4-year surveillance 2015 – Hip fracture (2011) NICE guideline CG124

Appendix A: decision matrix

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
Imaging options in occult hip fracture			
124 – 01. **In patients with a continuing clinical suspicion of hip fracture, despite negative radiographic findings, what is the clinical and cost-effectiveness of additional imaging (radiography after at least 48 hours), radionuclide scanning (RNS), ultrasound (US) and computed tomography (CT), compared to magnetic resonance imaging (MRI), in confirming, or excluding, a hip fracture? (1.1.1)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	Comments received via expert feedback: • It was noted that there had been a slight rewording of recommendation 1.1.1 after publication in response to an external query clarifying when MRI should be offered if hip fracture is still suspected after negative X-rays. The recommendation now reads 'despite negative X-rays of the hip of an adequate standard' instead of 'despite negative antero-posterior pelvis and lateral hip x-rays'. • Investigation of occult fractures needs expanding, but no evidence was provided in support of this comment. • For CT vs MRI as diagnosis, it was noted that the original question looked for diagnostic accuracy – whereas it may be more relevant to relate to clinical outcome. Additionally, some resistance to MRI was suggested due to difficulties accessing it as an urgent investigation. It was also queried whether fractures only visible on MRI but not CT are of clinical relevance.	No new evidence was identified that would affect recommendations. No evidence was identified that disputed the wording change made to recommendation 1.1.1. For investigation of occult fractures, and CT versus MRI, no evidence was supplied by topic experts and none was found by the 4-year surveillance review. The absence of any new evidence in these areas means that no firm conclusions can be drawn. **Surveillance decision** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
		No evidence was provided in support of this comment.	
Timing of surgery			
124 – 02. **In patients with hip fractures what is the clinical and cost effectiveness of early surgery (within 24, 36 or 48 hours) on the incidence of complications such as mortality, pneumonia, pressure sores, cognitive dysfunction and increased length of hospital stay? (1.2.1, 1.2.2)**			
Evidence Update (2013) **Effect of early surgery on mortality** A meta-analysis[1] of 35 studies (n=191,873; mean age=80 years) examined the association between mortality and delayed surgery in hip fracture among elderly patients. Early surgery (defined by most studies as within 24 or 48 hours) appeared to be associated with a significantly lower mortality risk than delayed surgery. This was deemed consistent with the guideline recommendation to operate on the day of, or day after, admission.	No relevant evidence identified.	None identified relevant to this question.	**Effect of early surgery on mortality** Evidence is unlikely to impact on CG124. The 2-year Evidence Update found that early surgery within 24 or 48 hours was associated with a lower mortality risk than delayed surgery, which is consistent with the current guideline recommendation to operate on the day of, or day after, admission. No new evidence was found by the 4-year surveillance review to change this conclusion. **Surveillance decision** This review question should not be updated.
Analgesia			
124 – 03. **In patients who have or are suspected of having a hip fracture, what is the comparative effectiveness and cost effectiveness of systemic analgesics in providing adequate pain relief and reducing side effects and mortality? (1.3.1–1.3.9)**			
Evidence Update (2013) No relevant evidence identified.	**Multimodal pain management** An RCT[2] of 82 older patients examined	Expert feedback from NICE's medicines and prescribing centre (MPC) was received on the	**Multimodal pain management** Evidence is unlikely to impact on

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	multimodal pain management with preemptive pain medication and intraoperative periarticular multimodal drug injections in patients undergoing bipolar hip hemiarthroplasty. Group I received preemptive pain medication and intraoperative periarticular injections (drugs not specified), whereas Group II did not receive these interventions. Group I had a lower pain level than Group II on postoperative days 1 and 4, but not on day 7. The total amount of fentanyl used and the frequency of use of patient-controlled analgesia were also lower in Group I. Patient satisfaction at discharge was higher in Group I. No differences were seen between groups in the times until the patients walked, performed standing exercises, or in complications.	following: **Systemic analgesics** ***Non-opioids*** The full version of CG124 stated it was assumed that patients will take a simple analgesic, such as paracetamol, continuously throughout their inpatient stay. The GDG noted that aspirin would not generally be used as an analgesic for this population, unless it is used as a low dose to prevent strokes. • The MPC noted that recommendation 1.5.15 in CG180 Atrial fibrillation now states 'Do not offer aspirin monotherapy solely for stroke prevention to people with atrial fibrillation'. The full version of CG124 also noted that the average cost of non-opioid analgesic drugs was less than £0.1p per dose (BNF 58). • The MPC noted that prices have gone up – the current BNF suggests a price of about 6 p per dose for paracetamol (but prices in hospital may be less because of bulk purchasing deals). CG124 recommends that paracetamol should be offered every 6 hours preoperatively and postoperatively unless contraindicated. • The MPC noted that the MHRA is conducting a safety review of non-prescription analgesics including paracetamol, which was originally planned for the end of 2014 but is now overdue. It could possibly have an impact on the	CG124. The absence of information about the specific drugs used in the intervention, any other accompanying pain medications, and the pain management used in the comparator group, makes it difficult to assess the impact of the evidence on current recommendations. **Systemic analgesics** Evidence is unlikely to impact on CG124. Although drug and staff costs associated with analgesia may have increased since the guideline was issued, this is unlikely to affect the recommendations in CG124 which were based on the rationale that complications are especially more likely to develop when stronger analgesia is administered in the elderly. Regular paracetamol is first-line unless contra-indicated. This and subsequent recommendations follow a logical hierarchy for the use of analgesic agents as indicated in the World Health Organisation pain relief ladder. Information from the MHRA safety

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
		guideline's recommendations on paracetamol, although any safety concerns are more likely to be related to long-term use. ***Opioids*** The full version of CG124 noted that the following opioids are non-controlled drugs and can be administered within existing nurse drug rounds, and therefore there is little extra cost associated with their administration: Codeine phosphate; Dihydrocodeine tartrate; Tramadol hydrochloride. • The MPC noted the following in relation to the above drugs: – Codeine and dihydrocodeine are covered by the Misuse of Drugs Act and regulations, but products for oral use are in Schedule 5 of the regulations and so are not subject to register-keeping and safe custody requirements, hence in practical terms they are similar to other prescription-only medicines. However, injections are in Schedule 2 and subject to the full controlled drug requirements relating to prescriptions, safe custody (locking in a CD cabinet), the need to keep registers, etc. – From June 2014, tramadol has been in schedule 3 of the MDA regulations (see MEC); however, this will make little difference to administration of	review of non-prescription analgesics will be examined (if available) at the next surveillance review point to assess any potential impact on the guideline. The additional information provided by the MPC on regulation of opioid analgesics is unlikely to affect the guideline recommendations. **Surveillance decision** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
		tramadol, as there is no requirement for safe custody or registers. The prescription requirements don't apply to inpatient prescriptions. The full version of CG124 noted that the following opioids controlled drugs were likely to be those that could be administered to hip fracture patients: Diamorphine hydrochloride; Morphine salts; Oxycodone hydrochloride; Buprenorphine. It was stated that this category of analgesics requires an additional round of 2 trained nurses to administer. The GDG estimated that this would involve approximately 15 minutes per dose, with an extra cost of £10.50 (considering that the cost per hour of a staff nurse is £21; PSSRU 2009). Hence, the cost of administering these controlled drugs is £11.84 (nurse time plus drug cost). • The MPC noted that the 2009 cost per hour of a staff nurse was likely to need updating. • The MPC also noted the following in relation to Oramorph (liquid oral morphine): The BNF explains that morphine solutions are controlled drugs (schedule 2) if the morphine concentration is above 13 mg/5ml. So Oramorph oral solution (10 mg/5 ml) is just a prescription-only medicine, but Oramorph concentrated oral solution (100 mg/5 ml) is a schedule 2 controlled drug (and a prescription-only	

