.g. by comorbidities, dependency, frailty, and cognitive impairment. Mortality for such patients is higher, and many will have little potential for rehabilitation (mainly because of previous disability and/or cognitive impairment). Care needs may increase: e.g. patients from residential care may subsequently require nursing care.

ASA grades▲
(Chart 5)

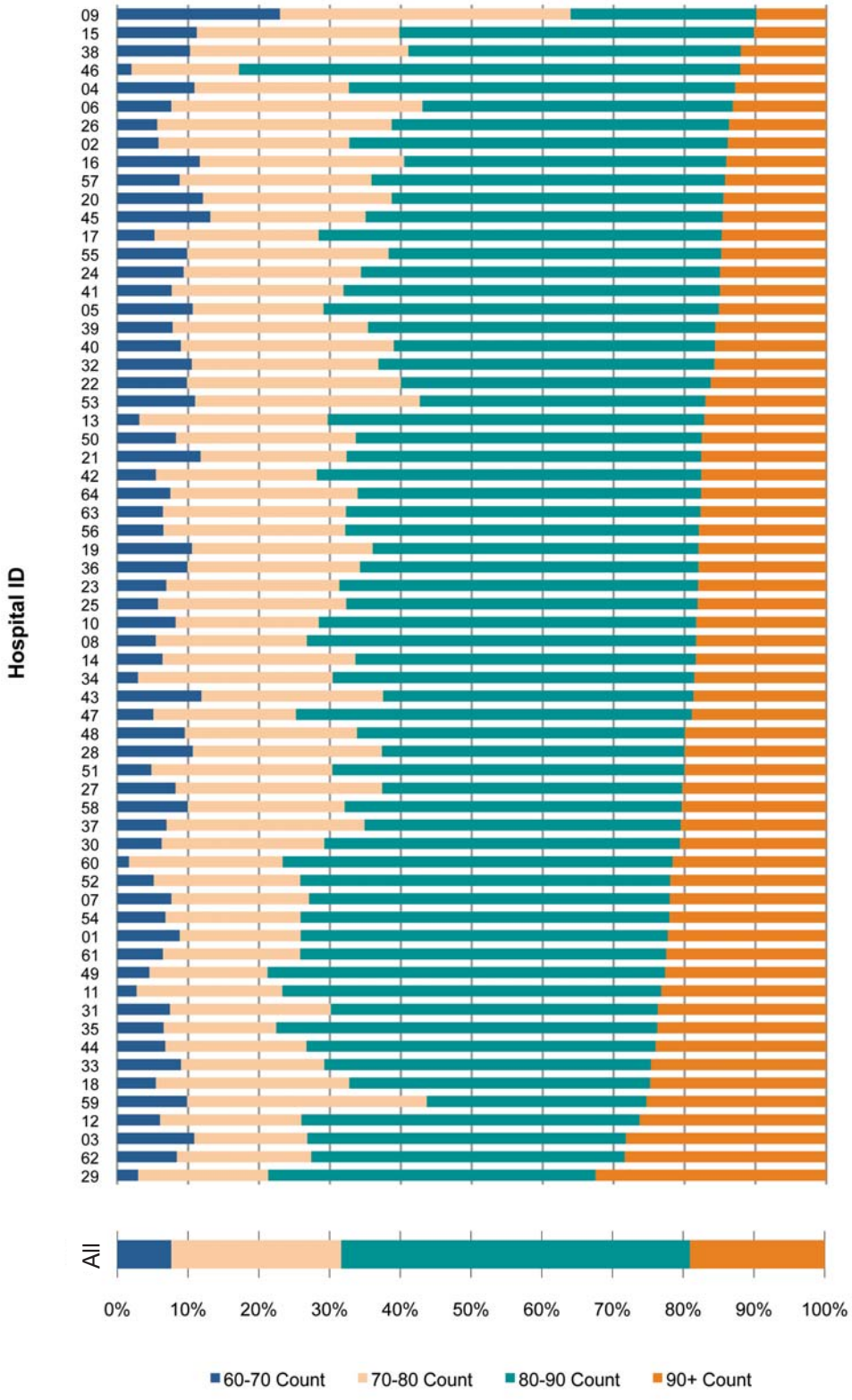
ASA grades[13] are a widely used means of categorising pre-operative risk. They range from 1 (healthy) to 5 (moribund, unlikely to survive 24 hours). It is noteworthy that 66% of hip fracture patients present with grades of 3 (severe systemic disease with functional limitation) or higher. Not surprisingly, mortality is most likely in patients in the higher risk grades. As noted in the introduction, concerns about completeness of current NHFD data are recognised. ASA grades are among the more commonly missed data items.

Walking ability
(Chart 6)

Forty three percent of patients presenting with hip fracture were previously mobile without a walking aid (e.g. walking stick). Loss of mobility – and hence independence – is an outcome greatly feared by patients. Maximum restoration of mobility is therefore a major goal of rehabilitation. However, around half of all hip fracture patients do not regain their previous level of mobility: e.g. will require to use a walking stick having previously walked independently, or will graduate from using a stick to using a walking frame.

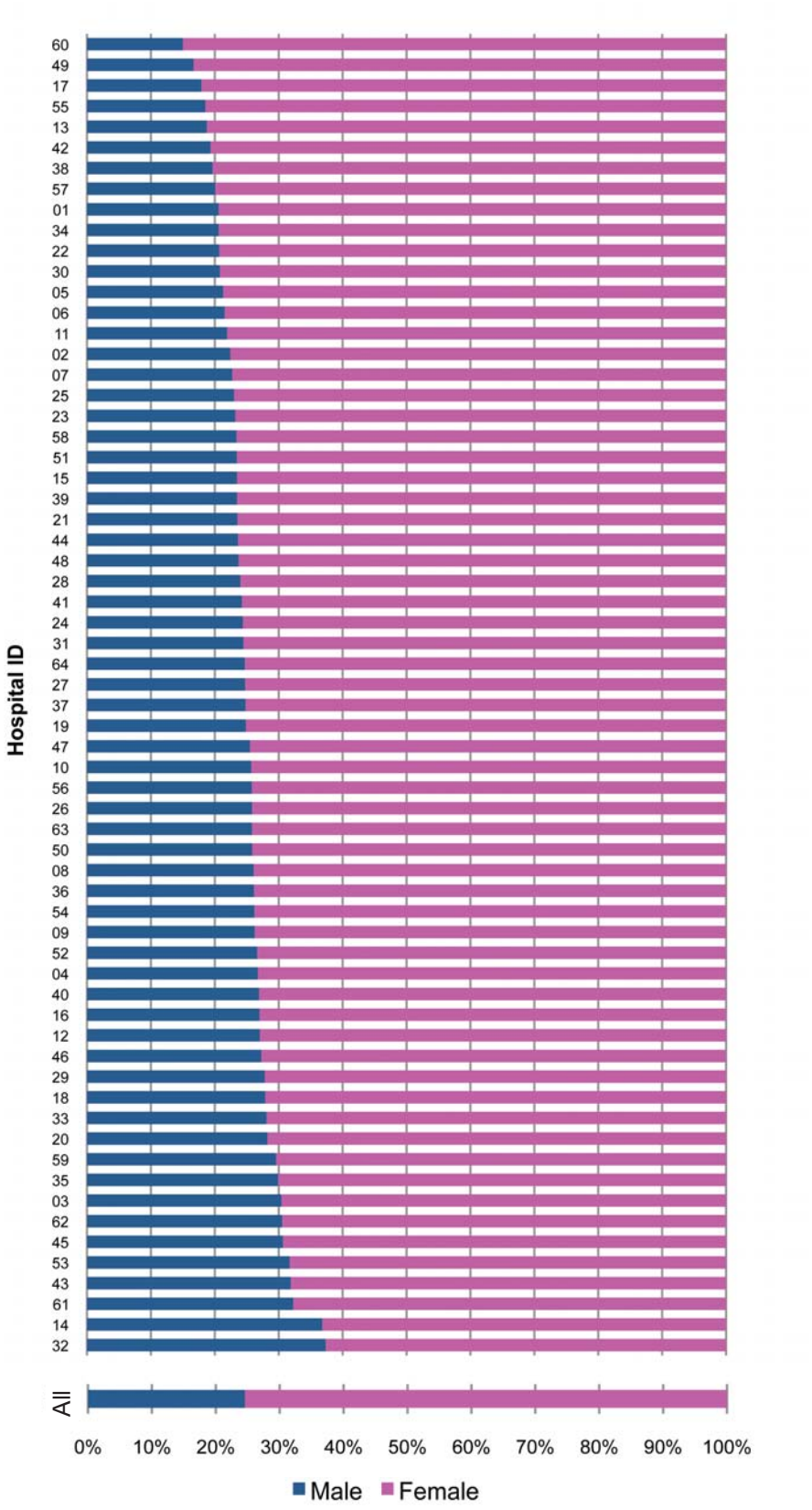
Age at admission

Chart 2



Sex

Chart 3


Hospital ID
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17
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13
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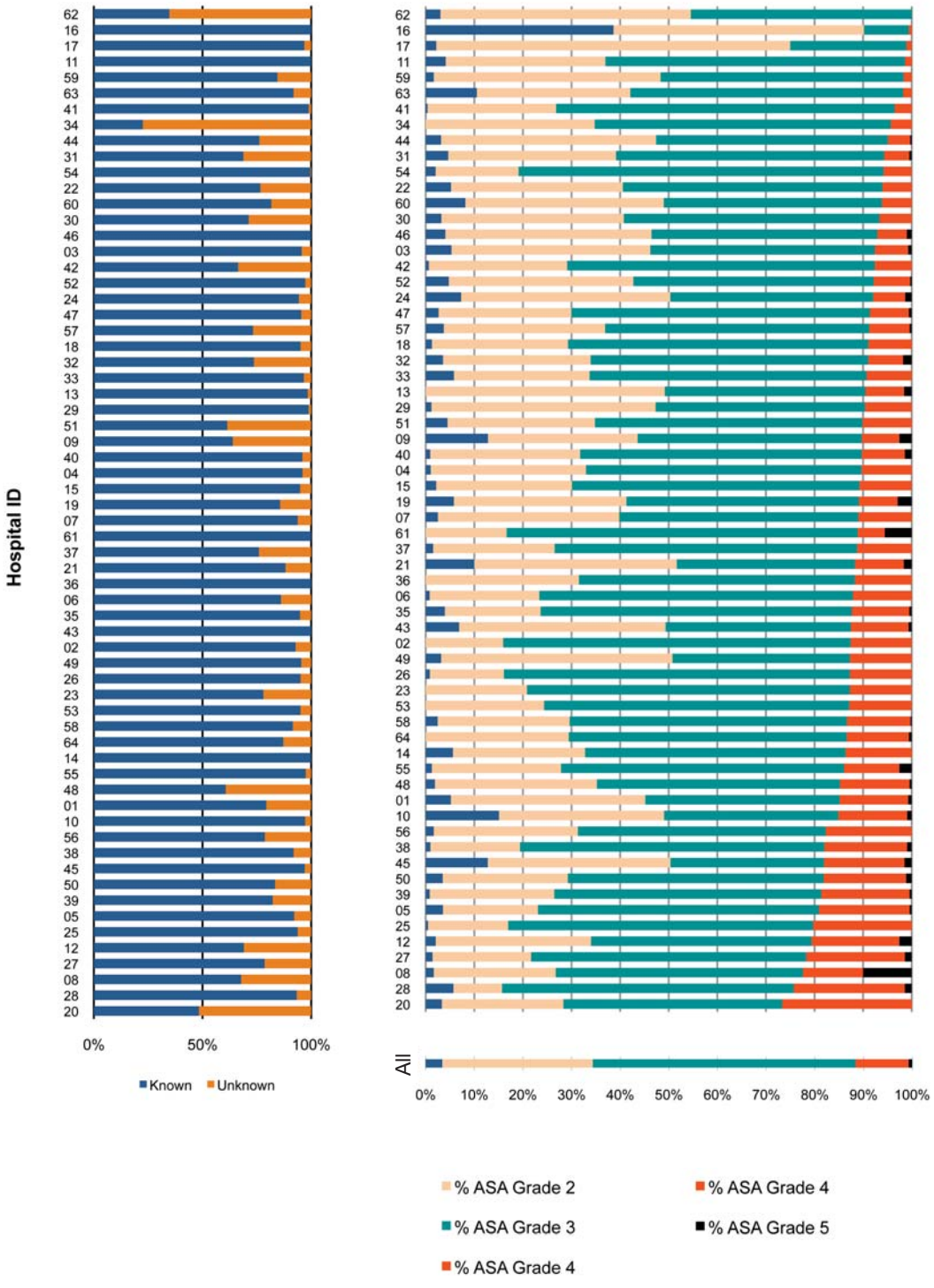
03
62
45
53
43
61
14
32
All
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Male
Female

Place of residence

Chart 4

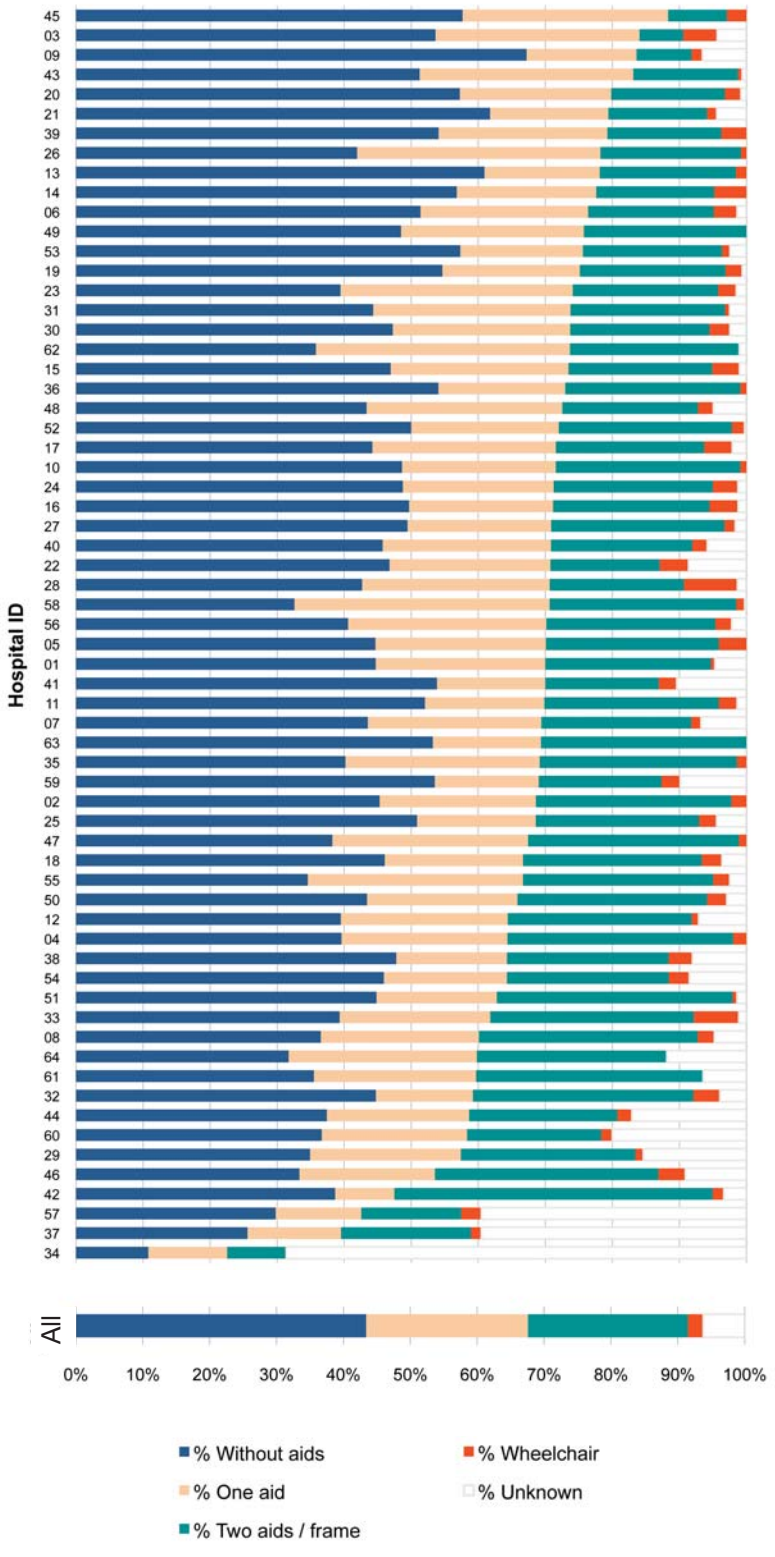
ASA Grade

Chart 5



Walking ability

Chart 6



Fracture type

In general, the term 'hip fracture' is used to describe a number of fracture types involving the upper or proximal femur. The term excludes fractures of the pelvic side of the hip joint and fractures of the surface of the head of the femur or isolated fractures the muscular attachments (trochanteric avulsion). Although the different fracture types are generally treated by different surgical techniques, the generic term 'hip fracture' is well defined and widely recognised. Hip fracture patients have usually suffered a fall, commonly have previous frailty and often complex rehabilitation needs. Interestingly, casemix-adjusted outcome analysis shows that fracture type is a relatively unimportant determinant of outcome (e.g when compared to age, sex, or ASA grade)

