



## **Hip fracture: Evidence Update March 2013**

A summary of selected new evidence relevant to NICE clinical guideline 124 'The management of hip fracture in adults' (2011)



Evidence Update 34

Evidence Updates provide a summary of selected new evidence published since the literature search was last conducted for the accredited guidance they relate to. They reduce the need for individuals, managers and commissioners to search for new evidence. Evidence Updates highlight key points from the new evidence and provide a commentary describing its strengths and weaknesses. They also indicate whether the new evidence may have a potential impact on current guidance. For contextual information, this Evidence Update should be read in conjunction with the relevant clinical guideline, available from the NHS Evidence topic page for [hip fracture](#).

**Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.**

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### **National Institute for Health and Clinical Excellence**

Level 1A  
City Tower  
Piccadilly Plaza  
Manchester M1 4BT  
[www.nice.org.uk](http://www.nice.org.uk)

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# Introduction

This Evidence Update identifies new evidence that is relevant to, and may have a potential impact on, the following reference guidance:

<sup>1</sup>  [Hip fracture](#). NICE clinical guideline 124 (2011).

A search was conducted for new evidence from 1 September 2010 to 8 October 2012. A total of 3554 pieces of evidence were initially identified. Following removal of duplicates and a series of automated and manual sifts, 10 items were selected for the Evidence Update (see Appendix A for details of the evidence search and selection process). An [Evidence Update Advisory Group](#), comprising topic experts, reviewed the prioritised evidence and provided a commentary.

Although the process of updating NICE guidance is distinct from the process of an Evidence Update, the relevant NICE guidance development centres have been made aware of the new evidence, which will be considered when guidance is reviewed.

## Quality standards

- [Hip fracture](#). NICE quality standard 16.

## Feedback

If you have any comments you would like to make on this Evidence Update, please email [contactus@evidence.nhs.uk](mailto:contactus@evidence.nhs.uk)

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<sup>1</sup> NICE-accredited guidance is denoted by the Accreditation Mark 

## Key points

The following table summarises what the Evidence Update Advisory Group (EUAG) decided were the key points for this Evidence Update. It also indicates the EUAG's opinion on whether the new evidence may have a potential impact on the current guidance listed in the introduction. For further details of the evidence behind these key points, please see the full commentaries.

The section headings used in the table below are taken from the guidance.

**Evidence Updates do not replace current accredited guidance and do not provide formal practice recommendations.**

Key point	Potential impact on guidance	
	Yes	No
<b>Imaging options in occult hip fracture</b> <ul style="list-style-type: none"> <li>Magnetic resonance imaging appears to be more effective than other imaging modalities in diagnosing occult hip fracture.</li> </ul>		✓
<b>Timing of surgery</b> <ul style="list-style-type: none"> <li>Early surgery following hip fracture seems to be associated with a lower overall mortality risk than delayed surgery.</li> </ul>		✓
<b>Analgesia</b> <ul style="list-style-type: none"> <li>Nerve blockade may reduce acute pain and delirium after hip fracture versus standard treatment.</li> </ul>		✓
<b>Surgical procedures</b> <ul style="list-style-type: none"> <li>Hemiarthroplasty appears to be a cost-effective treatment for patients with displaced intracapsular fractures.</li> <li>Total hip replacement may be associated with improved clinical and quality of life outcomes versus hemiarthroplasty following displaced intracapsular fracture.</li> <li>Functional outcomes and pain appear to be equivalent with cemented and uncemented hemiarthroplasty, but risk of death may be lower with cemented implants.</li> <li>Outcomes appear to be similar following treatment of trochanteric fracture with a sliding hip screw or intramedullary nail.</li> </ul>		✓ ✓ ✓ ✓
<b>Mobilisation strategies</b> <ul style="list-style-type: none"> <li>There is insufficient evidence to establish the best strategies for mobilisation after hip fracture.</li> </ul>		✓

# 1 Commentary on new evidence

These commentaries analyse the key references identified specifically for the Evidence Update. The commentaries focus on the 'key references' (those identified through the search process and prioritised by the EUAG for inclusion in the Evidence Update), which are identified in bold text. Supporting references provide context or additional information to the commentary. Section headings are taken from the guidance.

## 1.1 Imaging options in occult hip fracture

### **Magnetic resonance imaging (MRI) versus computed tomography (CT)**

[NICE clinical guideline \(CG\) 124](#) recommends that MRI should be offered if hip fracture is suspected despite negative anteroposterior pelvis and lateral hip X-rays. If MRI is not available within 24 hours or is contraindicated, CT should be considered.

A systematic review by [Chatha et al. \(2011\)](#) compared MRI and CT in diagnosing occult proximal femoral fractures. Studies were included of patients with negative or uncertain plain radiographs, with a high clinical suspicion of fracture, which led to further investigation with MRI, CT, both, or MRI and radionuclide bone scan. Both prospective and retrospective case series were included, but single case reports and studies involving radionuclide bone scans without MRI were excluded. A total of 15 prospective and 7 retrospective studies were included.