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
		medicine).	
124 – 04. **In patients who have or are suspected of having a hip fracture, what is the clinical and cost effectiveness of nerve blocks compared to systemic analgesia in providing adequate pain relief and reducing side effects and mortality? (1.3.6)**			
Evidence Update (2013) **Pharmacological and nonpharmacological interventions for pain management after hip fracture** A meta-analysis[3] of 83 studies (mean age ranged from 59 to 86 years) examined pharmacological and nonpharmacological interventions for pain management after hip fracture. There was a significant effect on acute pain versus standard treatment (no blockade) for: epidural analgesia; femoral nerve blockade; psoas compartment nerve blockade; fascia iliaca nerve blockade; and combined nerve blockades. No significant effect was seen with 3-in-1 nerve blockade. Delirium was significantly decreased with nerve blockades versus no blockade. The evidence for nerve blockades was deemed consistent with the guideline recommendation that adding nerve blocks should be considered if paracetamol and opioids do not provide sufficient preoperative pain relief, or to limit opioid dosage.	**Nerve block versus systemic analgesia** An RCT[4] of 36 patients aged >55 years compared ultrasound-guided 3-in-1 femoral nerve block plus morphine with morphine alone for analgesia in hip fracture. Intravenous morphine was prescribed and dosed at the discretion of the treating physician (to target a 50% reduction in pain or per-patient request). Pain intensity after 4 hours was significantly lower with femoral nerve block. Over the 4-hour study period, patients in the nerve block group experienced significantly greater overall pain relief. Patients receiving morphine alone did not have a clinically significant reduction in pain, and received significantly more morphine. There was no difference in adverse events between groups An RCT[5] of 24 patients with fractured femoral neck compared analgesia prior to surgery with either continuous femoral nerve block (bolus of local anaesthetic followed by a continuous infusion of 0.25% bupivacaine) or standard parenteral morphine analgesia as needed. Both groups received rescue analgesia with intramuscular morphine as needed, and all patients received paracetamol regularly. Pain scores at rest, dynamic pain scores reported	**Choice of nerve block** Comments received via expert feedback: • Further evidence is available re the choice & method of peri-operative nerve block, and there is wider acceptance of routine practice in A&E departments– but this may be insufficient to strengthen or modify recommendation 1.3.6. (See the RCT[7], which is summarised in the 4-year surveillance column under 'Choice of nerve block').	**Nerve block versus systemic analgesia** Evidence is unlikely to impact on CG124. Evidence from a meta-analysis included in the 2-year Evidence Update found a significant effect on acute pain versus standard treatment (no blockade) for: epidural analgesia; femoral nerve blockade; psoas compartment nerve blockade; fascia iliaca nerve blockade; and combined nerve blockades. Further evidence from 3 RCTs in the 4-year surveillance review found that nerve blocks reduced pain versus systemic analgesia, and reduced morphine use. It was also noted during the guideline development that studies have shown nerve blocks to be better than systemic analgesia at relieving pain. However, the GDG decided to recommend administration of analgesics step-wise to avoid more serious side effects of stronger

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	at each time point from 30 minutes up to 54 hours, and cumulative morphine consumption over 72 hours were all significantly less with femoral nerve block than parenteral morphine. Patient satisfaction scores were significantly greater with nerve block than morphine. An RCT[6] of 34 older patients with hip fracture analysed epidural anaesthesia (bupivacaine) versus ultrasound-guided continuous 3-in-1 block (bupivacaine) versus systemic pain therapy (piritramide/paracetamol) for preoperative acute pain management. The high dropout rate (57.1%) in the epidural group (which the authors believed was due to the higher complexity of this procedure resulting in technical problems and unsuccessful attempts) led to premature termination of the study. In the preoperative period, both regional anaesthesia procedures were significantly superior to systemic analgesia (analgesia responders after 1 hour: 3-in-1 block=86.7%, epidural=100%, systemic analgesia=46.7%). Need for rescue medication was also significantly lower with the regional anaesthesia procedures. The authors concluded that 3-in-1 block appears to provide adequate preoperative pain relief but that findings should be corroborated by larger studies. **Choice of nerve block** An RCT[7] of 110 patients compared		medications. All the evidence is consistent with the guideline recommendation that adding nerve blocks should be considered if paracetamol and opioids do not provide sufficient preoperative pain relief, or to limit opioid dosage. **Choice of nerve block** Evidence is unlikely to impact on CG124. An RCT found that compared with fascia iliaca compartment block, femoral nerve block provided superior preoperative analgesia and reduced need for morphine after the block. Although this study does not directly address the review question, it provides useful information about the comparative efficacy of nerve blocks. However, the evidence was from a single trial therefore further evidence may be warranted to compare the efficacy of nerve blocks in providing adequate pain relief after a hip fracture. **Analgesia for positioning for spinal anaesthesia** Evidence is unlikely to impact on

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	preoperative nerve stimulator-guided femoral nerve block and fascia iliaca compartment block in patients with a femoral neck fracture. Femoral nerve block provided significantly superior preoperative analgesia, alongside a significantly reduced need for morphine after the block, compared with fascia iliaca compartment block. **Analgesia for positioning for spinal anaesthesia** An RCT[8] of 60 patients compared femoral nerve block (20 ml 1.5% lidocaine with adrenaline [1:200,000]) and intravenous fentanyl (1 microgram/kg) to reduce pain before positioning for spinal anaesthesia ahead of femoral fracture surgery. Pain during positioning for spinal anaesthesia, and time to perform anaesthesia, were significantly lower with femoral nerve block than fentanyl. The quality of patient positioning for spinal anaesthesia, and patient acceptance, were significantly higher with femoral nerve block.		CG124. An RCT found that pain during positioning for spinal anaesthesia, time to perform anaesthesia, quality of patient positioning and patient acceptance were improved with femoral nerve block versus intravenous fentanyl. Although this study does not directly address the review question, it provides useful information about nerve blocks for positioning for spinal anaesthesia. However, the evidence was from a single trial therefore further research may be warranted of the efficacy of analgesic strategies for patient positioning. **Surveillance decision** This review question should not be updated.
Anaesthesia			
124 – 05. **In patients undergoing surgical repair for hip fractures, what is the clinical and cost effectiveness of regional (spinal/epidural) anaesthesia compared to general anaesthesia in reducing complications such as mortality, cognitive dysfunction thromboembolic events, postoperative respiratory morbidity, renal failure and length of stay in hospital? (1.4.1, 1.4.2)**			
Evidence Update (2013) No relevant evidence identified.	**Regional (spinal/epidural) anaesthesia versus general anaesthesia** An RCT[9] of 45 patients undergoing surgery for	**Regional (spinal/epidural) anaesthesia versus general anaesthesia** Two observational studies in this area were	**Regional (spinal/epidural) anaesthesia versus general anaesthesia**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	hip fracture compared continuous spinal anaesthesia (titration of 2.5 mg bupivacaine boluses to a T10 metameric level target), propofol target-controlled infusion, and sevoflurane. In the propofol and sevoflurane groups, a bispectral value target of around 50 guided the drug concentration, and analgesia was provided with remifentanil. The number of hypotension episodes (defined as a 30% decrease in mean arterial pressure – treated with intravenous ephedrine) was significantly lower in the spinal anaesthesia group (0 episodes) than in both the propofol group (11.5 episodes) and the sevoflurane group (10 episodes). Patients treated with propofol and sevoflurane needed significantly more ephedrine than patients receiving spinal anaesthesia (30.5 mg, 26 mg, and 1.5 mg respectively). The maximal decrease in mean arterial pressure was significantly lower in the spinal anaesthesia group (26%) than in the propofol group (47%) and the sevoflurane group (46%). The authors concluded that spinal anaesthesia with bupivacaine provided better blood pressure stability than propofol or sevoflurane anaesthesia. **Sedation depth in spinal anaesthesia** An RCT[10] of 114 older patients undergoing hip fracture repair using spinal anaesthesia compared light sedation (low intraoperative Bispectral Index [BIS]>80) with deep sedation	highlighted through topic expert feedback: An observational study[11] analysed 65,535 patient records from the National Hip Fracture Database to compare general and spinal anaesthesia for hip fracture surgery. Type of anaesthesia was recorded in 59,191 (90%) patients. There was no significant difference in either cumulative 5-day (2.8% vs 2.8%) or 30-day (7.0% vs 7.5%) mortality, even when 30-day mortality was adjusted for age and ASA physical status. A retrospective cohort study[12] of 56,729 patients aged ≥50 years compared regional (spinal or epidural) and general anaesthesia for hip fracture surgery. Overall, 3032 patients (5.3%) died. The near-far matched analysis (taking account of distance patients lived from hospitals specialising in the 2 anaesthesia types) showed no significant difference in 30-day mortality by anaesthesia type, although regional anaesthesia was associated with a significantly shorter length of stay (−0.6 days) than general anaesthesia.	Evidence is unlikely to impact on CG124. Between them, 2 observational studies of over 100,000 patients found no difference in 5-day or 30-day mortality between regional and general anaesthesia for hip fracture surgery, but hospital stay may be shorter with regional anaesthesia. An RCT additionally found that spinal anaesthesia provided better blood pressure stability than general anaesthesia. Until further studies investigating a wider array of outcomes following regional or general anaesthesia are published, the current evidence is consistent with recommendation 1.4.1 that patients should be offered a choice of spinal or general anaesthesia after discussing the risks and benefits. **Sedation depth in spinal anaesthesia** Evidence is unlikely to impact on CG124. An RCT found that mortality with light versus deep sedation was equivalent among all patients, however light sedation was safer than deep sedation among patients with serious comorbidities. Although this study