Those fractures that occur within the joint itself are termed intracapsular (54% of total). These are divided into those in which the bones remain in their correct place – undisplaced (13% of total), and those which have moved to an extent that the blood supply to the bone is disrupted – displaced (41% of total). Fractures outside the joint are divided into those that occur between the major muscle insertions (the trochanters) which are termed intertrochanteric (35% of total), and those that occur further down the femur at the junction with the femoral shaft. These are termed subtrochanteric (6% of total). (see Fig 1.)

Within these categories, fracture patterns show considerable variation and there is likely to be a degree of disagreement in classification between observers, particularly in terms of fracture displacement and in the subtrochanteric region.

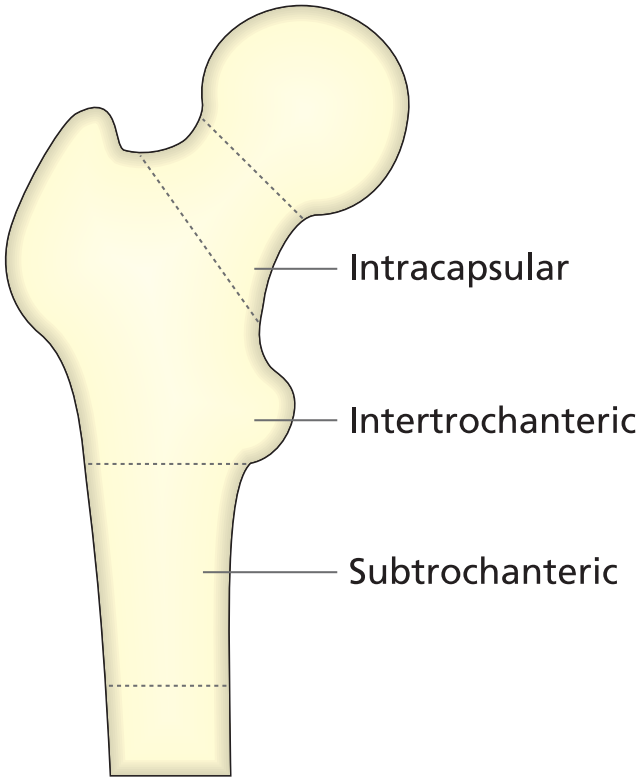
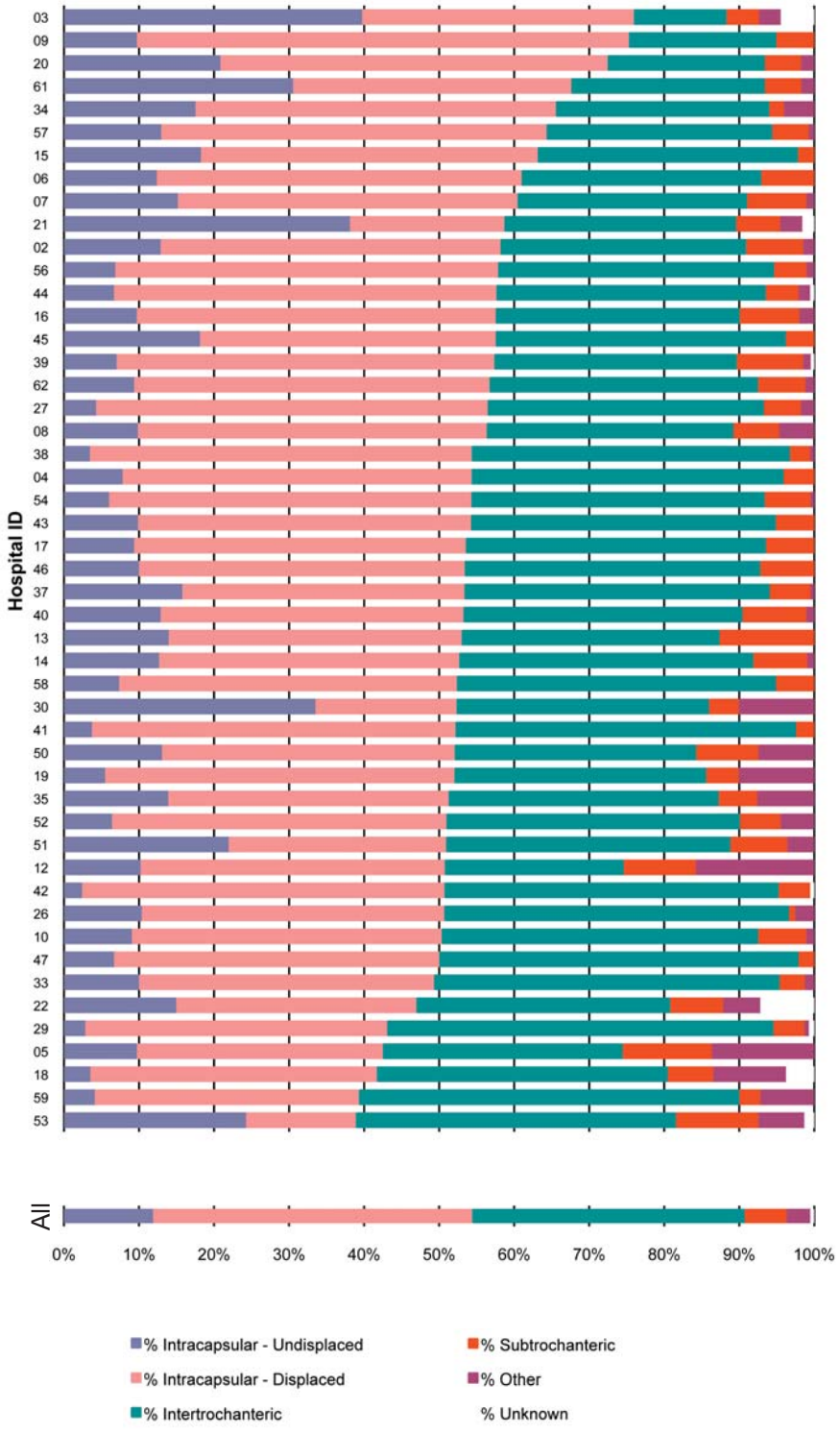


Fig 1

Fracture Type

Chart 7



Process

Surgery within 48 hours and during normal working hours (Chart 8)

The following chart shows the percentage of patients having surgery within 48hrs of presentation to the Accident and Emergency Department. This excludes the small number of patients – varying markedly across participating hospitals – regarded as unfit for surgery at 48hrs and patients operated on out of hours, in line with the Blue Book standard.

Early surgery (within 48 hours of arrival at Accident and Emergency) for hip fracture not only minimises avoidable discomfort and dependency but has been shown to improve rehabilitation prospects and hence diminish the length of stay.[16] Extended delay is associated with preventable morbidity and mortality, and should be avoided accordingly.[16,17] Ideally, patients should be operated on as soon as it is safe to do so. It is now twenty years since the Royal College of Physicians first recommended that hip fracture operations should be carried out 'within 24hrs'[5] and ten years since NCEPOD stated that 'There should be sufficient, fully staffed, daytime theatre and recovery facilities to ensure that no patient requiring an urgent operation waits for more than 24 hours once fit for surgery. This includes weekends'.[15] However, if we make a direct comparison with data from the Audit Commission report of 2000[7], applying the same criteria, we see that the percentage of patients having their operations within 24 hours has fallen from a half to 35% and those having surgery with 48hrs has fallen from 82% to 69%. Since out of hours surgery has been shown to carry higher risks[18], and since hip fracture surgery is an urgent rather than an emergency procedure, operating within 'normal working hours'▲ is recommended. Our data shows a reduction in out of hours operating from 14% to 4% (using the NCEPOD definition 18.01-07.59)[15] It may be that there has been an improvement in patient safety, but this has resulted in a deterioration of service delivery.

Pre-operative delay appears to vary with care setting. NHFD data shows that there is a significant difference between the percentage of patients treated in 'district' hospitals having their operation within 48hrs (71.6%) and those treated at a 'tertiary' hospital (60.1%, $P < 0.0001$). The higher caseloads encountered in the latter may make extra demands on the resourcing and/or organisation of pre-operative and operative care, and these issues should be addressed if patients treated in larger centres are not to be disadvantaged

In more general terms, measures that have been shown to decrease pre-operative delay include: dedicated hip fracture lists; orthogeriatrician input; the close involvement of senior anaesthetic staff; and the organisational contribution of an elderly trauma nurse specialist . Since minimising delay improves both the experience of the patient and the overall costs of care, here – as elsewhere in hip fracture care – cost and quality are not in conflict.

Reason for no operation within 48 hours (Chart 9)

Delay to surgery is relatively simple to measure. However, the reasons for delay may be complex, multiple and cumulative (e.g. when delay awaiting investigation or theatre time leads to medical problems such as pneumonia or electrolyte disturbance, with further resultant 'medical' delay).

The categories used here to document delay are necessarily somewhat simplistic, and in practice not mutually exclusive; but can be used locally to highlight problems (e.g. inadequate – or inefficiently used – theatre time; the need for orthogeriatrician input; the absence of assessment protocols, etc).

In pre-operative care, the real value of NHFD participation lies in using information locally to assess and address the main causes of delay, and not to perfect the documentation of these causes. If effective action is taken, avoidable delay will be minimised, care will be improved, and feedback data will show this.

Patients treated without surgery (Chart 10)

Very occasionally patients present late with a fracture - most commonly an undisplaced intracapsular fracture - that is already healing.

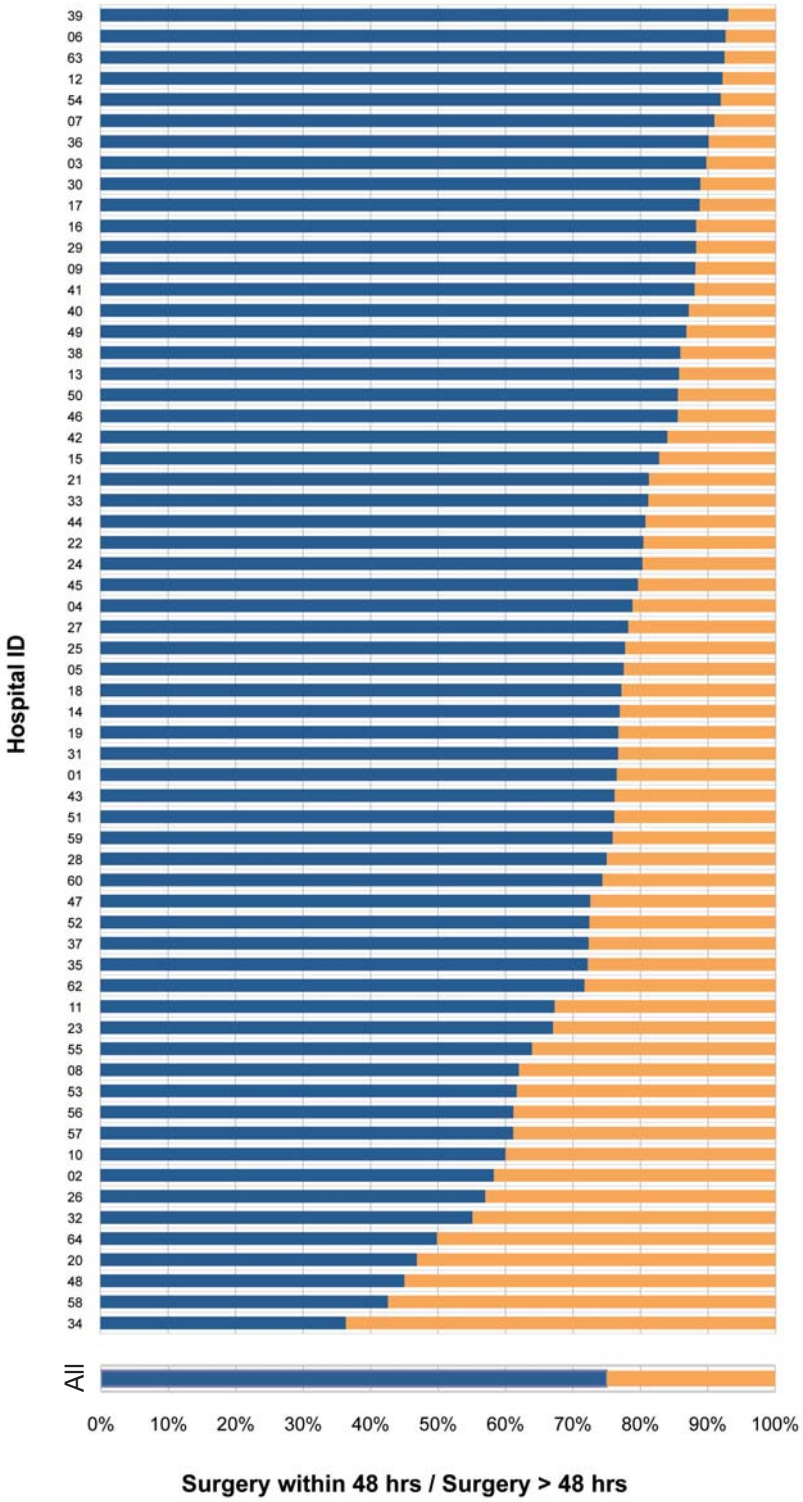
Apart from such cases, almost all patients with hip fracture should undergo surgery, which relieves pain, stabilises the joint and - even in frail patients nearing the end of life - can be justified because it reduces suffering and facilitates nursing care. For a very small group of patients where an operation is considered futile, an end of life care pathway should be instituted.