Among the 996 patients (mean age=75 years) with suspected occult proximal femur fractures who underwent MRI for further assessment, proximal femoral fracture was positively detected in 350 (35%) patients, of whom 295 (84%) underwent further treatment/surgical intervention. MRI was also able to detect other injuries as the cause of hip signs and symptoms, such as pubic rami fracture, isolated greater trochanteric fracture, acetabular fracture, pelvic ring fracture, sacral fracture, synovitis, and a large haematoma. In a single study directly comparing MRI with CT, MRI enabled definitive early diagnosis of proximal femoral fracture in patients with painful hips, whereas CT was less reliable (no statistical data presented, and the authors noted a small sample size and selection bias in this study). In another study comparing MRI with radionuclide bone scans, MRI was found to have greater sensitivity (100% versus 91%) and accuracy (100% versus 95%). The review was limited by the absence of detailed quality assessment for the included studies.

Data from the review suggest that MRI is more effective in diagnosing occult hip fracture versus other modalities, and can detect soft tissue injury and other conditions that may mimic hip fracture. This evidence is consistent with the recommendation in [NICE CG124](#) to offer MRI within 24 hours unless contraindicated. MRI should be the first choice imaging modality and therefore ideally be available at all times. However, definitive results about the clinical and cost effectiveness of MRI versus CT are still awaited in line with the [NICE research recommendation](#).

#### **Key reference**

Chatha HA, Ullah S, Cheema ZZ (2011) [Review article: Magnetic resonance imaging and computed tomography in the diagnosis of occult proximal femur fractures](#). *Journal of Orthopaedic Surgery* 19: 99–103

## 1.2 [Timing of surgery](#)

### **Mortality following delayed surgery**

[NICE CG124](#) recommends that surgery should be performed on the day of, or the day after, admission.

A systematic review and meta-analysis by [Moja et al. \(2012\)](#) examined the association between mortality and delayed surgery in hip fracture among elderly patients. Randomised, quasi-randomised, prospective or retrospective cohort or case-controlled studies of patients aged 65 years or older, with adequately reported timing of hip surgery and survival status, were included. Evidence from controlled observational studies was included because randomisation to delayed surgery was unlikely for ethical reasons. A total of 35 studies were identified (20 retrospective, 14 prospective, 1 randomised controlled trial [RCT]; n=191,873) of which 8 studies (n=33,435) were assessed as high quality on the Newcastle-Ottawa Scale. Data were taken from clinical records in 24 studies and from administrative databases in 10 studies (1 study's source was unclear). Early surgery was defined by most studies as within 24 or 48 hours (although 2 studies defined it as within 12 hours, and 3 studies as within 96 or 120 hours). The mean age of participants was 80 years (range 76–83 years), and in the 32 studies reporting gender the mean proportion of women was 74%.

A total of 34,448 deaths were observed across the studies. From a meta-analysis of the primary outcome of overall mortality, early surgery appeared to be associated with a lower mortality risk than delayed surgery (odds ratio [OR]=0.74, 95% confidence interval [CI] 0.67 to 0.81, p<0.0001; 34 studies, n not stated), although there was substantial heterogeneity between studies ( $I^2=84.7%$ ). A meta-analysis involving only the prospective studies gave similar results (OR=0.69, 95% CI 0.57 to 0.83; 15 studies, n not stated), and further analysis did not indicate any effect of potential confounders (such as age, sex, data source, baseline risk, early surgery definition, study location, quality and year). A funnel plot did not suggest any publication bias.

The authors stated that confounders such as comorbidity or cognitive impairment were frequently not controlled for in the included studies and that this, combined with the observational nature of the evidence and its considerable heterogeneity, limited firm conclusions. They also noted that larger studies involving data from administrative databases may have had more weight in the meta-analysis than smaller studies based on potentially more robust data from patient records. It was also noted that healthier patients may have been more likely to receive surgery earlier, and that some patients were excluded on the basis of medical conditions, which may have introduced bias.

The review's conclusions that early surgery appears to be associated with a lower overall mortality risk are consistent with the current recommendation in [NICE CG124](#) to operate on the day of, or day after, admission.

#### **Key reference**

Moja L, Piatti A, Pecoraro V et al. (2012) [Timing matters in hip fracture surgery: patients operated within 48 hours have better outcomes. A meta-analysis and meta-regression of over 190,000 patients.](#) PLoS One 7: e46175

## 1.3 [Analgesia](#)

### **Pain management interventions**

[NICE CG124](#) recommends that adding nerve blocks should be considered if paracetamol and opioids do not provide sufficient preoperative pain relief, or to limit opioid dosage. Nerve blocks should be administered by trained personnel and should not be used as a substitute for early surgery.

A systematic review by [Abou-Setta et al. \(2011\)](#) examined pharmacological and non-pharmacological interventions for pain management after hip fracture. Studies were included of adults aged at least 50 years hospitalised with acute hip fracture after low-energy trauma, involving any type of pain management used at any time during the care pathway. A total of 83 studies were identified comprising 64 RCTs, 14 cohort studies and 5 non-RCTs (number of participants ranged from 14 to 1333), of which 55 studies were set in Europe. The interventions assessed by the included studies were nerve blockade (32 studies), spinal anaesthesia (30), traction (11), systemic analgesia (3), complementary and alternative medicine (2), multimodal pain management (2), neurostimulation (2), and rehabilitation (1). Most studies were in the acute care setting. The mean age of participants ranged from 59 to 86 years, and 74% were women.