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	(BIS approximately 50). Among all patients, mortality was equivalent across sedation groups. However, among patients with serious comorbidities (Charlson score>4), 1-year mortality was significantly lower in the light (22.2%) than the deep (43.6%) sedation group. Similarly, among patients with Charlson score>6, 1-year mortality was significantly lower in the light (28.6%) than the deep (52.6%) sedation group. The authors concluded that further research on reduced mortality after light sedation during spinal anaesthesia is needed.		does not directly address the review question, it provides useful information about sedation depth in spinal anaesthesia. However, the evidence was from a single trial therefore further research on reduced mortality after light sedation during spinal anaesthesia may be warranted. **Surveillance decision** This review question should not be updated.
Planning the theatre team			
124 – 06. **Does surgeon seniority (consultant or equivalent) reduce the incidence of mortality, operative revision and poor functional outcome? (1.5.1, 1.5.2)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Surveillance decision** This review question should not be updated.
Surgical procedures			
124 – 07. **In hip fracture patients undergoing total hip replacement what is the clinical and cost effectiveness of cemented arthroplasty versus uncemented arthroplasty on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture? (1.6.5)**			
Evidence Update (2013) **Cemented versus uncemented implants** Three studies were identified comparing the	**Cemented versus uncemented implants** An RCT[16] of 220 hips compared cemented with uncemented bipolar hemiarthroplasty for	**Cemented versus uncemented implants** Comments received via expert feedback: • It is possible that the costs of cemented	**Cemented versus uncemented implants** New evidence was identified that

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
use of uncemented and cemented components. An RCT[13] of 130 patients (mean age=82 years) with a nonpathological displaced subcapital femoral neck fracture compared uncemented (VerSys Beaded FullCoat; standard or large metaphyseal sizing, standard or extended offset, and adjustable neck length) and cemented (VerSys LD/Fx; adjustable size and neck length) unipolar hemiarthroplasty implants. There was no significant difference in functional outcome between the uncemented and cemented groups based on either the Instrumental Activities of Daily Living (IADL) or Physical Activities of Daily Living (PADL). There was also no significant difference between the groups for any acute postoperative complications or mortality at 1 year. An RCT[14] of 160 patients (mean age=85 years) with an acute displaced femoral neck fracture compared uncemented (Alloclassic stem) and cemented (modular Exeter stem) hemiarthroplasty implants. There was no significant difference in pain between groups at any follow-up (p values not stated). There was also no significant difference in mortality at 2 years, however there were more complications in the uncemented versus cemented group, driven by a greater incidence of subsidence, intraoperative fractures, and	displaced femoral neck fracture. At 5-year follow-up, 60 patients (56%) had died in the cemented group and 63 (60%) in the uncemented group. Harris hip scores were significantly better in the uncemented group than in the cemented group (86.2 versus 76.3). However, significantly more postoperative periprosthetic femoral fractures were seen in the uncemented group (7.4%) than in the cemented group (0.9%). Barthel Index, EQ-5D scores and mortality rate did not differ significantly between groups. The authors concluded that uncemented hemiarthroplasty may result in higher hip scores but appears to carry an unacceptably high risk of later femoral fractures. An RCT[17] of 334 patients aged >75 years compared cemented and uncemented hemiprosthesis for dislocated cervical hip fracture. 1-year mortality did not differ significantly between groups. However, in the uncemented group, significant reductions were seen in operating time (mean difference=13 min) and blood loss (mean difference=92 ml). An RCT[18] of 110 patients compared cemented and uncemented hemiarthroplasty for displaced intracapsular hip fracture. All patients were reviewed at 12 weeks using a pain scale of 1–6 and a mobility scale of 0–9. The reduction in mean residual pain score	and/or uncemented implants may be reducing. (No evidence was provided in support of this comment). • Bone cement is causing a lot of interest recently. May need to consider that in a NICE guideline update, need to still recommend cement but say that it is not suitable for all and when is used do we need to take precautions. Two observational studies in this area were also highlighted through topic expert feedback (accompanied by the comment that 'In the light of its safety implications, it may be important to consider'): A retrospective study[23] of 1016 patients examined bone cement implantation syndrome (BCIS) in cemented hemiarthroplasty for femoral neck fracture. A recently proposed severity classification of BCIS was used in the analysis: no BCIS (grade 0) or BCIS grade 1, 2, or 3, depending on the degree of hypotension, arterial desaturation, or loss of consciousness around cementation. The incidence of BCIS grade 1, 2, and 3 were 21%, 5.1%, and 1.7%, respectively. Early mortality in BCIS grade 1 (9.3%) did not differ significantly from BCIS grade 0 (5.2%), while early mortality in BCIS grade 2 (35%) and grade 3 (88%) were significantly higher when compared with grades 0 and 1. Early mortality was also higher in BCIS grade 3 when compared with	may impact current recommendations. Evidence from 3 studies included in the 2-year Evidence Update indicated that functional outcomes and pain appeared to be equivalent with cemented and uncemented hemiarthroplasty, and that risk of death may be lower with cemented implants. The evidence was deemed consistent with the guideline recommendation to use cemented implants. The 4-year surveillance review found 4 RCTs, 3 meta-analyses and 2 observational studies in this area. Advantages of cemented implants appeared to be: less post-operative fractures, less pain, and improved mobility and functioning. A consistently observed benefit of uncemented implants was reduced operating time. For mortality, the evidence suggests that in the long term, there is no difference between cemented and uncemented implants. However, a large observational study of several thousand patients from the National Hip Fracture Database noted