Hospitals that have a high percentage of patients treated non-operatively should review their preoperative assessment process. Further information regarding the preoperative optimisation of patients is available from the NHFD website.

Surgery within 48 hours and during normal working hours

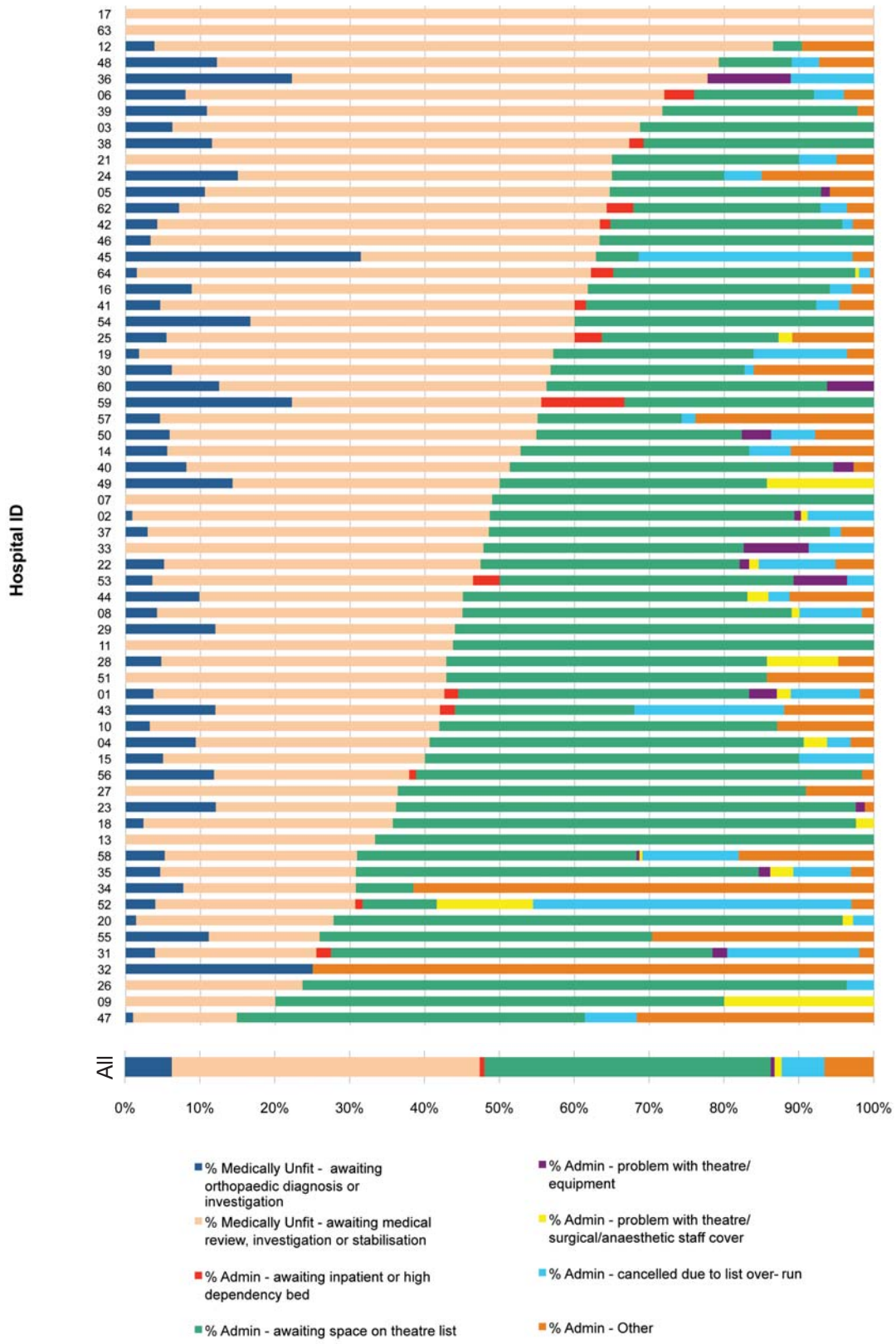
Blue Book Standard 2

Chart 8



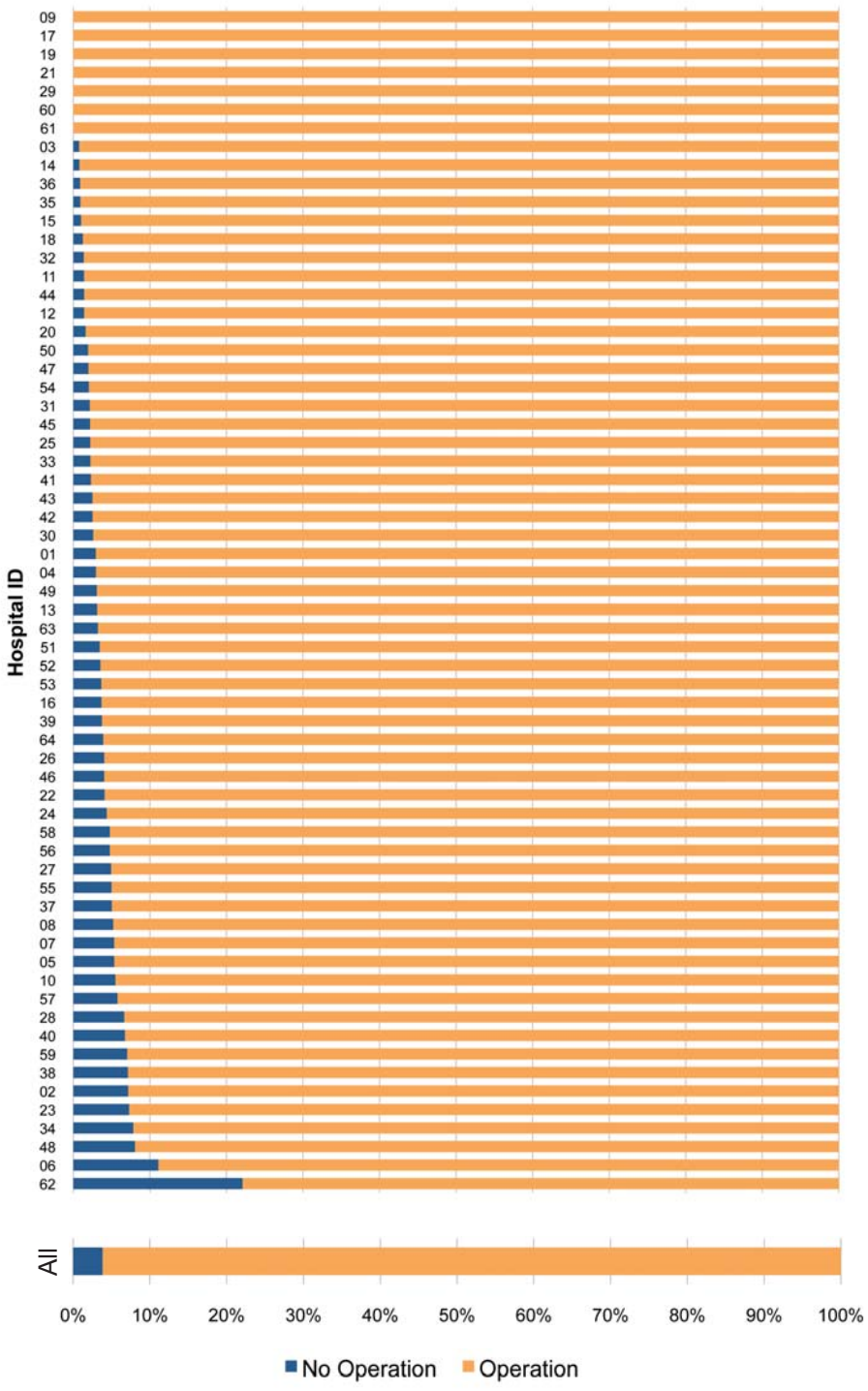
Reasons for no operation within 48hrs

Chart 9



Patients treated without surgery

Chart 10



Operations performed by fracture type

The following charts show the variation in surgical practice. Since this report has included hospitals that have submitted small numbers of records – inevitably not as representative of casemix and management as larger samples – the numbers of operations included in each fracture category have been included on the right.

Undisplaced intracapsular (Chart 11)

This chart shows that 41% of patients have an internal fixation while almost 57% have some form of arthroplasty▲. This finding is surprising as undisplaced intracapsular fractures that are treated surgically should generally be treated by internal fixation.[1] Data quality issues, perhaps arising from the use of non-clinical or untrained audit staff, may explain this anomaly.

Hospitals that report a high percentage of undisplaced fractures tend to have an increased use of rate of hemiarthroplasty▲.

Displaced intracapsular (Chart 12)

In contrast, 90.5% of displaced intracapsular fractures are treated with some form of arthroplasty, while 6.5% have a reduction and internal fixation. Because of the likely disruption of the blood supply to the femoral head patients older than 70 years are generally treated with an arthroplasty. In younger patients, internal fixation may be attempted in order to avoid the longer term problems of arthroplasty. These patients may require more revision operations in the short term.

Intertrochanteric (Chart 13)

For the majority of fracture configurations the treatment of choice is a sliding hip screw (SHS)▲, as complication rates are generally lower than occur in intramedullary fixation. In this group of patients 81% has a SHS while 10% had an intramedullary nail▲.

Subtrochanteric

Intramedullary nailing▲ (53.5%) produces a more stable fixation for early mobilisation than a sliding hip screw and should result in a lower incidence of non-union. Screw fixation (5.9%) is an improbable treatment, perhaps reflecting poor data quality rather than reality.

Data quality issues may have arisen in relation to fracture type also, with the possibility that subcapital fractures are wrongly coded as subtrochanteric. Hospitals that have a high proportion of intracapsular fractures that are undisplaced or a high proportion of subtrochanteric fractures treated by screws, should increase the level of orthopaedic involvement in the training of their data collectors.

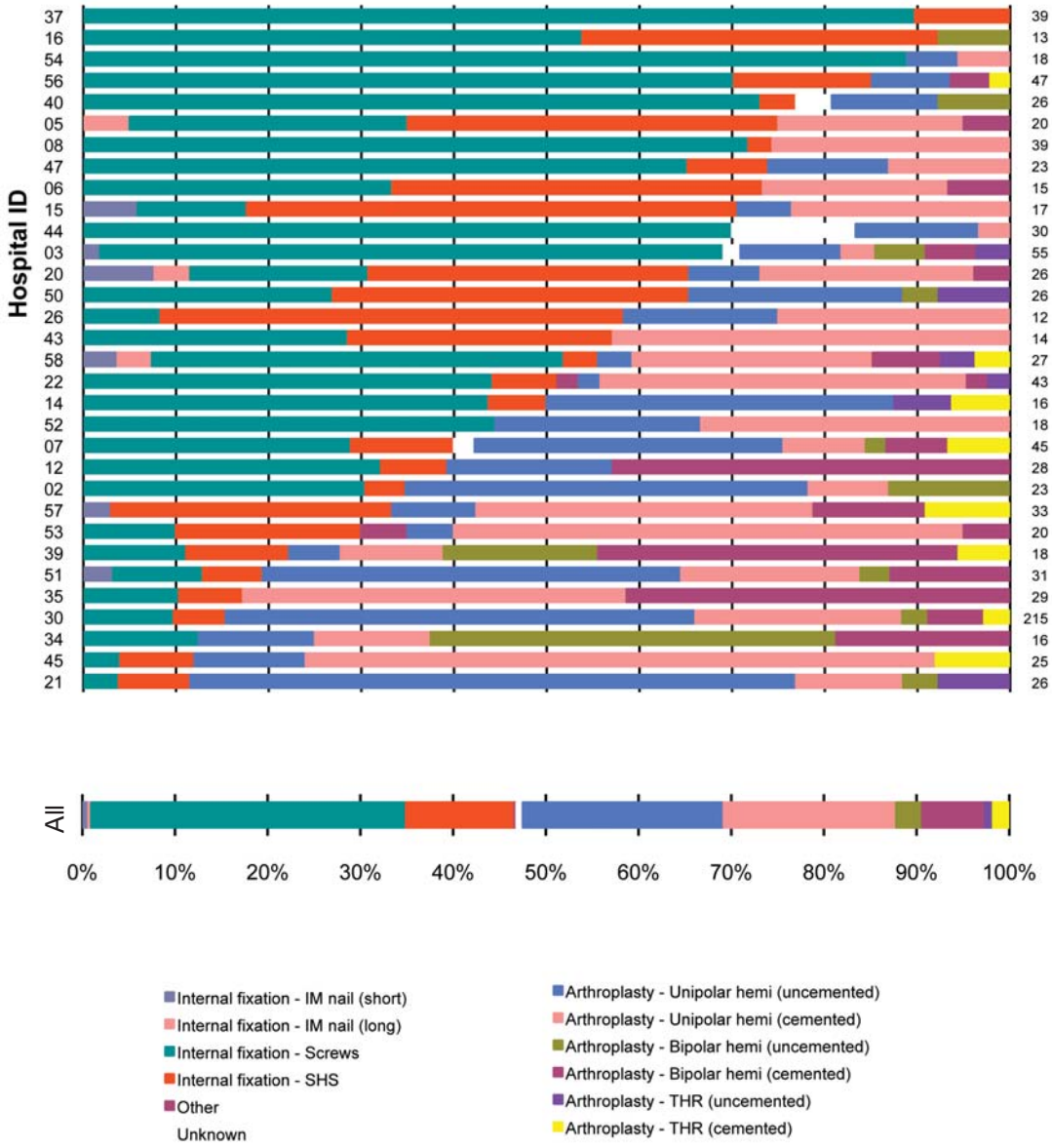
Subtrochanteric fractures amount to less than ten percent of hip fractures and individual hospitals operate on low numbers. No chart has been included as there appears to be some difficulty in recognising and reporting the fracture type and reporting on the surgical technique used. Again this emphasises the importance of audit staff selection and training, and of data validation.