Nerve blockade was evaluated by 29 RCTs and 3 cohort studies, but heterogeneity prevented a pooled analysis of all blockade types. Individual meta-analyses for specific blockades showed a significant effect on acute pain versus standard treatment (no blockade) for: epidural analgesia (standardised mean difference [SMD]=−0.83, 95% CI −1.17 to −0.49,  $p<0.001$ ; 2 RCTs,  $n=145$ ); femoral nerve blockade (SMD=−1.01, 95% CI −1.46 to −0.57,  $p<0.001$ ; 3 RCTs,  $n=109$ ); psoas compartment nerve blockade (SMD=−1.05, 95% CI −1.72 to −0.39,  $p=0.002$ ; 1 RCT,  $n=40$ ); and combined nerve blockades (SMD=−2.68, 95% CI −3.22 to −2.14,  $p<0.001$ ; 2 RCTs,  $n=135$ ). The largest meta-analysis involving fascia iliaca nerve blockade produced a result on the borderline of statistical significance (SMD=−1.38, 95% CI −2.75 to −0.004,  $p=0.05$ ; 3 RCTs,  $n=421$ ). No significant effect was seen with 3-in-1 nerve blockade. The authors additionally stated that delirium was also significantly decreased with nerve blockades versus no blockade (statistical data not reported).

Of the remaining pain management interventions evaluated, limited evidence was found that preoperative traction did not reduce acute pain, and insufficient evidence was found for the benefits and harms of most other therapies for managing acute pain (including spinal anaesthesia, systemic analgesia, multimodal pain management, acupuncture, relaxation therapy, transcutaneous electrical neurostimulation, and physical therapy regimens).

The authors noted several limitations of the evidence. The exclusion of participants with cognitive impairment or delirium in 31 of the studies may limit external validity of the data, and the lack of standardised outcomes, and outcomes to evaluate mobility, may limit the interpretation of results. There was also a lack of evidence examining pain management after hospital discharge or long-term effects of pain management. Finally, all RCTs in the nerve blockade meta-analyses were deemed by the authors to be at medium or high risk of bias.

The evidence suggests that nerve blockade may reduce acute pain and delirium after hip fracture versus standard treatment, which is consistent with their recommended use in [NICE CG124](#) as additional preoperative pain relief.

A position statement on fascia iliaca nerve blocks from [the Association of Anaesthetists of Great Britain and Ireland \(2013\)](#) recently indicated that non-medically qualified health professionals with appropriate training and following agreed clinical governance procedures may perform these blocks, subject to close monitoring, regular audit and review.

### Key reference

Abou-Setta AM, Beaupre LA, Rashiq S et al. (2011) [Comparative effectiveness of pain management interventions for hip fracture: a systematic review](#). *Annals of Internal Medicine* 155: 234–45

### Supporting reference

The Association of Anaesthetists of Great Britain and Ireland (2013) [Fascia iliaca blocks and non-physician practitioners](#)

## 1.4 [Anaesthesia](#)

No new key evidence was found for this section.

## 1.5 [Planning the theatre team](#)

No new key evidence was found for this section.

## 1.6 [Surgical procedures](#)

### **Hemiarthroplasty versus internal fixation for displaced intracapsular fracture**

[NICE CG124](#) recommends that replacement arthroplasty (hemiarthroplasty or total hip replacement) should be performed in patients with a displaced intracapsular fracture.

[Waalder Bjørnelv et al. \(2012\)](#) performed a cost-utility analysis of hemiarthroplasty versus internal fixation in treating displaced intracapsular femoral neck fractures in 166 previously ambulant patients aged 60 or over (mean age=82 years, 75% women). The analysis was based on the results of an RCT by [Frihagen et al. \(2007\)](#). Patients were excluded from the trial if they were unfit for arthroplasty, had previous symptomatic hip pathology, or had a delay of more than 96 hours from injury to treatment. Participants were randomised to Charnley-Hastings bipolar cemented hemiarthroplasty, or closed reduction and internal fixation with 2 parallel cannulated screws. The interventions were routinely performed in the department before the study, and no specific changes to practice were made for the study. Patients were followed up at 4, 12, and 24 months. Any patients from the original RCT with cognitive failure or who had died were excluded from the cost analysis because quality-adjusted life years (QALY) could not be calculated.

Patients' health-related quality of life (HRQoL) was assessed via the EQ-5D questionnaire (a measure of health state on 5 dimensions, each with 3 levels of severity, and which is recommended by NICE for measuring HRQoL). Any missing EQ-5D data were replaced using regression analysis or imputation, and this was then used in conjunction with time to calculate QALYs (1 year in perfect health equals 1 QALY). HRQoL was assumed to be 0.78 in both intervention groups at recruitment (taken from a Swedish population with a similar demographic to the RCT). Cost data were calculated prospectively at the individual level for direct hospital costs, total hospital costs (direct and indirect hospital costs), and total costs (direct and indirect hospital costs and societal costs).