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
postoperative fractures. Cardiovascular complications and respiratory, wound, and urinary tract infections did not differ significantly between groups. The mean Oxford hip score (used to assess clinical hip function) was significantly poorer in the uncemented than the cemented group at 6 weeks but not at other time points. A cross-sectional analysis[15] of 16,496 patients (median age=84 years) from the UK National Hip Fracture Database treated with hemiarthroplasty or total hip replacement for fractures of the femoral neck examined differences between uncemented and cemented hip arthroplasty. Following uncemented arthroplasty, 504 patients were dead at discharge versus 602 after cemented arthroplasty (p<0.001). From a mixed effects model, there was a lower risk of death among the cemented versus the uncemented group (OR=0.83). Overall, results from the 3 studies indicated that functional outcomes and pain appeared to be equivalent with cemented and uncemented hemiarthroplasty, and that risk of death may be lower with cemented implants. The evidence was deemed consistent with the guideline recommendation to use cemented implants.	was significantly greater in the cemented (3.18) than the uncemented group (2.91). The reduction in mean mobility score (signifying improved mobility) was also significantly greater in the cemented (4.40) than the uncemented group (4.00). An RCT[19] of 60 patients compared cemented and uncemented hemiarthroplasty for femoral neck fracture. Hospital stay, morbidity and mortality did not differ significantly between groups. Operating time was significantly longer in the cemented than the uncemented group (79.03 minutes vs 68.02 minutes). Harris Hip Score was significantly higher in the cemented group at 3, 6 and 12 months. Significantly less intensive bone mineral density reduction was seen in Gruen zones 2, 3 and 4 (a notation system dividing the interface between the femoral component of a hip arthroplasty and the femur bone into 7 zones) in the cemented versus the uncemented group. A meta-analysis[20] of 7 RCTs (n=1125 hips) compared cemented and uncemented hemiarthroplasty for femoral neck fractures in patients aged >70 years. Cemented hemiarthroplasty was significantly associated with: better postoperative hip function (odds ratio=0.48), lower residual pain (odds ratio=0.43), less implant-related complications (odds ratio=0.15) and longer operating time	grade 2. Independent predictors for severe BCIS were: ASA grade III-IV, chronic obstructive pulmonary disease, and medication with diuretics or warfarin. Severe BCIS was associated with 16-fold increase in mortality. An observational study[11] analysed 65,535 patient records from the National Hip Fracture Database to compare general and spinal anaesthesia. At the same time, the study also examined mortality associated with bone cement. Mortality within 24 hours after surgery was significantly higher among patients receiving cemented compared with uncemented hemiarthroplasty (1.6% vs 1.2%) [NOTE: Only RCTs were eligible for inclusion in the original guideline for the clinical question about bone cement; these studies have been included at the suggestion of the GDG as observational studies can be a useful source of data for adverse events.]	increased mortality within 24 hours after cemented implants. A retrospective study specifically examining bone cement implantation syndrome noted that mortality was significantly higher in the most severe grades of the syndrome, and that there was an association between the most severe syndrome grades and existing comorbidities such as ASA grade III-IV, chronic obstructive pulmonary disease, and medication with diuretics or warfarin. Along with the safety concerns expressed through topic expert feedback, this evidence may suggest that patients with particular comorbidities could benefit from uncemented implants (or extra caution if using cement), and may therefore affect recommendation 1.6.5 that currently states cemented implants should be used for all patients. **Surveillance decision** This review question should not be updated. Topic experts felt that certain patient groups may be at greater risk of bone cement implantation syndrome. They noted that **Consensus safety**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	(weighted mean difference=7.43 min). Mortality, cardiovascular and cerebrovascular complications, local complications, general complications, reoperation rate and intraoperative blood loss did not differ significantly between groups. A meta-analysis[21] of 8 RCTs (n=1175 hips) compared cemented and uncemented hemiarthroplasty for displaced femoral neck fracture in older patients. Mortality, reoperation rates and postoperational complications did not differ significantly between groups. The overall incidence of residual pain at 1 year was significantly lower in the cemented (23.6%) than the uncemented group (34.4%). A meta-analysis[22] of 12 studies (n=1805 patients) compared cemented and uncemented hemiarthroplasty for displaced femoral neck fracture. Operating time was significantly longer with cemented than uncemented hemiarthroplasty (standardised mean difference=−0.43). Mortality, hospital stay, blood loss, residual pain, and complications did not differ significantly between groups.		**guidelines** on reducing the risk from cemented hemiarthroplasty for hip fracture were published in the Anaesthesia journal in Feb 2015. The topic experts suggested that applying the approach outlined in the safety guideline with all patients could remove a layer of decision-making associated with identifying high-risk patients. Although the consensus safety guidelines provide guidance for clinicians on safe practices when using cement, the guidelines are not currently NICE accredited. Therefore, it was not considered appropriate to add a footnote into CG124 to these safety guidelines at this time. The next scheduled surveillance review of CG124 will reconsider the issue of safe practices when using cement and consider the accreditation status of the safety guidelines.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
124 – 08. **In patients undergoing repair for intracapsular hip fractures what is the clinical and cost effectiveness of internal fixation compared to hemiarthroplasty compared to total hip replacement on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture? (1.6.1–1.6.4)**			
Evidence Update (2013) **Internal fixation versus hemiarthroplasty** A cost-utility analysis[24] (n=166; mean age=82 years) examined hemiarthroplasty (Charnley-Hastings bipolar cemented) versus internal fixation (closed reduction and internal fixation with 2 parallel cannulated screws) in treating displaced intracapsular femoral neck fractures. The incremental effect of hemiarthroplasty was 0.20 quality-adjusted life years (QALYs) for patients with a complete set of EQ-5D data, and 0.15 QALYs in patients with imputed EQ-5D data. The incremental costs of internal fixation over hemiarthroplasty for direct hospital costs, total hospital costs, and total costs were €2,731, €2,474, and €14,160, respectively. As more QALYs were gained with hemiarthroplasty, which was less costly than internal fixation, hemiarthroplasty appeared to be cost effective. This was deemed consistent with the guideline recommendation to perform hemiarthroplasty in these patients. **Hemiarthroplasty versus total hip replacement** A 4-year follow-up of an RCT[25] (n=83; mean age=81 years) compared bipolar	**Internal fixation versus hemiarthroplasty** An RCT[26] of 60 patients with severe cognitive dysfunction analysed internal fixation using 2 cannulated screws versus cemented Exeter hemiarthroplasty for displaced femoral neck fractures. Patients were reviewed at 4, 12, and 24 months. More patients were reoperated on after internal fixation than hemiarthroplasty (7 vs 1; significance not stated). The EQ-5D index score at the follow-ups were generally lower after internal fixation than hemiarthroplasty, with a significant difference at 12 months. Hip function, general complications, and mortality did not differ significantly between the groups. An RCT[27] of 222 patients aged >60 years assessed bipolar hemiarthroplasty versus internal fixation with 2 parallel screws for displaced femoral neck fractures. Minimum follow-up was 4.9 years. Mortality was similar in the hemiarthroplasty (66.4%) and internal fixation (70.5%) groups. Of patients alive after 5 to 7 years, only 39 % (12 of 31) of the internal fixation group had their native hips, whereas significantly more patients (95%) in the hemiarthroplasty group still had the hemiarthroplasty. Between 2 and 6 years,	**Undisplaced intracapsular hip fractures** Comments received via expert feedback: • The treatment of undisplaced fractures need addressing. • Undisplaced intracapsular hip fractures were not covered in initial guideline. The debate at the British Orthopaedic Association (BOA) in 2014 demonstrated that controversy remains. More specificity is required in determining which patients with displaced intracapsular fractures would benefit from a total hip replacement. • Presently there is huge variation in the diagnosis and treatments offered – hence where NICE usually provides guidance. **Displaced intracapsular hip fractures.** Comments received via expert feedback: • The role of total hip replacements and the definition of patient group needs adjusting. Following publication of the 2011 guidance, it was apparent the evidence was based on 8-9 RCTs, of which only 1 recruited to patients over 80. The National Hip Fracture Database has looked into this and as a consequence only 20% of "NICE" eligible patients get total hip replacements. Hence the guidance is not being followed by the majority. It is likely that further clarification of this is needed in the	**Internal fixation versus hemiarthroplasty** Evidence is unlikely to impact on CG124. The 2-year Evidence Update included a cost-utility analysis that found more QALYs were gained at lower cost with hemiarthroplasty than internal fixation. The 4-year surveillance review found 2 RCTs which concluded that that although mortality and hip function did not differ, reoperation rate was higher with internal fixation. All evidence is consistent with recommendation 1.6.2 that hemiarthroplasty is an option for displaced intracapsular fracture, and that internal fixation is not recommended. **Internal fixation versus total hip replacement** Evidence is unlikely to impact on CG124. From 3 RCTs found by the 4-year surveillance review, the evidence