Cementing of arthroplasties (Chart 14)

Fifty six percent of arthroplasties are cemented in place (Range 0 – 100%). The available evidence suggests that there is a marginal advantage to cementing arthroplasties in hip fracture surgery, with a reduction in pain and an increase in mobility[19]. This is based on evidence from the use of older types of hemiarthroplasty and more recently developed devices need careful evaluation as better sizing and coating▲ of the implants may improve outcomes. While there are concerns regarding bone cement▲ implantation syndrome, which have lead to the National Patient Safety Agency issued a directive that all perioperative death or harm in patients treated with a hip hemiarthroplasty should be reported to the Agency, the risk or perioperative mortality may be reduced by appropriate measures in cementation.[20, 21, 22]

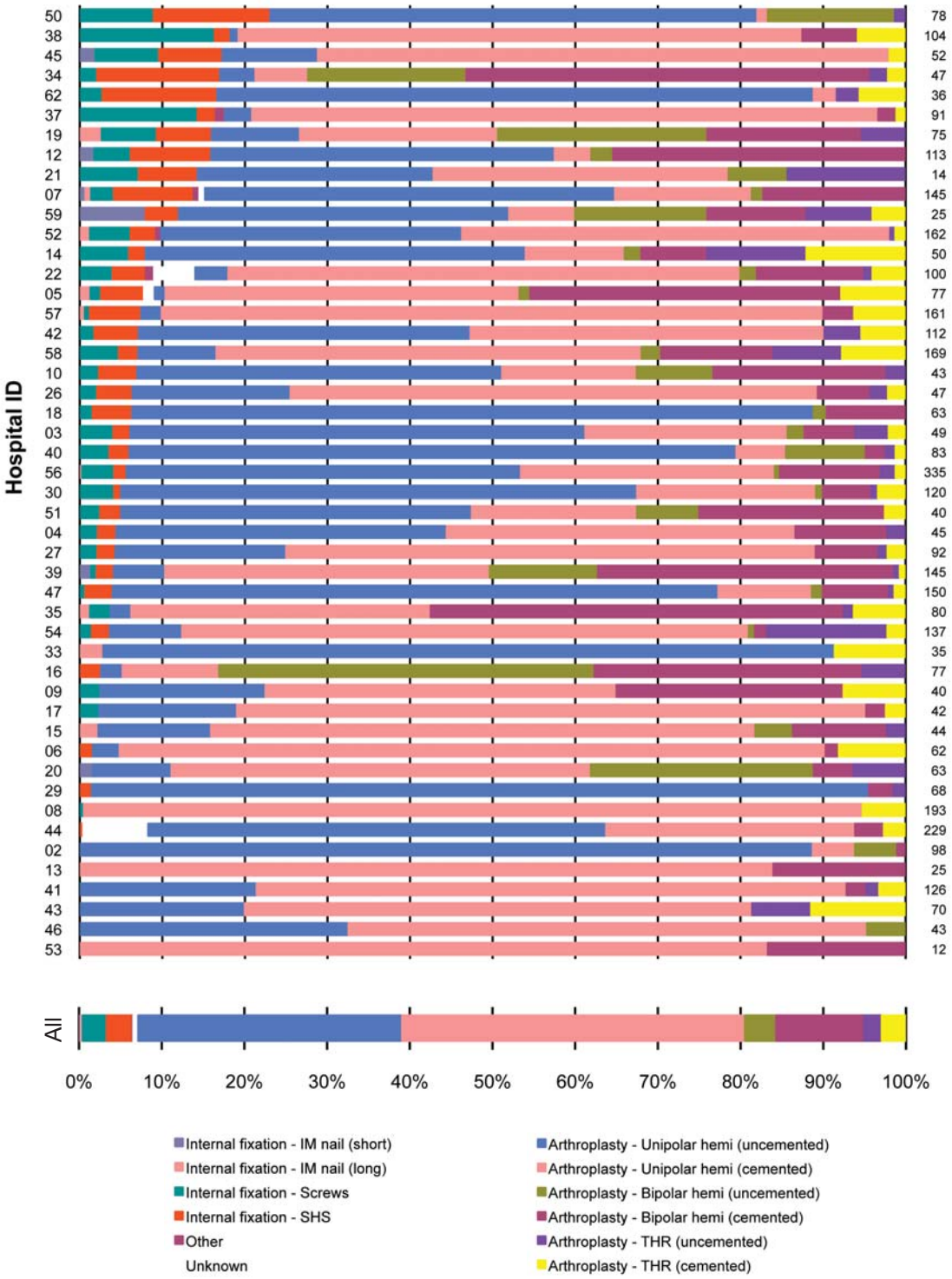
Operations performed for undisplaced intracapsular fractures

Chart 11



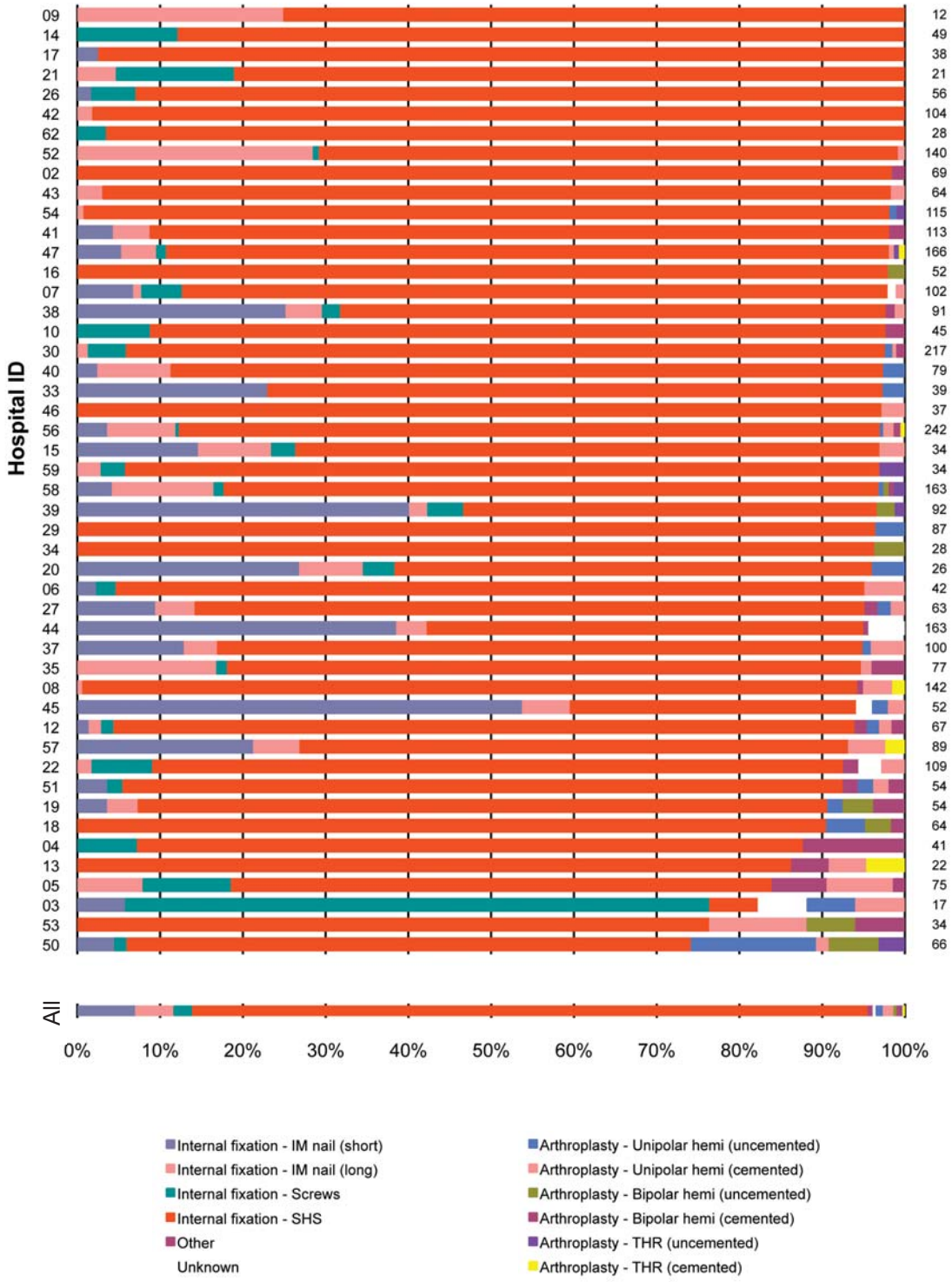
Operations performed for displaced intracapsular fractures

Chart 12



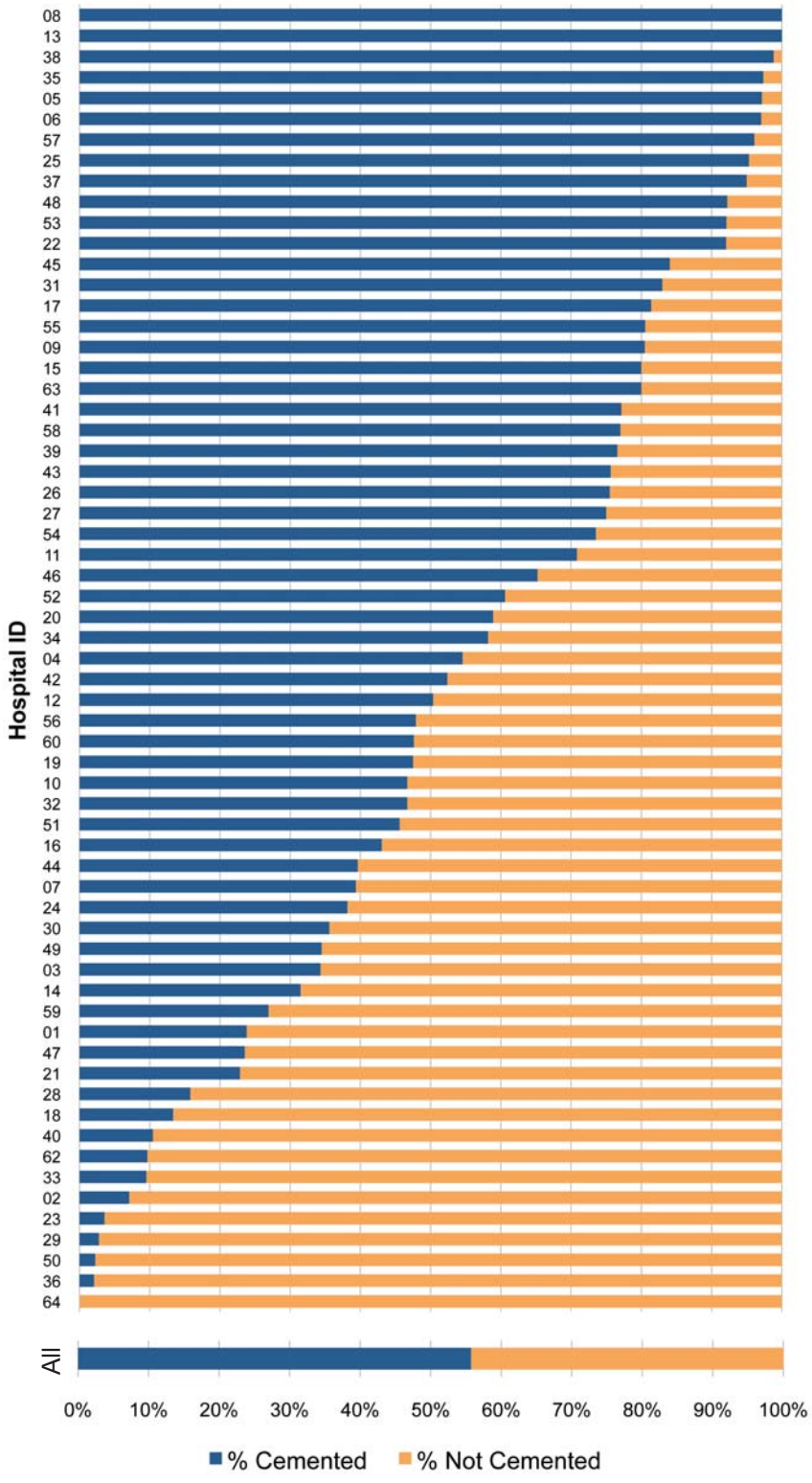
Operations performed for intertrochanteric fractures

Chart 13



Cementing of arthroplasties

Chart 14



Development of pressure ulcers

(Chart 15)

Expert nursing care is a crucial component of the overall care of hip fracture patients. Good practice includes assessing patient risk to pressure areas at the time of admission and thereafter, combined with a meticulous and proactive approach to pressure area care. The rate of pressure ulcer▲ development is seen as a useful measure of nursing care.[23]

The development of a new pressure ulcer (grade 2 or above)▲ appears from the available data to be a relatively infrequent occurrence (3.6%).

However, there are some concerns about the quality of the data on pressure ulcers, perhaps with paradoxical results: reporting of ulcer development may be less likely where pressure area care and awareness is poor.

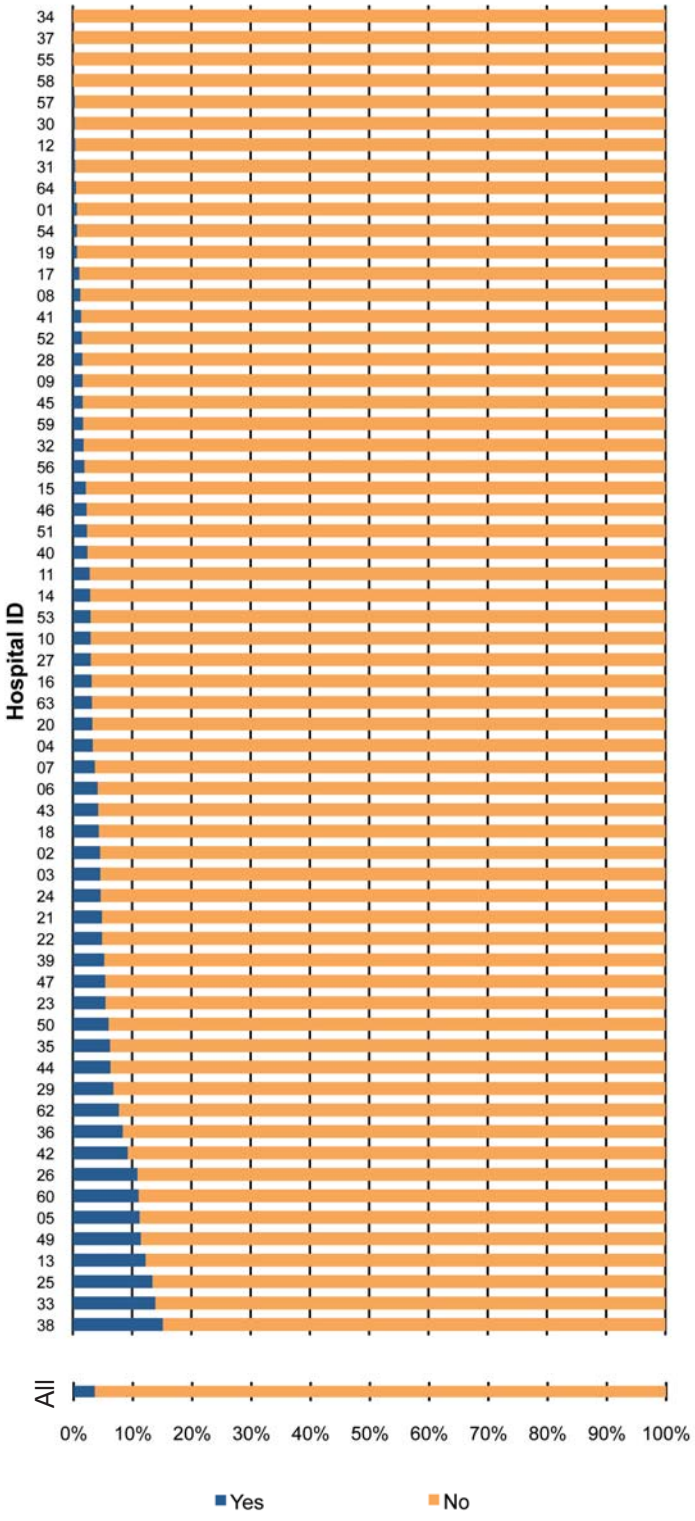
Pre-operative medical assessment

(Chart 16)

The RCP (London) report of 1989 describes a model of hip fracture care that included "medical advice via a geriatrician" prior to surgery.[5] This chart demonstrates the extent to which this has become routine practice. It is disappointing that only 24% of patients have a routine assessment by a geriatrician and that only 42% of patients have any preoperative medical assessment.