Over the 2-year follow-up period, for patients with a complete set of EQ-5D data, a mean of 1.11 QALYs were gained by those treated with internal fixation versus a mean of 1.31 QALYs gained following hemiarthroplasty (incremental effect of hemiarthroplasty=0.20 QALYs). Over the same time period, in patients where imputation of EQ-5D was used, gains of 1.02 and 1.17 QALYs were seen for internal fixation and hemiarthroplasty respectively (a significant incremental effect of hemiarthroplasty of 0.15 QALYs,  $p=0.02$ ). Costs associated with internal fixation were higher than with hemiarthroplasty; the incremental costs of fixation for direct hospital costs, total hospital costs, and total costs were €2,731 ( $p=0.81$ ), €2,474 ( $p=0.80$ ), and €14,160 ( $p=0.07$ ), respectively.

It should be noted that the implants used in the study (bipolar device or 2-screw fixation) differed from those commonly found in UK practice (monobloc implant or 3-screw fixation). The authors also noted some limitations of the study, for example HRQoL may have differed between the 2 groups at recruitment, and the estimate used for baseline HRQoL may not have reflected the actual value. They also noted that costs were based on those of university hospitals which may be higher than smaller hospitals (although a sensitivity analysis involving halving or doubling costs did not affect overall conclusions). It was further noted that help from family and friends was not factored into the analysis but may have affected costs, as may the inclusion of follow-up times in the study additional to those more likely to be used in practice. Finally it was highlighted that follow-up was only for 2 years, which may not have been long enough to observe all differences between the interventions.

The results indicate that more QALYs were gained with hemiarthroplasty, which was also less costly than internal fixation, and therefore hemiarthroplasty appears to be cost effective for patients with displaced intracapsular fractures. The evidence is consistent with the recommendation in [NICE CG124](#) to perform hemiarthroplasty in these patients. It should be noted that the guidance also allows for total hip replacement alongside hemiarthroplasty.

#### Key reference

Waalder Bjørnelv GM, Frihagen F, Madsen JE et al. (2012) [Hemiarthroplasty compared to internal fixation with percutaneous cannulated screws as treatment of displaced femoral neck fractures in the elderly: cost-utility analysis performed alongside a randomized, controlled trial](#). *Osteoporosis International* 23: 1711–9

#### Supporting reference

Frihagen F, Nordsletten L, Madsen JE (2007) [Hemiarthroplasty or internal fixation for intracapsular displaced femoral neck fractures: randomised controlled trial](#). *BMJ* 335: 1251–4

### **Bipolar hemiarthroplasty versus total hip replacement for displaced intracapsular fracture**

[NICE CG124](#) recommends that total hip replacements should be offered to patients with a displaced intracapsular fracture who: were able to walk independently out of doors with no more than the use of a stick; and are not cognitively impaired; and are medically fit for anaesthesia and the procedure.

[Hedbeck et al. \(2011\)](#) performed a 4-year follow-up of an RCT by [Blomfeldt et al. \(2007\)](#) comparing bipolar hemiarthroplasty or total hip replacement in 120 patients (mean age=81 years, 84% women; 83 patients still available at 4 years) with an acute displaced intracapsular fracture of the femoral neck. Patients without severe cognitive dysfunction, living independently, and able to walk with or without aids were included, but those with pathological fractures and displaced fractures for at least 48 hours before presenting, or with rheumatoid arthritis or osteoarthritis, were excluded. All patients were randomised to a modular Exeter femoral component with a 28 mm head, and either hemiarthroplasty with a bipolar head, or total hip replacement with an Ogee acetabular component. The same cementing technique was used in all cases. A group of 9 orthopaedic surgeons, experienced in both procedures, carried out all operations. Hip function was assessed by an unbiased research nurse (not blinded to treatment groups) using the Harris hip score, comprising 4 dimensions: pain (0–44 points), function (0–47 points), absence of deformity (0–4 points), and range of motion (0–5 points); maximum score=100, higher score equals better function.

For the primary outcome of hip function at 4 years, total Harris hip score was greater following total hip replacement than hemiarthroplasty (89.0 versus 75.2,  $p<0.001$ ), which was stated to be a clinically relevant difference by the authors. A significantly greater HRQoL (assessed by EQ-5D score) was also seen at 4 years in the total hip replacement group compared with those who received hemiarthroplasty (0.68 versus 0.57,  $p<0.05$ ).

The authors noted that the evidence was potentially limited by the absence of blinding in the research nurse assessing clinical outcomes, however they reiterated that the nurse was unbiased.

The data suggest improved clinical and quality of life outcomes with total hip replacement versus hemiarthroplasty following displaced intracapsular fracture, consistent with the recommendation in [NICE CG124](#) to offer total hip replacements to appropriate patients.

#### Key reference

Hedbeck CJ, Enocson A, Lapidus G et al. (2011) [Comparison of bipolar hemiarthroplasty with total hip arthroplasty for displaced femoral neck fractures: a concise four-year follow-up of a randomized trial](#). *The Journal of Bone and Joint Surgery (American volume)* 93: 445–50

#### Supporting reference

Blomfeldt R, Törnkvist H, Eriksson K (2007) [A randomised controlled trial comparing bipolar hemiarthroplasty with total hip replacement for displaced intracapsular fractures of the femoral neck in elderly patients](#). *The Journal of Bone and Joint Surgery (British volume)* 89: 160–5

### Cemented implants for arthroplasty

[NICE CG124](#) recommends the use of cemented implants in patients undergoing surgery with arthroplasty. Three studies recently compared the use of uncemented and cemented components in treating fractures.