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
hemiarthroplasty with total hip replacement for displaced femoral neck fractures. 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. For hip function, 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 health-related quality of life (assessed by EQ-5D) was also seen with total hip replacement versus hemiarthroplasty. This was deemed consistent with the guideline recommendation to offer total hip replacements to appropriate patients.	there were 2 new major reoperations (both in the internal fixation group). Mean Harris Hip Score, mean EQ-5D index, and functioning (measured by activities of daily living) did not differ significantly between groups. **Internal fixation versus total hip replacement** An RCT[28] of 285 patients aged >65 years assessed closed reduction and internal fixation versus total hip replacement for displaced femoral neck fracture. During the 5-year follow-up, significantly higher rates were seen in the internal fixation group of: hip joint complication (38.3% vs 12.7%), general complication (45.3% vs 21.7%) and reoperation (33.6% vs 10.2%). Mortality did not differ significantly between groups. The proportion of patients with a Harris Hip Score of 80–100 (good to excellent) at 5 years was significantly higher with total hip replacement (89.0%) than internal fixation (57.6%). An RCT[29] of 100 patients analysed total hip replacement versus open reduction and internal fixation for displaced femoral neck fracture. Follow-up evaluations were performed at 3 months and at 1, 2, 4, 11, and 17 years. Harris Hip Score during the study period was significantly higher in the total hip replacement group (mean difference=14.7 points). Mortality did not differ significantly between groups. Significantly lower rates were	guideline to make it more applicable to the audience (and hence easy to comply). • More specificity required in determining which patients with displaced intracapsular fractures would benefit from a total hip replacement.	suggested that although mortality was similar, complications and reoperations were more frequent after internal fixation, and hip function was better after total hip replacement. This is consistent with recommendation 1.6.2 that total hip replacement is an option for displaced intracapsular fracture, and that internal fixation is not recommended. **Hemiarthroplasty versus total hip replacement** Evidence is unlikely to impact on CG124. The 2-year Evidence Update included an RCT that found hip function and health-related quality of life were greater after total hip replacement. The 4-year surveillance review found 2 meta-analyses concluding that although mortality and pain did not differ, reoperation rate was lower and mobility and hip function were improved following total hip arthroplasty. Topic expert feedback noted that more specificity was required in

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	seen after total hip replacement for major reoperation (9% vs 39%) and overall reoperation (23% vs 53%). The results for gait speed and activities of daily living favoured total hip replacement during the first year. An RCT[30] of 143 patients (146 hips) assessed closed reduction and internal fixation versus cemented total hip replacement for displaced femoral neck fractures. Failure after internal fixation was defined as early redisplacement, nonunion, symptomatic segmental collapse, or deep infection. In the arthroplasty group, failure was defined as 2 or more dislocations, implant loosening, deep infection, or a periprosthetic fracture. For lucid patients, the failure rate was greater after internal fixation than after total hip replacement (55% vs 5%; significance not stated). For the 38% of patients with mental impairment, the failure rate was 16% in both groups. **Hemiarthroplasty versus total hip replacement** A meta-analysis[31] of 7 RCTs (n=828) compared total hip replacement and hemiarthroplasty for displaced femoral neck fracture. Risk of reoperation was significantly lower following total hip arthroplasty. Mobility was significantly better with total hip arthroplasty whereas the dislocation rate was significantly lower following hemiarthroplasty. There were no significant differences between		determining which patients with displaced intracapsular fractures would benefit from a total hip replacement. There was no specific evidence to assist with this question, other than that one of the meta-analyses was in active patients – supporting the current criteria in recommendation 1.6.3 that patients offered a total hip replacement should have been able to walk independently out of doors with no more than a stick. All evidence is consistent with recommendation 1.6.3 to offer total hip replacements to appropriate patients with a displaced intracapsular fracture. **Internal fixation plus biological therapy (e.g. plasma injection, grafting)** Evidence is unlikely to impact on CG124. Two RCTs found by the 4-surveillance review examined internal fixation plus biological therapy. The first RCT found no effect of injecting platelet-rich plasma into the fracture site on revision surgery (although median length of stay was 8 days lower). The second RCT found that

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	the groups for mortality, infection and pain rate. A meta-analysis[32] of 8 RCTS (n=983) compared hemiarthroplasty with total hip replacement for active older patients with displaced femoral neck fracture. The likelihood of a higher Harris Hip Score was significantly greater with total hip replacement than hemiarthroplasty after both 1 year (standardised mean difference=−7.11) and 2 years (standardised mean difference=−6.91). Risk of revision after hemiarthroplasty was significantly greater than after total hip replacement , but dislocation rate did not differ significantly. **Internal fixation plus biological therapy (e.g. plasma injection, grafting)** An RCT[33] of 200 patients aged >65 years examined internal fixation of intracapsular femoral fracture with or without an accompanying injection of platelet-rich plasma into the fracture site. There was no significant difference between patients who did and did not receive platelet-rich therapy for the primary outcome of failure of fixation within 12 months (defined as any revision surgery). Neither were any significant differences seen for any secondary outcomes except length of stay favouring platelet-rich therapy (median difference=8 days). Adverse events were similar between groups.		an iliac graft improved hip function and fracture healing time. Although this study does not directly address the review question, it provides useful information about the addition of biological therapy to internal fixation. However, the evidence was from single trials, therefore benefits of these supplementary biological therapies may warrant additional studies to more firmly establish their effect. **Unipolar versus bipolar hemiarthroplasty** Evidence is unlikely to impact on CG124. The 4-year surveillance review found 3 RCTs and a meta-analysis comparing uni- and bipolar heads. Overall, some longer-term health-related quality of life benefits, and less dislocation, were seen with bipolar heads, but hip function, reoperation rate, walking ability, pain and mortality did not differ between groups. The benefits of bipolar implants do not appear to outweigh the substantially lower cost of unipolar implants. Although this study does not directly address the review question, it provides useful

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	An RCT[34] of 78 young adults aged 16–38 years assessed internal fixation with cannulated compression screws, with or without an iliac graft (supported by the ascending branch of the lateral femoral circumflex artery), for displaced femoral neck fracture. Mean follow-up was 4.5 years. Mean Harris Hip Score was significantly better with the iliac graft (92) than without the graft (84). Mean fracture healing time was significantly shorter with iliac graft (4.4 months) than without (6 months). Significantly fewer cases of osteonecrosis of the femoral head occurred with the graft (2) than without (8). **Unipolar versus bipolar hemiarthroplasty** An RCT[35] of 120 patients aged ≥80 years compared cemented Exeter hemiarthroplasty using a unipolar or a bipolar head for displaced femoral neck fracture. Follow-ups were performed at 4, 12, 24 and 48 months postoperatively. The mean EQ-5D index score was generally higher in the bipolar group at the follow-ups, with a significant difference at 48 months. Acetabular erosion was significantly greater in the unipolar group at the early follow-ups, with a significant difference at 12 months (20% vs 5%) but not at 24 or 48 months. Harris Hip Score and reoperation rate did not differ significantly between the groups at any follow-up. An RCT[36] of 261 older patients compared		information about unipolar versus bipolar hemiarthroplasty. No recommendations are made in CG124 related to unipolar or bipolar heads and this evidence is unlikely to impact current recommendations. **Short versus long cementless femoral stem** Evidence is unlikely to impact on CG124. An RCT from the 4-year surveillance review found no differences between short and conventional stems for hip function or activity score. However higher incidences were seen with the conventional than the short stem for: thigh pain, pulmonary microemboli, and intra-operative undisplaced fracture of the calcar. Although this study does not directly address the review question, it provides useful information about short versus long cementless femoral stems. However, the evidence was from a single trial, therefore benefits of short stems may warrant additional studies to more firmly establish their efficacy. **Pipkin fracture of the femoral head** Evidence is unlikely to impact on CG124.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	cemented unipolar or bipolar hemiarthroplasty for femoral neck fracture. At 12 months, functional walking ability or endurance, and self-selected pain ratings, did not differ significantly between groups. However abduction and internal rotation in the operated hip compared to the non-operated hip was significantly reduced in the unipolar group. An RCT[37] of 175 patients aged >65 years compared cemented hemiarthroplasty using a unipolar or a bipolar head for displaced femoral neck fracture. Follow-ups were at 2 months and 1, 3 and 5 years. The primary end point of implant survival was similar in the unipolar (0.98) and bipolar (0.97) groups. The unipolar group had a significantly higher dislocation rate compared with the bipolar group but this did not translate into a difference in revision rates at 8 years. Ambulatory ability, possibility to return home, and early radiological acetabular erosion did not differ significantly between groups. The overall mortality rate was 6% at 30 days, 9% at 90 days, 16% at 12 months, and 53% at 5 years, but mortality did not differ significantly between groups between. A meta-analysis[38] of 9 RCTs (n=1100) compared unipolar and bipolar hemiarthroplasty for displaced femoral neck fracture in older people. No significant differences between groups were seen for:		An RCT from the 4-year surveillance review found that, for Pipkin type I femoral fractures, emergent surgical reduction and fixation was associated with a shorter hospital stay, and lower rates of complication and avascular necrosis, than secondary operative fixation after emergent closed reduction. Operating time and blood loss did not differ significantly between groups. Although this study does not directly address the review question, it provides useful information about managing Pipkin fracture of the femoral head. However, the evidence was from a single trial, therefore benefits of emergent surgical reduction and fixation may warrant additional studies to more firmly establish its efficacy. **Type of screw fixation for undisplaced/displaced intracapsular fracture** New evidence was identified that may change current recommendations. In the 4-year surveillance review, 2 RCTs were found comparing different types of screw fixation for intracapsular fracture. In the first RCT