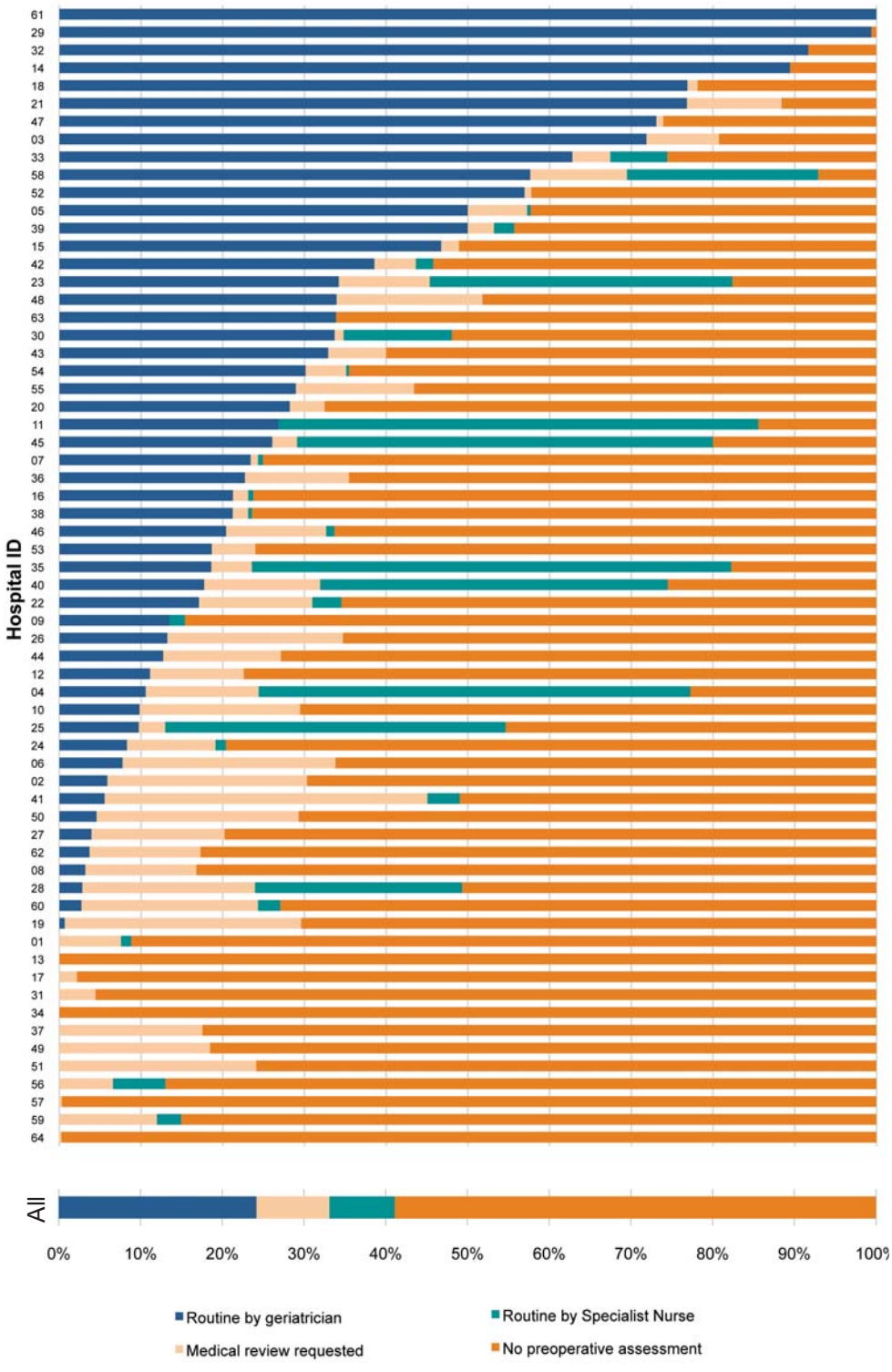
Development of pressure ulcers
Blue Book Standard 3

Chart 15



Preoperative medical assessment
Blue Book Standard 4

Chart 16



Anti-resorptive therapy
(Charts 17,18 & 19)

NHFD seeks not only to improve the care of hip fracture but to diminish its incidence. Bone protection therapy – usually in the form of antiresorptive medication▲ that increases bone mineral density – has been shown to be both effective and cost effective in the prevention of future fractures

It is encouraging that two thirds of hip fracture patients are discharged from acute care with prescribed antiresorptive therapy.

However, since good compliance – continuing with regular treatment – is essential, further work by NHFD is required to assess this.

Specialist falls assessment
(Chart 20)

Following a fracture all frail elderly patients should be assessed for secondary prevention. Currently 42% of patients have an assessment during their admission and a further 3% are referred to a falls clinic. Fifty five percent have no documented assessment.

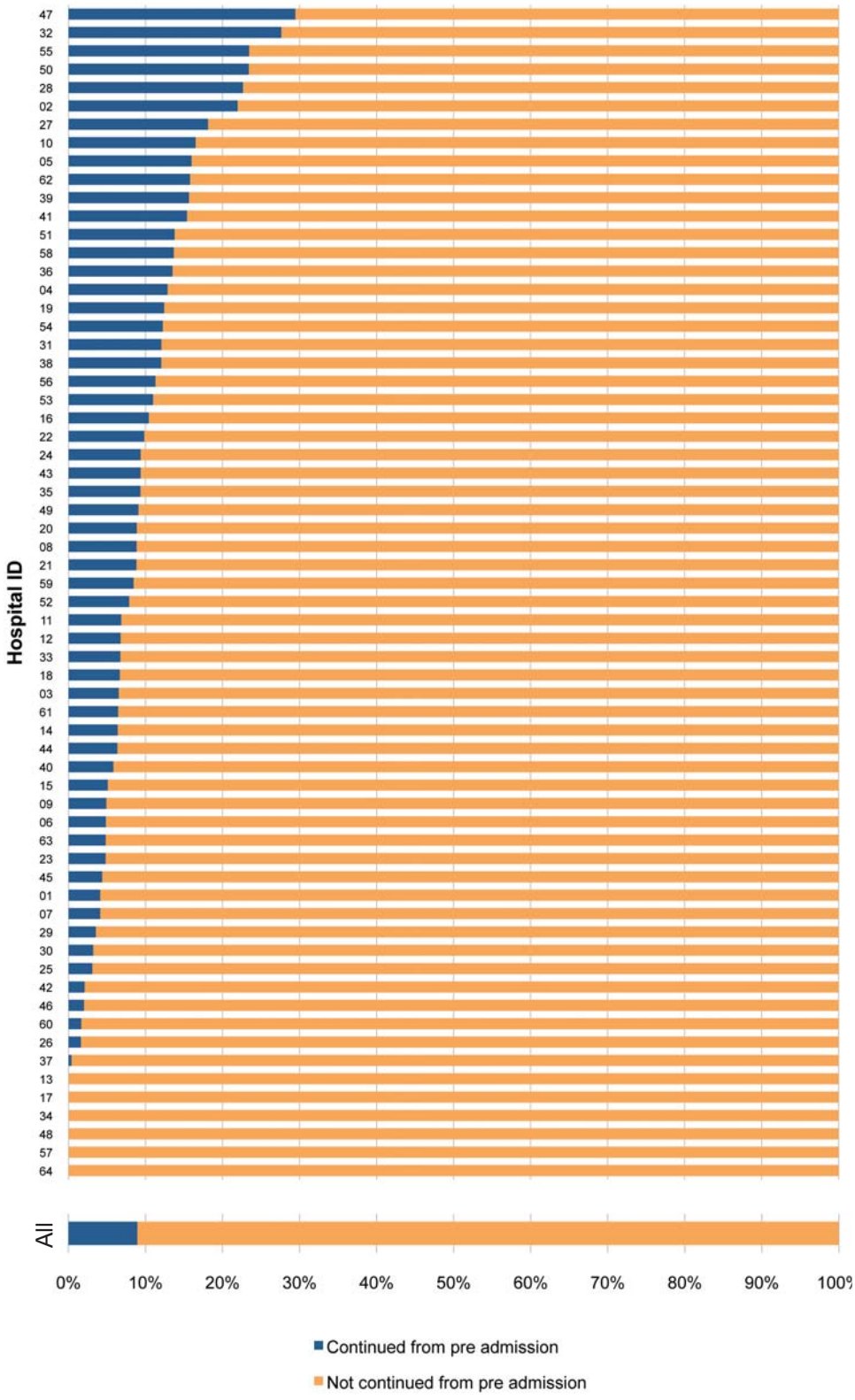
Specialist falls assessment▲ – followed by appropriate interventions such as exercise, home modifications, and simplification of medication – has been shown to reduce the subsequent incidence of falls.

Together with antiresorptive therapy it is an effective component of the prevention of future fractures.

Ideally, comprehensive secondary prevention following hip fracture would be readily accessible and patient-focused, with bone protection and falls assessment provided within a single service. The Fracture Liaison Service model achieves these goals far more effectively than other relevant UK initiatives[24], and should be more widely adopted.