An assessor-blinded RCT by [DeAngelis et al. \(2012\)](#) compared uncemented and cemented hemiarthroplasty implants in 130 patients (mean age=82 years, 77% women) with a nonpathological displaced subcapital femoral neck fracture, and who were able to walk at least 10 feet before presentation. Patients with multiple extremity trauma, acute myocardial infarction within the 30 days before enrolment, symptoms linked to anaemia or metabolic bone disease, or who had previously taken part in the trial, were excluded. All patients were randomised to hemiarthroplasty with a unipolar head and either an uncemented component (VerSys Beaded FullCoat; standard or large metaphyseal sizing, standard or extended offset, and adjustable neck length), or a cemented component (VerSys LD/Fx; adjustable size and neck length). All surgeons were asked to use the same surgical approach for each procedure but use of a preferred approach was permitted. Between the groups there was no significant difference for any operative characteristics such as mean operating time ( $p=0.405$ ) or intraoperative blood loss ( $p=0.452$ ). Functional outcomes were measured for Instrumental Activities of Daily Living (IADL) and Physical Activities of Daily Living (PADL) using a modified version of the Older Americans Resources and Services Instrument (to assess ability to perform daily tasks in the previous 2 weeks, such as shopping or house cleaning).

For the primary endpoint of functional outcome at 1 year, there was no significant difference between mean scores in the uncemented and cemented groups for either IADL (3.4 versus 3.2 respectively,  $p=0.384$ ) or PADL (5.7 versus 4.4 respectively,  $p=0.168$ ). There was also no difference between the uncemented and cemented groups for any acute postoperative complications (18.8% versus 16.7% respectively,  $p=0.756$ ) or mortality at 1 year (20.0% versus 23.1% respectively,  $p=0.811$ ).

Limitations of the study noted by the authors were that multiple surgeons carried out the procedures, which may have confounded results through differences in practice. Additionally, the authors noted that although no cardiopulmonary collapse was observed with the use of cement, the trial was not powered to detect differences of this nature.

A second assessor-blinded RCT by [Taylor et al. \(2012\)](#) compared uncemented and cemented hemiarthroplasty implants in 160 patients (mean age=85 years, 69% women) with an acute displaced femoral neck fracture. Patients who had previously fractured the same hip or had a pathological fracture were excluded, as were patients whose risk of mortality if they were to receive a cemented component was deemed too high (based on age, history of

cardiovascular and respiratory disease, and previous bone cement implantation syndrome). Participants were randomised to either an uncemented component (Alloclassic stem) or a cemented component (modular Exeter stem) and efforts were made to standardise operative procedures between patients. Mean operating time was 4.5 minutes shorter in the uncemented group (p value not stated), but there was no significant difference between groups for intraoperative blood loss, length of hospital stay, Charlson Comorbidity Index or American Society of Anesthesiologists grade (p values not stated). Patients were followed up at 6 weeks and then at 6, 12 and 24 months after surgery by a research nurse blinded to treatment groups.

For the primary outcome of pain assessed by a visual analogue scale, there was no significant difference between groups at any follow-up (p values not stated). There was also no significant difference in mortality at 2 years (32 deaths in the uncemented group, 35 in the cemented group, p value not stated). There were however more complications in the uncemented versus cemented group (63 versus 28 respectively), driven by a greater incidence of subsidence (18 versus 1,  $p < 0.001$ ), intraoperative fractures (6 versus 0,  $p = 0.028$ ), and postoperative fractures (12 versus 1,  $p = 0.0023$ ). Cardiovascular complications, and respiratory, wound, and urinary tract infections did not differ significantly between groups ( $p = 1$ ). The mean Oxford hip score (used to assess clinical hip function; low score better) was significantly poorer in the uncemented than the cemented group at 6 weeks (38.8 versus 35.7 respectively,  $p < 0.05$ ), but not at other time points.

The authors noted some limitations of the study, such as the exclusion of 46 patients with cardiovascular comorbidities because of potential risks if they received cemented implants, which may limit external validity of results. Additionally, although no significant differences were seen in cardiovascular or respiratory complications between groups, the trial was not powered to evaluate these fully. The authors also discussed the high level of withdrawals and deaths, with only 48 of the original 160 participants followed up at 2 years; however a secondary analysis did not find a difference in outcomes between these patients and the whole cohort.

In a third study, a cross-sectional analysis by [Costa et al. \(2011\)](#), in response to a report from the [National Patient Safety Agency \(2009\)](#) discussing concerns with mortality in patients undergoing cemented hip arthroplasty for fractures of the proximal femur, examined differences between uncemented and cemented hip arthroplasty using data from the UK National Hip Fracture Database (a national registry launched in 2007, with over 90% of hospitals in the UK now submitting data to it). Data were gathered between April 2009 and March 2010 in 16,496 patients (median age=84 years, 74% women) from 129 hospitals, treated with hemiarthroplasty or total hip replacement for fractures of the femoral neck. Difference in death at discharge between patients receiving uncemented and cemented arthroplasty was calculated via a mixed effects logistic regression model, adjusted for variables including age, gender, type of arthroplasty, heterogeneity between hospitals, American Society of Anesthesiologists grade, and whether the patient was accompanied when walking outdoors.