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	function score, mortality, dislocation, deep infection, acetabular erosion, operating time, blood loss or length of hospital stay. **Short versus long cementless femoral stem** An RCT[39] of 70 patients (70 hips) compared a short and a conventional, anatomical metaphyseal-fitting cementless femoral stem for displaced femoral neck fracture. Mean follow-up was 4.1 years in the short stem and 4.8 years in the conventional stem group. At final follow-up there were no significant differences between the short and the conventional stems for: mean Harris Hip Score, mean Western Ontario and McMaster Universities Osteoarthritis Index, or mean University of California, Los Angeles activity score. Significantly higher incidences were seen with the conventional stem than the short stem for: thigh pain (11 vs 0 patients), pulmonary microemboli (11 vs 0 patients) and intra-operative undisplaced fracture of the calcar (8 vs 1 patient). No component was revised for aseptic loosening in either group. One acetabular component in the short stem group and two acetabular components in the conventional stem group were revised for recurrent dislocation. **Pipkin fracture of the femoral head** An RCT[40] of 36 patients assessed emergent surgical reduction and fixation versus		(patients with only undisplaced fractures) no differences were seen between 2-hole dynamic hip screw versus 3 partially threaded cancellous screws for re-operation rate (3.2 vs 10.3%), patient satisfaction, quality of life, radiological union or osteonecrosis. In the second RCT (patients with either displaced or undisplaced intracapsular hip fracture), there was no difference between the Targon femoral neck hip screw and cannulated screws for risk of revision or any secondary outcome measures. Topic expert feedback noted that undisplaced intracapsular hip fractures were not covered in the guideline recommendations and debate at the British Orthopaedic Association (BOA) in 2014 demonstrated that controversy remains. The RCT in patients only with undisplaced fracture noted equivalence of 2-hole dynamic hip screw versus 3 partially threaded cancellous screws. CG124 does not currently make recommendations on undisplaced intracapsular hip fractures. As such, it

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	secondary operative fixation after emergent closed reduction for Pipkin type I femoral fractures. Fragments that constituted more than one-fourth of the femoral head were included. Operating time and blood loss did not differ significantly between groups. However, the emergent surgical reduction and fixation group had a significantly shorter hospital stay (7.6 vs 9.4 days). After 2 years, rates of complication and avascular necrosis were significantly higher in the secondary operative fixation after emergent closed reduction group. The authors concluded that emergent surgical reduction and fixation should be performed shortly after injury to enhance the treatment outcome. **Type of screw fixation for undisplaced/displaced intracapsular fracture** An RCT[41] of 62 patients assessed 2-hole dynamic hip screw versus 3 partially threaded cancellous screws for undisplaced subcapital neck of femur fracture. Follow-up was 2 years, in which time there were 6 deaths (19.3%) in each group. Re-operation rate did not differ significantly between dynamic hip screw (3.2%) and cancellous screws (10.3%). There was also no significant difference between groups in patient satisfaction, quality of life, radiological union or osteonecrosis. The authors concluded that a large, multicentre		may be appropriate to consider the evidence base for surgical fixation of this fracture type. **Surveillance decision** ***Hemiarthroplasty versus total hip replacement*** The topic experts noted that based on data from the National Hip Fracture Database, there appears to be low compliance with recommendation 1.6.3 in NICE CG124 on the use of total hip replacements. Currently, the recommendation specifies that patients should be offered a total hip replacement who: were previously able to walk independently, are not cognitively impaired, and are medically fit for anaesthesia and the procedure. But the topic experts noted that when surgeons are deciding on patients' suitability for total hip replacement, they may be using a fourth criteria related to expected long-term functional benefit. The topic experts noted that future functional status was not part of current recommendations, and also that the original evidence used to develop the recommendation was mainly from patients aged less than

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	trial was needed to differentiate between these 2 fixation methods. An RCT[42] of 174 patients aged ≥65 years assessed the Targon femoral neck hip screw versus cannulated screws for internal fixation of displaced or undisplaced intracapsular hip fracture. For the primary outcome of revision surgery within 1 year, there was no significant absolute reduction in risk of revision with the Targon hip screw. There were also no significant differences in any of the secondary outcome measures.		80 years. It was therefore debated whether the current recommendation was applicable to the whole hip fracture population, or only patients with better prospects of long-term functional benefits. It was felt that the original evidence base should be re-examined with an emphasis on long-term functional benefit. This review question should be updated. ***Undisplaced intracapsular fractures*** The topic experts explained that undisplaced fractures were not examined during the development of the original guideline, but were keen for this area to be included in an update of this question. They also stated that there may be variation between hospitals in diagnosing undisplaced fractures, and ensuring that the correct diagnosis is made is a key consideration. This review question should be updated. ***Other areas (Internal fixation versus hemiarthroplasty; Internal fixation versus total hip replacement; Internal fixation plus***

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			biological therapy [e.g. plasma injection, grafting]; Unipolar versus bipolar hemiarthroplasty; Short versus long cementless femoral stem; Pipkin fracture of the femoral head) This review question should not be updated.
124 – 09. **In patients having surgical treatment for intracapsular hip fracture with hemiarthroplasty what is the clinical and cost effectiveness of anterolateral compared to posterior surgical approach on mortality, number of reoperations, dislocation, functional status, length of hospital stay, quality of life and pain? (1.6.6)**			
Evidence Update (2013) No relevant evidence identified.	**Minimally invasive (direct anterior) and conventional (Watson-Jones anterolateral) approaches in bipolar hemiarthroplasty** An RCT[43] of 60 patients compared minimally invasive (direct anterior) and conventional (Watson-Jones anterolateral) approaches in bipolar hemiarthroplasty for femoral neck fracture. Mobility after 5 days (measured by the Barthel index), and pain intensity after 16 days, were significantly improved in the minimally invasive compared with the conventional surgery group. No significant difference was seen when comparing radiographic results for successful implant positioning. The authors noted that the study could not address whether improved mobilisation results in fewer complications or lower mortality, and that larger studies with	None identified relevant to this question.	**Minimally invasive (direct anterior) and conventional (Watson-Jones anterolateral) approaches in bipolar hemiarthroplasty** Evidence is unlikely to impact on CG124. No studies were identified through the surveillance which compared an anterolateral approach with a posterior approach when inserting a hemiarthroplasty. However, the 4-year surveillance review found an RCT in which mobility after 5 days, and pain intensity after 16 days, were significantly improved with a minimally invasive (direct anterior) compared to a conventional (Watson-Jones anterolateral) approach. The