Antiresorptive therapy at admission

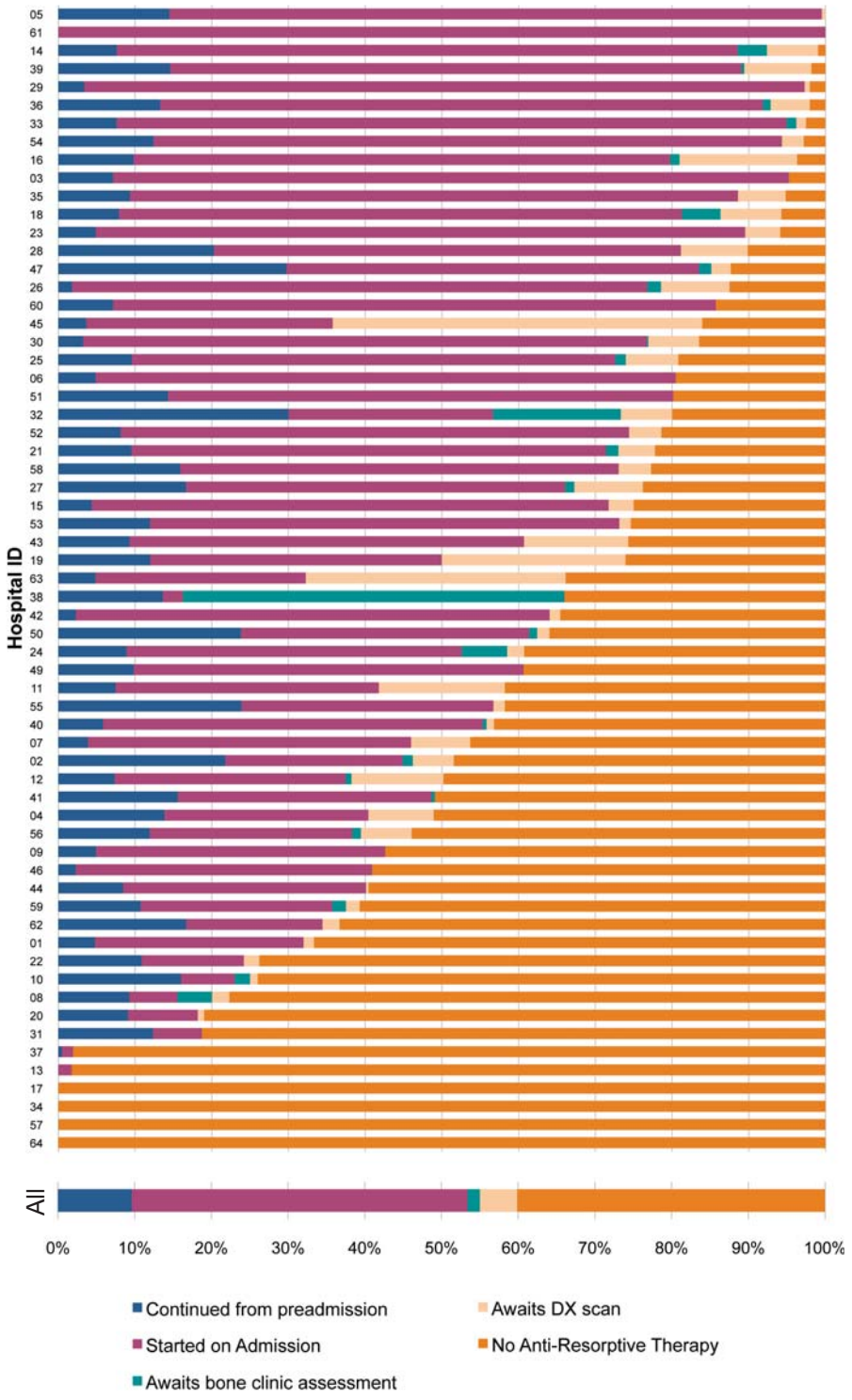
Chart 17



Bone health assessment and treatment at discharge

Blue Book Standard 5

Chart 18



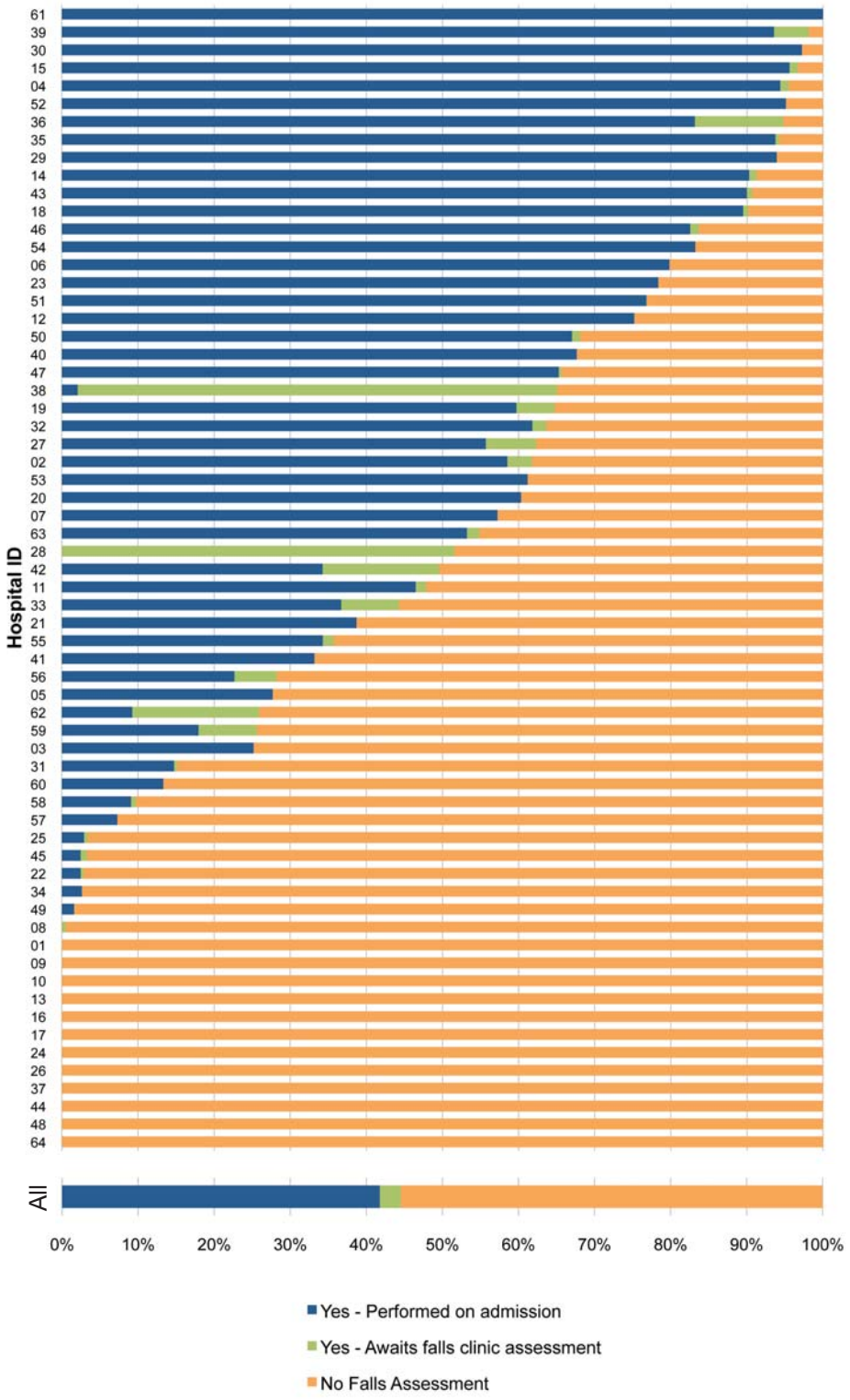
Patients discharged on anti-resorptive treatment continuing treatment at 120 days

Chart 19

Falls assessment

Blue Book Standard 6

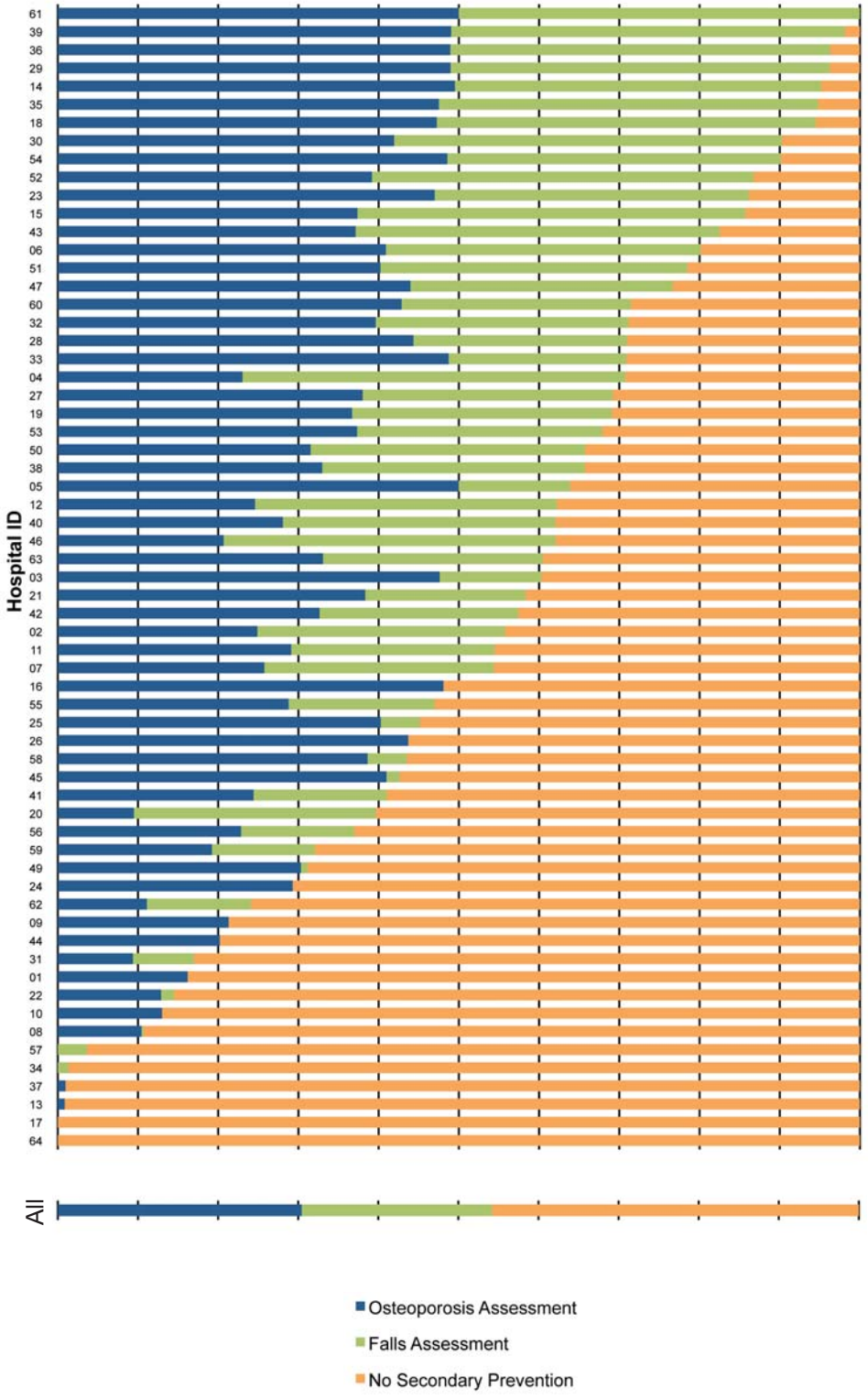
Chart 20



Secondary prevention overview

Chart 21

This chart shows all patients in hospital 61 receive falls assessment and bone health assessment with other hospitals providing varying proportions of these, or none.



Length of stay and discharge destination (Charts 22 & 23)

Length of stay is calculated from the day of admission to the hospital to the day of discharge from the hospital (23 days, range 12 - 58) in line with DoH length of 'spell'. As yet we cannot divide this into 'acute ward' v 'rehabilitation ward' due to poor completion of these fields. 'Superspell', the entire length of the NHS treatment including rehabilitation in other NHS hospitals, is more difficult to measure as it requires data collection from two sites. This may become possible once all hospitals undertake regular patient follow up. Alternatively, future data linkage with the Health Episode Statistics (HES – data submitted by every hospital in England for each admission) – already under discussion – may allow reliable capture of 'superspell' data on a large scale.

Access to down-stream multi-disciplinary rehabilitation▲ - which is of value for frailer patients from home requiring sustained rehabilitation to maximise chances of return home – varies greatly between hospitals. Where it is limited, much of the necessary rehabilitation will be carried out in the acute setting, resulting in longer stay there. However, this is not the case due to variations in the structure of care locally. Early rehabilitation in the acute setting, backed up by ready access to Early Supported Discharge Schemes▲ offering care and continuing rehabilitation at home, will offer shorter overall stay and a prompt return home.

It should be noted that an over-zealous focus on the reduction of acute care stay - driven by acute sector bed pressures and achieved by transfer of a large proportion of patients to post-acute care elsewhere – is likely to add to overall length of stay and hence costs, and also fails to meet patients' wish to get home quickly.

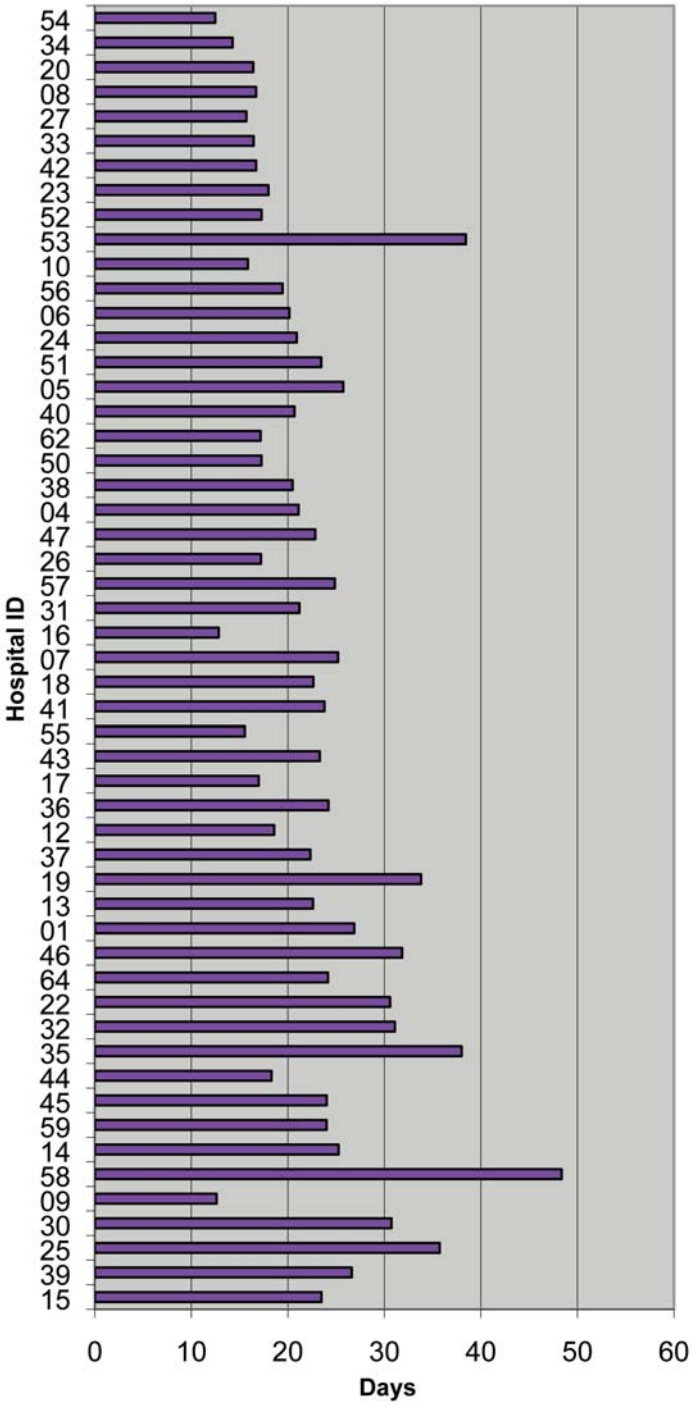
Effective early rehabilitation in acute care together with early supported discharge schemes provide a cost-effective model of care that also meets the aspiration of patients to return home as soon as possible. Such care should be much more widely available.

However rehabilitation is structured and provided in the local care system, what matters most to patients – and what mainly determines overall cost of care – is the total length of inpatient stay following hip fracture.

NHFD coverage of this should improve in future, with better access to linked 'superspell' data. This, and the contribution of NHFD audit and feedback, together with the recommendations of the Blue Book, should assist in promoting care that is not only of higher quality but also more cost effective.