Following uncemented arthroplasty, 504 (8.36%) patients were dead at discharge versus 602 (5.75%) after cemented arthroplasty ( $p < 0.001$ ). From the mixed effects model, there was a lower risk of death among the cemented versus the uncemented group (OR=0.83, 95% CI 0.72 to 0.96).

The primary limitation of the findings noted by the authors were that they were based on observational data obtained from a large national registry, leading to potential biases caused by, for example, lack of randomisation to treatment, selective reporting by institutions, missing data, and inability to analyse unreported variables that may have included potentially important confounders. However, it should be noted these data provide information about all

patients, particularly those with comorbidities (who may often be excluded from RCTs). Additional limitations discussed were the use of death at discharge as the mortality outcome, which is not specific to death during surgery (when cement-related deaths often occur); however the authors felt that this provided more complete data as it would also include any post-operative deaths related to cementing. Finally, long-term effects of cement were not examined and the conclusions relate only to peri-operative mortality.

Results from the 3 studies indicate that functional outcomes and pain appear to be equivalent with cemented and uncemented hemiarthroplasty, and that risk of death may be lower with cemented implants. The evidence is consistent with the recommendation in [NICE CG124](#) to use cemented implants, and provides useful data about the safety and efficacy of cementing in modern prosthetic components relevant to current practice.

#### Key references

Costa ML, Griffin XL, Pendleton N et al. (2011) [Does cementing the femoral component increase the risk of peri-operative mortality for patients having replacement surgery for a fracture of the neck of femur? Data from the National Hip Fracture Database](#). *The Journal of Bone and Joint Surgery (British volume)* 93: 1405–10

DeAngelis JP, Ademi A, Staff I et al. (2012) [Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: a prospective randomized trial with early follow-up](#). *Journal of Orthopaedic Trauma* 26: 135–40

Taylor F, Wright M, Zhu M (2012) [Hemiarthroplasty of the hip with and without cement: a randomized clinical trial](#). *The Journal of Bone and Joint Surgery (American volume)* 94: 577–83

#### Supporting reference

National Patient Safety Agency (2009) [Mitigating surgical risk in patients undergoing hip arthroplasty for fractures of the proximal femur](#) [online; accessed 15 January 2013]

### Sliding hip screw versus intramedullary nail for trochanteric fracture

[NICE CG124](#) recommends the use of extramedullary implants such as a sliding hip screw in preference to an intramedullary nail in patients with trochanteric fractures above and including the lesser trochanter.

An assessor-blinded RCT by [Parker et al. \(2012\)](#) compared sliding hip screw with Targon PF intramedullary nail in the treatment of 600 cases of trochanteric hip fracture among 598 patients (mean age=82 years, 80% women). Patients admitted for surgical treatment of any trochanteric fracture were included, but were excluded if they had subtrochanteric fracture, pathological fractures, previously treated fractures, conservatively treated fractures, or significant arthritis needing total hip replacement. Patients were randomised to treatment with a sliding hip screw or intramedullary nail and all operations were either performed or supervised by a single orthopaedic surgeon. Mean operating time was 3 minutes longer in those treated by a nail ( $p<0.001$ ), and there were also more operative difficulties than for treatment with a screw (for example, problems with proximal screw insertion [ $p=0.002$ ] and distal locking in [ $p<0.0001$ ]). There was however no difference in the need for post-operative blood transfusion between groups ( $p=1$ ). Patients were reviewed 6 weeks after discharge, and followed up at 3, 6 and 12 months after injury by a research nurse blinded to treatment.

There were no significant differences between groups for total hospital stay ( $p=0.3$ ), wound healing complications ( $p=1$ ), other fracture-related complications ( $p$  values ranging from 0.12 to 1), loss of hip flexion ( $p=0.31$ ) or shortening ( $p=1$ ) at 6 weeks. There were also no significant differences between groups at 1 year for mortality (indicated by Kaplan-Meier curve) or pain ( $p=0.26$ ). There was however a significantly greater recovery of mobility at 1 year with intramedullary nail versus sliding hip screw (difference in mobility score of approximately 0.5 on a scale from 0 to 9,  $p=0.01$ ). The use of a single surgeon was likely to ensure greater consistency of technique across all procedures.

The evidence indicates that outcomes appear to be similar following treatment of trochanteric fracture with a sliding hip screw or intramedullary nail. These data do not contradict the recommendation in [NICE CG124](#) to use a screw (which is a cheaper option than a nail), and with no economic data presented in the article the evidence is unlikely to impact current guidance.

#### **Key reference**

Parker MJ, Bowers TR, Pryor GA (2012) [Sliding hip screw versus the Targon PF nail in the treatment of trochanteric fractures of the hip: a randomised trial of 600 fractures](#). *The Journal of Bone and Joint Surgery (British volume)* 94: 391–7

## **1.7 [Mobilisation strategies](#)**

### **Improving mobility after hip fracture**

[NICE CG124](#) recommends that patients should be offered a physiotherapy assessment and, unless medically or surgically contraindicated, mobilisation on the day after surgery. Patients should be offered mobilisation at least once a day, and regular physiotherapy review should be ensured.