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	longer follow-up are needed.		study could not address whether improved mobilisation results in fewer complications or lower mortality. The evidence comes from a single trial with short follow-up, and larger studies with longer follow-up may be warranted to confirm the efficacy of the minimally invasive approach. **Surveillance decision** This review question should not be updated.
124 – 10. **In patients undergoing surgery for hip fracture what is the clinical and cost effectiveness of 'OEDP 10A rating' designs of stems in preference to Austin Moore or Thompson stems when inserting a hemiarthroplasty on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture? (1.6.4)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Surveillance decision** This review question should not be updated.
124 – 11. **In patients undergoing repair for trochanteric extracapsular hip fractures what is the clinical and cost effectiveness of extramedullary sliding hip screws compared to intramedullary nails on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture? (1.6.7)**			
Evidence Update (2013) **Sliding hip screw versus intramedullary nail for trochanteric fracture** An RCT[44] of 598 patients (mean age=82 years) with any type of trochanteric hip fracture compared sliding hip screw with	**Sliding hip screw versus intramedullary nail for trochanteric fracture** An RCT[45] of 80 patients compared intramedullary Gamma nail with AMBI sliding hip screw for pertrochanteric multifragmentary fracture (AO classification 31-A2.2/A2.3). All	**Sliding hip screw versus intramedullary nail for trochanteric fracture** The following information was received from post-guideline publication feedback: A before and after study[67] of 2000 patients in which an algorithm was introduced at a	**Sliding hip screw versus intramedullary nail for trochanteric fracture** New evidence was identified that may change current recommendations.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
Targon PF intramedullary nail. There were no significant differences between groups for total hospital stay, wound healing complications, other fracture-related complications, loss of hip flexion or shortening at 6 weeks. There were also no significant differences between groups at 1 year for mortality or pain. There was however a significantly greater recovery of mobility at 1 year with intramedullary nail versus sliding hip screw. These data were deemed not to contradict the guideline recommendation to use a screw (which is a cheaper option than a nail), and with no economic data presented in the article the evidence was felt unlikely to impact guidance.	patients were followed up at 1, 3, 6 and 12 months (except for 9 who died). At 12 months, activities of daily living (Barthel Index) and EQ-5D scores were significantly higher in the nail group than the screw group, and the EQ-5D score had returned to its pre-operative values in the nail group but not in the screw group. Operating time, incision length and hip pain occurrence were significantly less in the nail group. Parker mobility score, mortality, implant failure rates, radiation time and hospital stay did not differ significantly between groups. An RCT[46] of 60 patients compared expandable proximal femoral nail with dynamic hip screw for extracapsular hip fracture. Significantly fewer cases of shaft medialisation were seen with expandable nail (9 cases) than hip screw (1 case). Among patients with partially unstable fractures (AO classification 31-A2), those treated with a screw had a significantly shorter femoral offset (compared to the unaffected side; 5.3 vs 0.25mm). Mortality, complications (including reoperation), and functional outcomes did not differ significantly between groups. An RCT[47] (number of patients not stated in the abstract) of older patients compared dynamic hip screw and proximal femoral nail for pertrochanteric fracture (AO classification 31-A1 or 31-A2). Follow-up was for 1 year.	Danish hospital (in which AO fracture types A1 and A2.1 were treated with dynamic hip screw, and AO types A2.2, A2.3 and A3 were treated with intramedullary nail). After the algorithm was implemented, reoperation rate reduced from 18% to 12% (p<0.001). The following 2 studies were provided via expert feedback: An observational study[68] of the Norwegian Hip Fracture Register examined 7643 operations for simple 2-part trochanteric fractures (AO classification 31-A1) treated with a sliding hip screw (n=6355) or an intramedullary nail (n=1288). There was an increased risk of reoperation within 1 year after intramedullary nail compared with sliding hip screw (4.2% versus 2.4%, p=0.001), which persisted at 3 years (7.1% versus 4.5%, p<0.001). An observational study[69] of 14,915 patients from the Finnish Health Care Register Data compared extra- and intramedullary implants for the treatment of pertrochanteric fractures (AO classification 31-A1 and 31-A2). One-year mortality was higher in the patients treated with intramedullary than extramedullary implants (26.6% vs. 24.9%, p=0.011). In the first year after the fracture, there were more new operations on hip and thigh in patients treated with intramedullary than extramedullary implants (11.1% versus 8.9%, p<0.0001). Similarly, there were more new	An RCT included in the 2-year Evidence Update compared sliding hip screw with Targon PF intramedullary nail for trochanteric fracture. There were no significant differences between groups for total hospital stay, wound healing complications, other fracture-related complications, loss of hip flexion, shortening, mortality or pain. But there was a greater recovery of mobility with intramedullary nail versus sliding hip screw. These data were deemed not to contradict the guideline recommendation to use a screw (which is a cheaper option than a nail), and with no economic data presented in the article the evidence was felt unlikely to impact guidance However, the 4-year surveillance review found an additional 4 RCTs, 3 meta-analyses and 2 observational registry studies in this area. Across the studies, improvements in the following outcomes were observed with intramedullary nail for trochanteric fracture: activities of daily living, pain, shaft medialisation, neck shortening, short-term postoperative loss of function, and

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	Functional recovery scores in the hip screw group at 3 and 6 months were significantly reduced from preoperative baseline scores compared with the femoral nail group. However, there were no significant differences between the 2 groups in functional recovery scores at baseline or at 3, 6 and 12 months after surgery. There was no significant between-group difference in mortality. The authors concluded that functional recovery scores were similar with nail and screw, however patients treated with a screw exhibited significant loss of function in the first 6 months, which did not occur in the nail group. An RCT[48] of 684 older patients compared TRIGEN INTERTAN intramedullary nail and sliding hip screw (with or without a trochanteric stabilising plate) for intertrochanteric or subtrochanteric fracture. Follow-up was at 3 and 12 months. Significantly less pain was recorded during early postoperative mobilisation with INTERTAN nail (visual analogue scale score 48 vs 52), although there was no difference at 3 or 12 months. Length of hospital stay, functional mobility, hip function, patient satisfaction, and quality-of-life assessments were comparable between the groups. Surgical complications were also similar for the 2 groups (29 vs 32 patients).	subtrochanteric and diaphyseal fractures of the femur in patients treated with intramedullary than extramedullary implants (3.2% vs. 1.05%, p<0.0001).	length of incision. The following did not appear to differ between nail and screw fixation: mobility, mortality, hospital stay, radiation time, patient satisfaction, wound complication, pneumonia, thromboembolic events, and lag screw cut-out rate. Some benefits were seen for intramedullary nail in the following outcomes (though in some studies no difference was seen between nail and screw): health-related quality of life, functioning, operating time, implant failure and blood loss. The 2 studies of registry data supplied via expert feedback suggested that intramedullary implants were associated with increased reoperation rates and mortality. Data from post-guideline publication feedback suggested separate treatment protocols for A1 and simple A2 fractures, and more complex A2 and A3 fractures, could lead to reduced reoperation rates. The included studies examined a range of implants and trochanteric fracture types, and although some

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	Three meta-analyses also compared sliding hip screw versus intramedullary nail for trochanteric fracture. All 3 studies included a mixture of A1, A2 and A3 fractures but did not perform sub-analyses according to fracture type. Details of the 3 meta-analyses are below: A meta-analysis[49] of 8 RCTs (n=1348 fractures) compared proximal femoral nail with dynamic hip screw for trochanteric fractures. No significant differences between the groups were seen for: operating time, blood loss and transfusion during perioperative time, hospital stay, wound complication, mortality, or reoperation. A meta-analysis[50] of 14 RCTs (n=1983) compared proximal femoral nail antirotation, Gamma nail, and dynamic hip screw for intertrochanteric fracture: (1) Proximal femoral nail versus dynamic hip screw: Femoral nail was associated with significantly less blood loss and lower rate of fixation failure, but led to more fluoroscopy time. (2) Proximal femoral nail versus Gamma nail: Femoral nail led to significantly less blood loss, shorter fluoroscopy time, and length of hospital stay. (3) Dynamic hip screw versus Gamma nail: Hip screw was associated with a significantly		consistent benefits and absence of differences between nail and screw were seen for various outcomes, results for several outcomes varied. As such, it may be appropriate to re-analyse the evidence base for intramedullary nail versus sliding hip screw in trochanteric fracture to determine whether the current guideline recommendations are still justified. **Different screw fixation types** Evidence is unlikely to impact on CG124. The 4-year surveillance review found 2 RCTs and a meta-analysis in this area. In the first RCT, reoperation rate and functional status did not differ between the sliding hip screw and the Medoff sliding screw and side plate for unstable pertrochanteric fracture (OA classification 31-A2). The second RCT compared dynamic hip screw with a locking side plate (using locking screws) versus dynamic hip screw with a conventional sideplate (using normal screws) for intertrochanteric fracture. No significant differences were seen