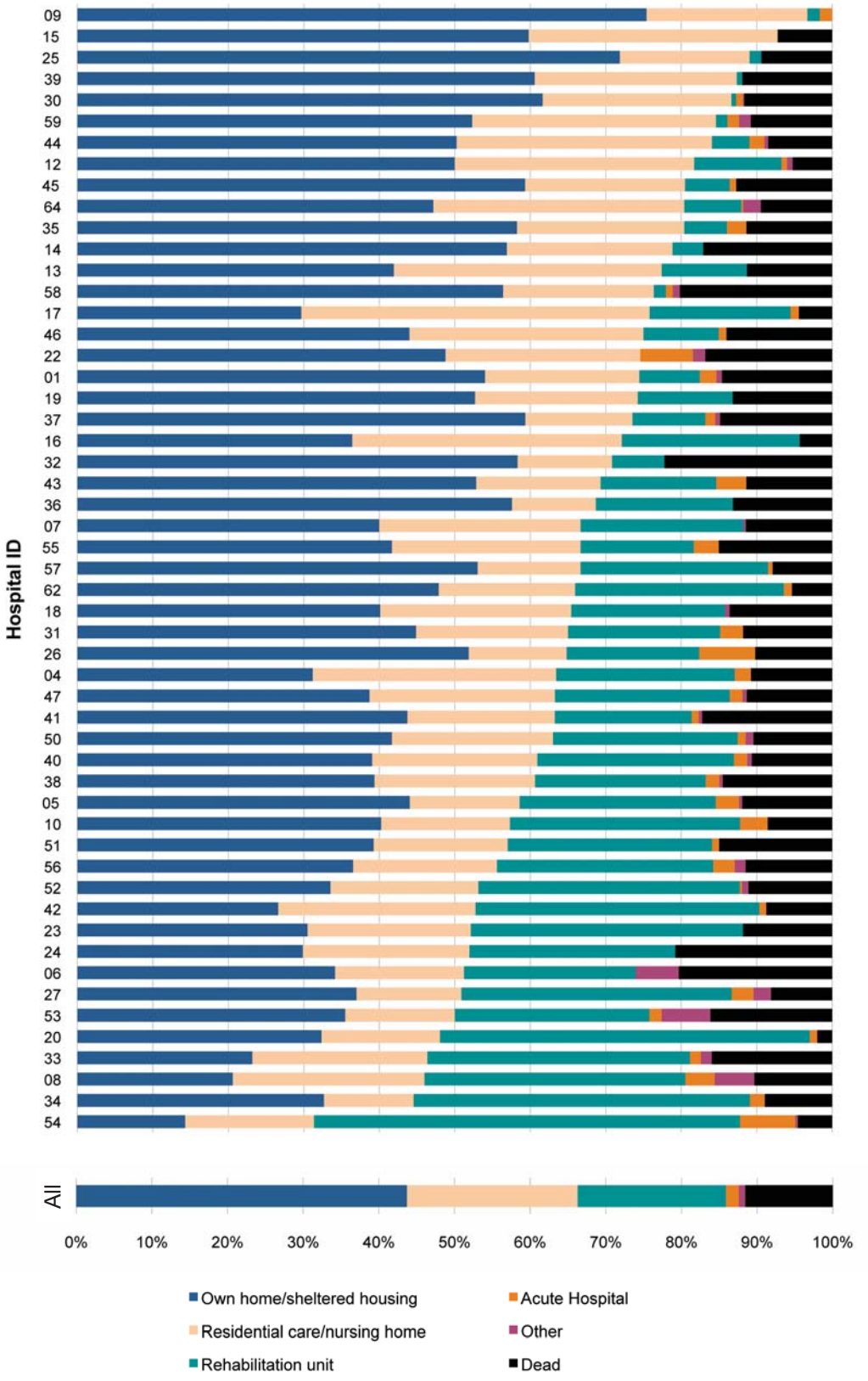
Length of acute Trust stay

Chart 22



Discharge destination from Trust

Chart 23

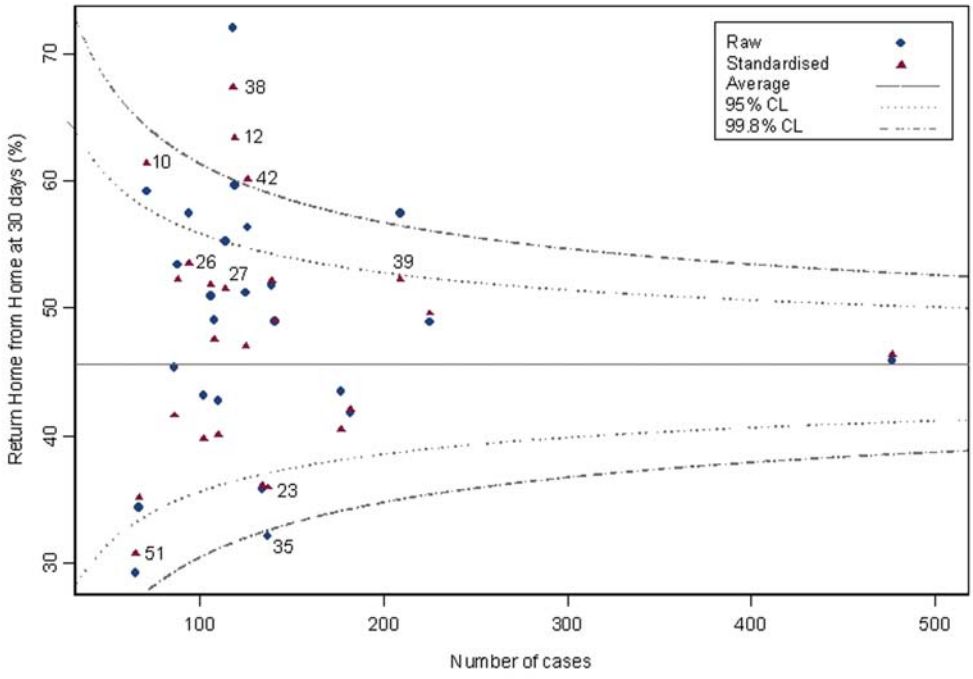


Casemix Adjusted Outcomes

Casemix adjusting of outcomes allows for a fair comparison of individual units.[Appendix C]
Casemix methodology developed by Quantics Consulting Ltd.

Funnel plot for return home from home at 30 days

Chart 24



Return home from home

This chart shows the percentage of patients admitted from home who are discharged to their own home in less than 30 days. It does not include patients who have returned home after attending another provider for rehabilitation.

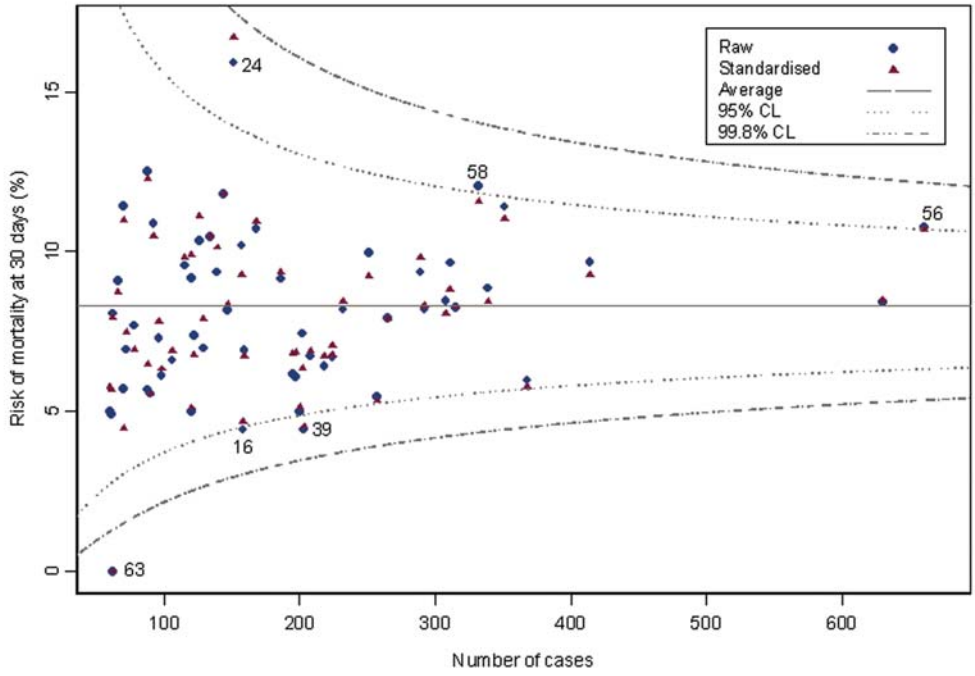
The dominant case-mix factors determining early return home are age and walking ability.

While Office of National Statistics (ONS)[25] mortality data is robust, NHFD follow-up data on return home by 30 days is less so, with fewer hospitals contributing the necessary data.

However, the spread of this important outcome is even more striking – with implications for cost and quality of care that participating units may wish to address.

Funnel plot for mortality at 30 days

Chart 25



Mortality

The dominant case-mix factors determining mortality are ASA grade, walking ability prior to injury, and place of residence prior to injury. For this analysis, linked data on mortality was obtained by NHFD from the ONS.

As will be seen from the funnel plot, there is a considerable spread around the average figure of 8.3%, but the vast majority of adjusted and unadjusted mortality falls within the 95% confidence limits shown as dotted lines.

Case-mix adjustment of rates from individual hospitals shows varying impact: with a poorly-performing unit brought within the 95% confidence limits; and another – a well-performing unit – also brought within the 95% confidence limits.

Facilities Audit

All hospitals participating in the National Hip Fracture Database are asked to complete a Facilities Audit at the time of registration and yearly thereafter. This allows for the identification of special circumstances faced by a particular hospital and shows something of the variation in the provision of services nationally.

Acute Care:

Population

Hospitals with similar catchment areas may face greater demands on their hip fracture services as a result of variation in the demographics of the local population. The rate of hip fractures is lowest in some inner city areas while the highest rate is seen in a coastal resort.

Trauma theatres

Over a third of delays to operation are directly attributable to a lack of theatre time. While all of the hospitals have introduced dedicated daytime (08:00 – 20:00) trauma sessions as a response to the NCEPOD report Who operates when?[15], the provision of such theatre time in district hospitals varies by a factor of ten. It may be that hospitals use vacant elective lists and 'emergency' lists to accommodate fracture patients, but hospitals with a high proportion of patients not receiving surgery within 48hrs of presentation should assess their need for additional lists.

Orthogeriatric care

The need for input from physicians trained in the care of the frail elderly patient has been established. However, despite the National Service Framework for Older People 2001[26] statement: 'specialist attention is particularly relevant for older people undergoing surgery', of the 64 hospitals submitting records for this report, 8 (12.2%) have no orthogeriatrician, and 40 (62.5%) have two or less orthogeriatric ward rounds a week. Hospitals should ensure that sufficient orthogeriatric cover is available to allow for daily review of patients.

Some units may find that the link between orthopaedic surgeons and the geriatric department is enhanced by the development of elderly trauma nurse specialists. Further details are available on the website.

Hospital *hospitals providing 'tertiary' trauma services such as pelvic and limb reconstruction	Catchment population for trauma	Hip fracture patients treated per year	No. of hip fracture cases per 1,000 population	Hours of dedicated trauma theatre per week	Hours of dedicated trauma theatre per 100,000 population per week	Total orthogeriatric input (hours per week)	Orthogeriatric ward rounds per week
Barnet General Hospital	270000	250	0.9	30	11.1	10	2
Barnsley District General	250000	365	1.5	20	8.0	15	2
Basildon University Hospital	320000	334	1.0	28	8.8	35	5
Bradford Royal Infirmary	480000	350	0.7	35	7.3	20	5
Cheltenham General Hospital	600000	654	1.1	28	4.7	4	2
Countess of Chester Hospital	240000	300	1.3	7	2.9	7	2
Cumberland Infirmary	200000	275	1.4	21	10.5	6	2
Derby Royal Infirmary	500000	500	1.0	72	14.4	8	4
Diana, Princess of Wales Hospital, Grimsby	244000	246	1.0	23	9.4	8	2
Frenchay Hospital, Bristol*	550000	550	1.0	56	10.2	16	4
Friarage Hospital, Northallerton	122000	179	1.5	20	16.4	0	0
Good Hope General Hospital, Sutton Coldfield	400000	400	1.0	20	5.0	8.5	5
Hillingdon Hospital, London	300000	200	0.7	30.5	10.2	16	2
Hope Hospital, Salford*	237341	244	1.0	18.6	7.8	10	1
Hull Royal Infirmary	650000	550	0.8	60	9.2	40	5
Ipswich Hospital	350000	443	1.3	35	10.0	10	2
James Cook University Hospital, Middlesbrough*	270000	400	1.5	28	10.4	0	0
John Radcliffe Hospital, Oxford*	500000	500	1.0	104	20.8	36	2
King's College Hospital, London*	250000	180	0.7	18	7.2	4	1
Leicester Royal Infirmary*	1000000	800	0.8	129	12.9	40	4
Leighton Hospital	280000	220	0.8	28	10.0	0	0
Maelor Hospital, Wrexham	300000	300	1.0	25	8.3	15	3
Maidstone General Hospital	250000	112	0.4	17.5	7.0	0	0
Manchester Royal Infirmary	251655	170	0.7	31.5	12.5	14	2
Medway Maritime Hospital, Gillingham	375000	370	1.0	44	11.7	14	2
Milton Keynes General Hospital	275000	250	0.9	18	6.5	0	0
Musgrove Park Hospital, Taunton	360000	400	1.1	48	13.3	12	2
Noble's Hospital, Isle of Man	76220	120	1.6	16	21.0	10	5
Norfolk and Norwich Hospital*	750000	640	0.9	70	9.3	15	5

North Middlesex Hospital	250000	140	0.6	20	8.0	26	2
Northampton General Hospital	380000	335	0.9	47	12.4	2	1
Pilgrim Hospital, Boston	215000	300	1.4	25.5	11.9	2	2
Princess Royal Hospital, Telford	220,000	200	0.9	17.5	7.7	0	0
Queen Alexandra Hospital, Portsmouth	610000	662	1.1	84	13.8	49	8
Queen Elizabeth Hospital, Gateshead	218000	323	1.5	36	16.5	24	5
Queen Elizabeth Hospital, King's Lynn	220000	300	1.4	21	9.5	4	2
Queen Elizabeth Hospital, Woolwich	300000	168	0.6	29	9.7	12	1
Queen's Hospital, Romford	750000	532	0.7	86	11.5	49.5	2
Queen's Medical Centre, Nottingham	750000	750	1.0	85	11.3	0	0
Royal Albert Edward Infirmary, Wigan	305600	350	1.1	40	13.1	15	5
Royal Berkshire Hospital	500000	400	0.8	55.5	11.1	75	5
Royal Bolton Hospital	360000	350	1.0	46	12.8	4	2
Royal Shrewsbury Hospital	330000	286	0.9	15	4.5	1.5	1
Royal Surrey County Hospital	320000	337	1.1	25.5	8.0	0	0
Royal United Hospital Bath	600000	550	0.9	64	10.7	1	0
Royal Victoria Hospital Belfast*	1020000	1089	1.1	132	12.9	67.5	3
St Mary's Hospital, Paddington	250000	165	0.7	28	11.2	80	5
St Thomas Hospital, London*	400000	220	0.6	32	8.0	14	3
Scunthorpe General Hospital	103100	182	1.8	24	23.3	0	1
Stepping Hill Hospital, Stockport	350000	376	1.1	57	16.3	5	2
Stoke Mandeville Hospital	450000	409	0.9	49	10.9	14	1
Sunderland Royal Hospital	350000	500	1.4	60	17.1	3.5	1
Tameside General Hospital	213043	315	1.5	45.5	21.4	6	3
University Hospital of North Staffordshire*	500000	525	1.1	60	12.0	10	2
University Hospital of North Tees	352000	535	1.5	47	13.4	13	4
University Hospital of Wales*	500000	500	1.0	84	16.8	45	7
University Hospital, Lewisham	250000	250	1.0	17.5	7.0	12	2
Victoria Hospital, Blackpool	143283	366	2.6	33.5	23.4	10	1
Walsgrave Hospital, Coventry*	500000	400	0.8	94	18.8	0	0
Warwick Hospital	270000	380	1.4	25	9.3	7	1
Watford General Hospital	500000	450	0.9	44	8.8	54	5
Whipps Cross Hospital, London	315000	350	1.1	40	12.7	6	1
Whittington Hospital, London	240000	110	0.5	20	8.3	8	2
York District Hospital	350000	400	1.1	10	2.9	6	2

Secondary prevention of fractures:

Fracture liaison nurses

These nurses have a special interest in finding all patients with fragility fractures and ensuring that they are assessed by the osteoporosis service and referred into the local falls service if appropriate. Thirty eight hospitals (59%) have no fracture liaison nurse. Since six of these have no elderly trauma nurse specialist or orthogeriatrician, secondary prevention is presumably left to the junior orthopaedic surgeons, who may have had little or no training in this field.

Falls clinics

Despite the National Service Framework for Older People 2001 requirement for an integrated falls service to be in place by 2005, thirteen hospitals report that they do not have a falls clinic to refer patient to.

DXA scanners

Dual energy X-ray absorptiometry is the most widely used means of measuring bone density to determine the need for osteoporosis treatment in the younger patient i.e. below the age of 75. This service is frequently provided by a hospital but could be provided by the PCT or a private provider. Axial scanners are more sensitive than peripheral ones, although the latter have the advantage of being portable. Although the National Service Framework for Older People 2001 states that all hospitals should have access to bone mineral densitometry, 36% of hospitals did not have access to on-site scanning.

The facilities audit shows a number of structural failings in the provision of services to ensure secondary prevention of fractures, which should have been addressed with the implementation of the recommendations of the National Service Framework for Older People 2001. It is no wonder that almost 40% of patients leave hospital without evidence of an assessment for antiresorptive treatment. Implementation of the fracture liaison service model, as advocated by the BOA/BGS Blue Book would provide a proven mechanism to close this healthcare delivery gap.