A Cochrane review by [Handoll et al. \(2011\)](#) evaluated different interventions for improving mobility after hip fracture surgery. Randomised and quasi-randomised trials among skeletally mature patients treated for a hip fracture at any stage during rehabilitation, that compared different post-operative mobilisation strategies or programmes after surgery to repair an acute hip fracture, were included. Trials were excluded where interventions began after the generally accepted recovery time of around 1 year. Included interventions comprised post-operative rehabilitation performed at various stages aiming to improve walking and minimise functional impairments, whereas interventions not specifically aiming to improve mobility were excluded. A total of 19 studies were identified (18 RCTs, 1 quasi-randomised trial; n=1589), of which 12 studies examined interventions started in the early post-operative period (some continuing after hospital discharge) and 7 involved community interventions following inpatient rehabilitation. The mean age of patients ranged from 71 to 84 years across the trials, and the proportion of women ranged from 67% to 100%.

Heterogeneity among the studies prevented meta-analysis and most results were from single trials. For interventions started soon after surgery, improved mobility was seen with a 2-week weight-bearing programme, a quadriceps muscle strengthening exercise programme, and electrical stimulation aimed at alleviating pain. No significant improvement in mobility, or inconsistent results, were seen with a treadmill gait retraining programme, 12 weeks of resistance training, 16 weeks of weight-bearing exercise, ambulation within 48 hours of surgery, weight bearing at 2 versus 12 weeks, intensive physiotherapy, and electrical stimulation of the quadriceps. For interventions after hospital discharge, improved mobility was seen with 12 weeks of intensive physical training, a home-based physical therapy programme, 6 months of intensive physical training, a 1-year exercise programme, and home-based exercises started 22 weeks after injury. No significant effects were seen with home-based resistance or aerobic training, or home-based weight-bearing exercises starting at 7 months.

The authors noted some issues with the included trials such as heterogeneity (particularly for interventions and settings), and incomplete descriptions of inclusion criteria, interventions or outcomes. Length of follow-up was also deemed suboptimal in 16 trials (particularly those following up to either hospital discharge, or only until the end of the intervention). It was also noted that acceptability and tolerance of interventions varied between some studies, for example it may have been that fitter patients were more tolerant of electrical stimulation.

Given the limitations of the evidence, and that conclusions about interventions were largely based on single trials, the authors stated there was insufficient evidence to establish the best strategies for mobilisation after hip fracture. However, the results from the trials generally indicate that it is possible to enhance mobility after hip fracture, though the optimal method to achieve this remains unclear. This is consistent with the recommendations in [NICE CG124](#) on mobilisation and multidisciplinary management. The uncertainties about optimal strategies highlighted in this review are consistent with the need for further study as set out in the [NICE research recommendation](#), which encourages assessment of some of the interventions included in the review.

**Key reference**

Handoll HHG, Sherrington C, Mak JCS (2011) [Interventions for improving mobility after hip fracture surgery in adults](#). Cochrane Database of Systematic Reviews issue 3: CD001704

## 1.8 [Multidisciplinary management](#)

No new key evidence was found for this section.

## 1.9 [Patient and carer information](#)

No new key evidence was found for this section.

## 2 New evidence uncertainties

During the development of the Evidence Update, the following evidence uncertainties were identified for the NHS Evidence UK Database of Uncertainties about the Effects of Treatments (UK DUETs).

### **Mobilisation strategies**

- [Interventions for improving mobility after hip fracture surgery in adults](#)

Further evidence uncertainties for hip fracture can be found in the [UK DUETs database](#) and in the [NICE research recommendations database](#).

UK DUETs was established to publish uncertainties about the effects of treatments that cannot currently be answered by referring to reliable up-to-date systematic reviews of existing research evidence.

# Appendix A: Methodology

## Scope

The scope of this Evidence Update is taken from the scope of the reference guidance:

- [Hip fracture](#). NICE clinical guideline 124 (2011).

## Searches

The literature was searched to identify studies and reviews relevant to the scope. Searches were conducted of the following databases, covering the dates 1 September 2010 (the end of the search period of NICE clinical guideline 124) to 8 October 2012:

- CDSR (Cochrane Database of Systematic Reviews)
- CENTRAL (Cochrane Central Register of Controlled Trials)
- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- DARE (Database of Abstracts of Reviews of Effects)
- EMBASE (Excerpta Medica database)
- HTA (Health Technology Assessment) database
- MEDLINE (Medical Literature Analysis and Retrieval System Online)
- NHS EED (Economic Evaluation Database)
- PreMEDLINE
- PsycINFO

Table 1 provides details of the MEDLINE search strategy used, which was adapted to search the other databases listed above. The search strategy was used in conjunction with validated Scottish Intercollegiate Guidelines Network [search filters for RCTs, systematic reviews and observational studies](#).

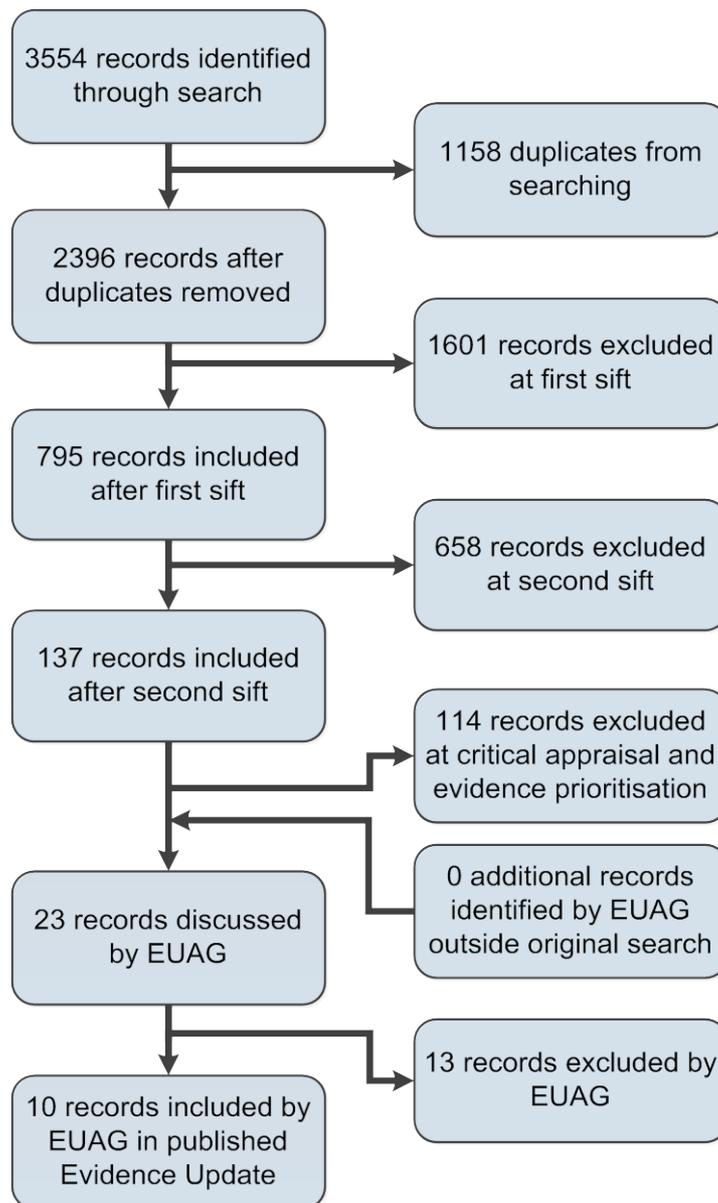
Figure 1 provides details of the evidence selection process. The long list of evidence excluded after review by the Chair of the EUAG, and the full search strategies, are available on request from [contactus@evidence.nhs.uk](mailto:contactus@evidence.nhs.uk)

There is more information about [how NICE Evidence Updates are developed](#) on the NHS Evidence website.

**Table 1 MEDLINE search strategy (adapted for individual databases)**

<b>1</b>	exp Hip Fractures/		intracapsular\$ or extracapsular\$) adj4 fracture\$).ti,ab.
<b>2</b>	((femur\$ or femoral\$) adj3 (head or neck or proximal) adj4 fracture\$).ti,ab.	<b>4</b>	1 or 2 or 3
<b>3</b>	((hip\$ or femur\$ or femoral\$ or trochant\$ or pertrochant\$ or intertrochant\$ or subtrochant\$ or		

**Figure 1 Flow chart of the evidence selection process**



EUAG – Evidence Update Advisory Group

# Appendix B: The Evidence Update Advisory Group and Evidence Update project team

## Evidence Update Advisory Group

The Evidence Update Advisory Group is a group of topic experts who review the prioritised evidence obtained from the literature search and provide the commentary for the Evidence Update.

### **Professor Cameron Swift – Chair**

Emeritus Professor of Health Care of the Elderly, Kings College London School of Medicine, London.

### **Professor Judy Adams**

Consultant Radiologist and Honorary Professor of Diagnostic Radiology, Central Manchester University Hospitals NHS Foundation Trust and University of Manchester.

### **Mr Tim Chesser**

Consultant Trauma and Orthopaedic Surgeon, Frenchay Hospital, North Bristol NHS Trust.

### **Dr Richard Griffiths**

Consultant Anaesthetist, Peterborough and Stamford Hospitals NHS Foundation Trust.

### **Mr Robert Handley**

Consultant Trauma and Orthopaedic Surgeon, Oxford University Hospitals NHS Trust.

### **Mrs Karen Hertz**

Advanced Nurse Practitioner, University Hospital of North Staffordshire.

### **Dr Sally Hope**

General Practitioner, Woodstock, Oxfordshire.

### **Dr Antony Johansen**

Consultant Orthogeriatrician, Trauma Unit, University Hospital of Wales.

### **Professor Sallie Lamb**

Professor of Rehabilitation and Director of Warwick Clinical Trials Unit, University of Warwick; Professor of Trauma Rehabilitation, Director Oxford Clinical Trials Research Unit, University of Oxford.

### **Dr Martin Wiese**

Consultant in Emergency Medicine, University Hospitals of Leicester NHS Trust.



## Evidence Update project team

**Marion Spring**

Associate Director

**Chris Weiner**

Consultant Clinical and Public Health Adviser

**Cath White**

Programme Manager

**Fran Wilkie**

Project Manager

**Russell Dube**

Information Specialist

**Patrick Langford**

Medical Writer