Hospital *hospitals providing 'tertiary' trauma services such as pelvic and limb reconstruction	Fracture Liaison Nurse	Falls Clinic	DXA Scanner
Barnet General Hospital	1	cons	none
Barnsley District General	0	nurse	peripheral
Basildon University Hospital	1	cons	axial
Bradford Royal Infirmary	0	cons	axial
Cheltenham General Hospital	0	cons	none
Countess of Chester Hospital	0	cons	none
Cumberland Infirmary	0	nurse	none
Derby Royal Infirmary	1	cons	axial
Diana, Princess of Wales Hospital, Grimsby	1	none	axial
Frenchay Hospital, Bristol*	0	cons	axial
Friarage Hospital, Northallerton	0	none	none
Good Hope General Hospital, Sutton Coldfield	0	cons	axial
Hillingdon Hospital, London	0	none	none
Hope Hospital, Salford*	0.5	cons	none
Hull Royal Infirmary	0	none	axial
Ipswich Hospital	1	cons	axial
James Cook University Hospital, Middlesbrough*	0	none	axial
John Radcliffe Hospital, Oxford*	2	cons	none
King's College Hospital, London*	1	cons	axial
Leicester Royal Infirmary*	0	cons	axial
Leighton Hospital	1	none	axial
Maelor Hospital, Wrexham	1	none	none
Maidstone General Hospital	1	cons	none
Manchester Royal Infirmary	0	cons	axial
Medway Maritime Hospital, Gillingham	0	cons	axial
Milton Keynes General Hospital	0	cons	none
Musgrove Park Hospital, Taunton	0	cons	axial
Noble's Hospital, Isle of Man	0	nurse	axial
Norfolk and Norwich Hospital*	0	cons	axial
North Middlesex Hospital	0	cons	none
Northampton General Hospital	0	none	axial
Pilgrim Hospital, Boston	0	cons	axial
Princess Royal Hospital, Telford	1	cons	none
Queen Alexandra Hospital, Portsmouth	0	cons	axial
Queen Elizabeth Hospital, Gateshead	0.6	nurse	axial

Hospital *hospitals providing 'tertiary' trauma services such as pelvic and limb reconstruction	Fracture Liaison Nurse	Falls Clinic	DXA Scanner
Queen Elizabeth Hospital, King's Lynn	0	none	none
Queen Elizabeth Hospital, Woolwich	1.6	cons	axial
Queen's Hospital, Romford	0	nurse	axial
Queen's Medical Centre, Nottingham	0.5	cons	axial
Royal Albert Edward Infirmary, Wigan	0	cons	axial
Royal Berkshire Hospital	1	cons	none
Royal Bolton Hospital	1	cons	none
Royal Shrewsbury Hospital	0	nurse	none
Royal Surrey County Hospital	0	cons	none
Royal United Hospital Bath	1	cons	peripheral
Royal Victoria Hospital, Belfast*	1	cons	none
St Mary's Hospital, Paddington	1	cons	axial
St Thomas Hospital, London*	0	cons	axial
Scunthorpe General Hospital	0	cons	axial
Stepping Hill Hospital, Stockport	0	cons	axial
Stoke Mandeville Hospital	1	cons	peripheral
Sunderland Royal Hospital	1	cons	peripheral
Tameside General Hospital	0.2	cons	none
University Hospital of North Staffordshire*	0.5	cons	axial
University Hospital of North Tees	0.5	cons	axial
University Hospital of Wales*	0	none	axial
University Hospital, Lewisham	0	cons	none
Victoria Hospital, Blackpool	0	none	peripheral
Walsgrave Hospital, Coventry*	0	none	none
Warwick Hospital	0	none	none
Watford General Hospital	0	cons	none
Whipps Cross Hospital, London	1	cons	axial
Whittington Hospital, London	0	cons	axial
York District Hospital	0	cons	none

Glossary

Term	Definitions
Arthroplasty	Any replacement of the upper femur including hemiarthroplasties, bipolar hemiarthroplasties and total hip replacements
ASA grades	American Society of Anesthesiologists' (ASA) physical status classification :- 1. A normal healthy patient 2. A patient with a mild systemic disease 3. A patient with a severe systemic disease that limits activity, but is not incapacitating 4. A patient with an incapacitating systemic disease that is a constant threat to life 5. A moribund patient not expected to survive 24 hours with or without operation This grading does not take into account acute illness, hence a patient can be ASA 1 and 'unfit'.
Best practice tariffs	These are to be introduced so that the NHS will pay for best practice rather than average cost, meaning NHS organisations will have to make constant improvements in care to reduce costs.[3]
Bone cement	Polymethyl methacrylate is a plastic that may be used to hold hip replacements in place. A mixture of powder and fluid are introduced into the bone before the replacement is put in place. The 'cement' sets in a few minutes.
Bone Protection Medication	1. Bisphosphonates **Oral** Etidronate Alendronate Risedronate Ibandronate **Combined treatment (Bisphosphonate + vitamin D)** **Intravenous** Ibandronate Zoledronate Pamidronate-Aredia and generic 2. HRT and SERMS HRT (various) Tibolone Raloxifene 3. Parathyroid hormone PTH 1-34 (Teriparatide) PTH 1-84

Term	Definitions
Bone Protection Medication	4. Strontium Strontium ranelate 5. Calcium and vitamin D 6. Calcitonin
Case mix factors	Demographic and functional information about patient. E.g. Age, sex, mobility, deprivation status , ASA and previous living circumstances (for mortality data only)
Co-morbidity	The presence of one or more disorders (or diseases) in addition to the hip fracture at the time of admission.
Early supported discharge schemes	Supported discharge and early supported discharge (ESD) schemes comprise an identified team of staff (schemes vary but the teams tend to include designated medical, nursing, physiotherapy, occupational therapy and social work personnel) whose role is to assess patients on admission, to identify those suitable for supported discharge, to facilitate early mobilisation and rehabilitation and arrange appropriate support on discharge and follow up.
Elderly trauma nurse specialist	A nurse with specialist training in the assessment and care of elderly patients with fractures.
Fracture liaison nurse / service	A nurse is based in fracture clinic whose primary purpose is liaison with orthopaedic and trauma services to ensure in and outpatients with low impact fractures after falls are screened for falls and osteoporosis
Coating (of inplants)	Hydroxyapatite (HA) is a chemical found in bone. Coating metal hip replacements with HA at the time of manufacture may produce a bond between the patient's bone and the metal of the replacement, increasing the chance of the hip functioning well.
Hemiarthroplasty /Bipolar Hemiarthroplasty	A replacement of the upper end of the femur. This can be made of a single piece of metal (monoblock), or it can be made of a separate stem and head (modular). Some have a ball and socket joint between the head and stem (bipolar). Initially designed to reduce wear in the hip joint, bipolar design makes revision to a total hip replacement easier.
Intramedullary nail	A metal rod that goes down the centre of the femur.
Multidisciplinary rehabilitation	A multidisciplinary approach incorporates staff from different medical disciplines and professions allied to medicine who are engaged in working together as equal stakeholders.
NCEPOD	The National Confidential Enquiry into Perioperative Deaths. A Department of Health funded independent organisation that makes recommendations on the safe management of surgical cases.

Term	Definitions
Normal working hours	08:00 – 19:59hrs The NCEPOD reports of 1997 and 2003 Ref define "out of hours" as any time outside 08:00 to 17:59 on weekdays, and any time on a Saturday or Sunday. The 1999 report states that "There should be sufficient, fully-staffed, daytime theatre and recovery facilities to ensure that no patient requiring an urgent operation waits for more than 24 hours once fit for surgery. This includes weekends." The NCEPOD website includes a section on 'urban myths' acknowledging that patterns of work will vary, dependent upon local arrangements, and for these reasons along with the fact that this definition is currently in use in Scotland[27], we have adopted 08:00 to 19:59 seven days a week as being 'normal working hours'
Payment by Results	Under this process, instead of being commissioned through block agreements as previously, hospitals (and other providers) are paid for the activity that they undertake. Payment will be linked to activity and adjusted for casemix.[28]
Pressure ulcer	A pressure ulcer is an area of localised damage to the skin and underlying tissue caused by pressure, shear, friction and or a combination of these.
Pressure ulcer grades	Grade 1 = skin inflammation Grade 2 = Skin blistering/superficial damage Grade 3 = Skin broken/serous discharge Grade 4 = Deep ulcer, underlying fascia, bone, muscle affected
Sliding hip screw (SHS)	A sliding hip screw is frequently used for intertrochanteric fractures. It consists of a large screw which is inserted into the head of the femur; this is assembled into the barrel at the end of a plate which is screwed onto the upper femur, allowing the two parts of the fracture to press together as they heal.
Specialist falls assessment	A systematic assessment by a suitably trained person e.g. Geriatrician or a specialist trained nurse which must cover the following domains:- Falls history (noting previous falls), cause of index fall (including medication review), risk factors for falling and injury (including fracture) and from this information formulate and document a plan of action to prevent further falls.
Total hip replacement	The prosthetic replacement of both surfaces of the hip joint

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Appendix A

Funding

Sponsorship through the Association of British Pharmaceutical Industries (ABPI) and Association of British Healthcare Industries (ABHI)

Amgen
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ARMA (Arthritis and Musculoskeletal Alliance)

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The BOA and BGS

NHFD participants: clinical and audit staff in all contributing hospitals

Quantics Consulting Ltd

We wish to acknowledge our colleagues in the NHS Institute for Innovation and Improvement. Hip fracture care has been selected as one of 2 orthopaedic key areas for the current National Rapid Improvement Programme.

Selected Secondary Care Trusts from all regions in England have been invited to participate in a 12-week intensive programme for hip fracture pathway and quality improvement. Support visits have been undertaken by the NHS Institute Management and Clinical Team. Pathways are adapted to local needs and expertise, but are integrated with the BOA / BGS Blue Book and NHFD guidelines. NHFD data collection will validate objective improvement.

It is anticipated that initial quality improvements achieved by the 12 week rapid Improvement Programme will be followed by a later delayed phase of improvement over a 2 year time-frame. This will be achieved from analysis of evidence base data from NHFD.

NHS Institute and NHFD therefore complement each other in achieving long-term sustainable quality improvement in hip fracture care.

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NHFD Stakeholders

National Osteoporosis Society

University of Derby

Royal College of Nursing

Age Anaesthesia

NHS Institute for Innovation and Improvement

Appendix B:
Data Completeness

The percentage of data completed was calculated by considering all draft and completed records for included hospitals.

Seventeen fields were considered and the points for each record were added and dividing by the total number of records for a hospital to give the percentage data completeness.

Fields used:

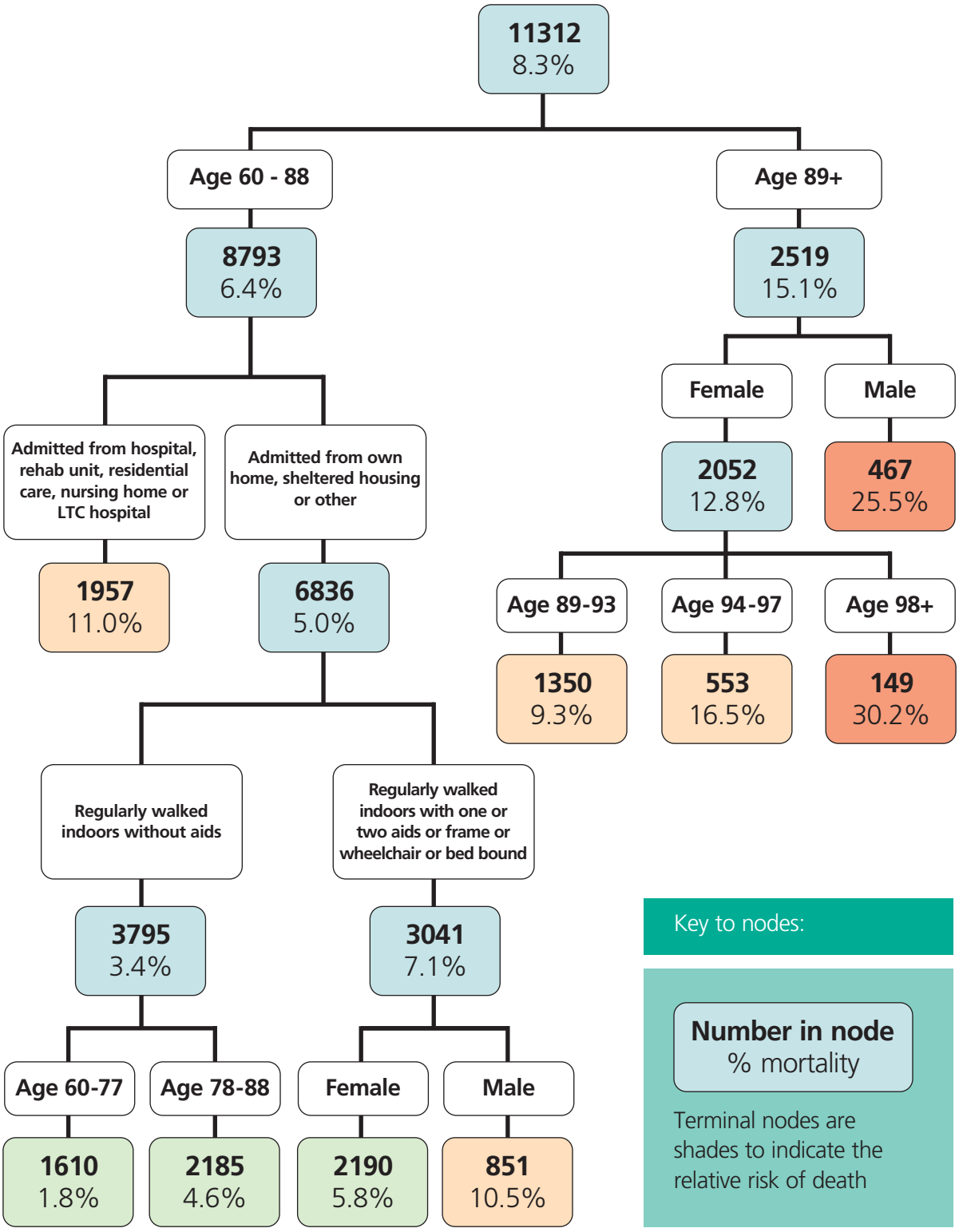
Age at Event (based on DOB); Sex; Admitted From; ASA Grade; Walking Ability Preadmission; Fracture Type; Operation Performed; Surgery; Reason 48 hours; Reason 24 Hours; Pressure Ulcers; Preoperative Medical Assessment; Antiresorptive Therapy; Discharge Ward Destination; Discharge Trust Destination; Antiresorptive Therapy at 120 days; Specialist Falls Assessment.

Appendix C:
Casemix Adjusting

The case mix factors were used to develop separate classification trees[29] for 30 day mortality and 30 day return home from home. Note that ASA Grade and Walking Ability Outdoors were both excluded from the case mix factors because they were poorly recorded. The trees categorised patients in such a way that within a category the outcome was similar, and between categories the outcome differed.

The case mix adjusted outcomes were then derived as follows. For each hospital, the expected outcome was calculated. For mortality at 30 days this was the expected number of deaths – calculated by multiplying the number of patients in each category by the national mortality rate for the category and summing across all the categories. The adjusted outcome for the hospital was then calculated by multiplying the national rate by the ratio of observed to expected outcome for the hospital. This method is known as indirect standardization.

Classification tree for mortality at 30 days



Key to nodes:

Number in node
% mortality

Terminal nodes are shades to indicate the relative risk of death

Notes

British Orthopaedic Association

The **National Hip Fracture** Database Preliminary National Report 2009

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