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	lower rate of operative fracture of femur, later fracture of femur, and reoperation, but caused significantly more blood loss. In contrast, there was no difference regarding operative time, infection hematoma, pneumonia, thromboembolic events, and mortality. The authors concluded that femoral nail should be a priority choice for treatment of intertrochanteric fractures with minimal rate of fixation failure, less blood loss and shorter length of hospital stay. Hip screw has advantages over Gamma nail with lower rate of plant-related complications and should be the preferred device for intertrochanteric fractures. However, owing to the low quality evidence currently available, more high-quality RCTs are needed to confirm these findings. A meta-analysis[51] of 6 RCTS (669 fractures) compared proximal femoral nail with dynamic hip screw for intertrochanteric fracture. Compared with hip screw, femoral nail was associated with significant reductions in: operating time, intraoperative blood loss, and length of incision. Postoperative infection rate, lag screw cut-out rate, and reoperation rate did not differ significantly between groups. **Different screw fixation types** An RCT[52] of 163 patients compared sliding hip screw with the Medoff sliding screw and side plate for unstable pertrochanteric fracture (OA classification 31-A2). Follow-up was at regular		for any outcomes. In a meta-analysis comparing the helical blade implant system with the screw implant system for trochanteric fractures, only operating time and fluoroscopy time were less in the blade group than the screw group. Other outcomes such as post-operative function, cut-out and other complications did not differ. Although these studies do not directly address the review question, they provide useful information about different screw fixation types. CG124 does not currently distinguish between types of screw fixation, and the lack of evidence of differences between specific screw types is unlikely to affect current recommendations. **Different types of intramedullary nail** Evidence is unlikely to impact on CG124. The 4-year surveillance review found 2 RCTs and a Cochrane review in this area. An RCT comparing Gamma 3 nail and ACE trochanteric nail for intertrochanteric fracture found

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	intervals for a minimum of 6 months. The quality of reduction was the same for each group, but the operating time was longer with the Medoff screw (61.6 vs. 50.1 min). Reoperation rate did not differ significantly between the Medoff screw (2/77) and sliding hip screw (3/86). Functional recovery scores at 6 months were also similar with the Medoff screw and sliding hip screw. An RCT[53] of 50 patients assessed dynamic hip screw with a locking side plate (using locking screws) versus dynamic hip screw with a conventional sideplate (using normal screws) for intertrochanteric fracture. No significant differences between the groups were seen for: hip deformity (coxa vara or valga), rate of restoration of postoperative neck-shaft angle, rate of anteversion angle restoration, lag screw slippage, fracture union duration, or functional outcome (Parker score). No patient developed deep infection, avascular necrosis, deep vein thrombosis or any other significant complications. The authors concluded that treating intertrochanteric fracture with a locking dynamic hip screw allows sound bone healing and is not associated with any major complications. However, results were all non-significant and a larger study is needed. A meta-analysis[54] of 6 RCTs (n=759) compared the helical blade implant system		postoperative hip scores did not differ between groups and walking ability was adequately restored in approximately 80% of patients. An RCT comparing sliding and non-sliding lag screw in a gamma nail for a variety of intertrochanteric fractures found no difference in bone healing rate and hip function between groups. A Cochrane review found that limited evidence was insufficient to determine differences between designs of intramedullary nails for extracapsular hip fractures. Although these studies do not directly address the review question, they provide useful information about different types of nail. CG124 does not currently distinguish between types of intramedullary nail, and the lack of evidence of differences between specific nail types is unlikely to affect current recommendations. **Compression plate** ***Compression plate versus nail*** Evidence is unlikely to impact on CG124. The 4-year surveillance review found

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	with the screw implant system for trochanteric fractures in older people. Operating time and fluoroscopy time were significantly less in the blade group than the screw group. No significant differences between groups were seen for: 'centre-centre' position, tip-apex distance, post-operative function, cut-out and other complications. **Different types of intramedullary nail** An RCT[55] of 112 patients compared 2 implant designs for intramedullary fixation of intertrochanteric hip fracture: Gamma 3 nail and ACE trochanteric nail. Patients were followed up on a regular basis between 6 weeks and 1 year. Twenty-six patients (23%) died within the first postoperative year. In each group, 2 patients were revised due to mechanical failure. No cases of non-union (defined as the absence of radiographic callus across the fracture line, including early redisplacement or progressive displacement) were seen in either group. Postoperative hip scores did not differ significantly between groups. Walking ability was adequately restored in approximately 80% of the patients. An RCT[56] of 80 patients compared the use of a sliding and non-sliding lag screw in a gamma nail for intertrochanteric fracture. Patients were first divided into 3 groups (Group A: AO classification 31-A1 [simple trochanteric]; group B: AO classification 31-		3 RCTs of compression plate versus nail. An RCT found that for unstable intertrochanteric fracture, proximal femoral nail was better than contralateral reverse distal femoral locking compression plate for: duration of surgery, blood loss, fluoroscopy time, functional outcome, health-related quality of life and implant failures. A second RCT comparing minimally invasive surgery using either percutaneous compression plate or proximal femoral nail anti-rotation for intertrochanteric fracture found that mean operating time and blood loss were lower with the nail. However, there was difference in complications, pain, hip motion range, hip function or recovery of walking ability. A third RCT compared proximal femur nail antirotation and reverse less invasive stabilisation for internal fixation of intertrochanteric fracture. Although duration of surgery was shorter with femoral nail, blood loss, quality of reduction, time to bone healing, and hip function did not differ significantly between the groups.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	A2.1 [stable multifragmentary trochanteric]; group C: AO classification A2.2 and A2.3 [unstable multifragmentary trochanteric]). Patients in each of groups A, B and C were then randomly allocated to the sliding and non-sliding subgroups. Follow-up was at 1, 3, 6 and 12 months. Bone healing rate and Harris Hip Score did not differ significantly between groups. In group C, lower limb discrepancy was significantly different between sliding (0.955 mm) and non-sliding screw (0.573 mm). Sliding distance was also significantly different among groups A, B and C (0.48 mm, 0.62 mm, and 0.92 mm respectively). The authors concluded that the sliding distance is minimal in Gamma nails and it is related to the comminuted extent of the intertrochanteric area in A1 and A2 intertrochanteric fractures. For treating these kinds of fractures, the sliding of the lag screw of a Gamma nail did not improve any clinical results and in certain cases, such as highly comminuted A1 and A2 fractures, can therefore even benefit from a locked lag screw by tightening the set-screw. A Cochrane review[57] of 17 RCTs (n=2130) assessed 12 comparisons of different intramedullary nail designs for extracapsular (mainly unstable trochanteric) hip fracture. There was no significant difference between the proximal femoral nail and the Gamma nail		Although these studies do not directly address the review question, they provide useful information about compression plate versus nail. However, the evidence is mixed and originated from individual trials comparing different types of implant, therefore is unlikely to affect CG124 which does not currently recommend compression plates. Further study may be warranted to more firmly establish the efficacy of compression plate versus intramedullary nail. ***Compression plate versus screw*** Evidence is unlikely to impact on CG124. The 4-year surveillance review found, from 2 meta-analyses of compression plate versus dynamic hip screw, that compression plate was associated with less blood loss and fewer cardiovascular events, but length of hospitalisation, rate of walking unaided, mortality, incidence of implant-related complications, and reoperation rate did not differ. Although these studies do not directly address the review question, they provide useful information about compression plate versus screw.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	in functional outcome, mortality, or serious fixation complications or re-operations (4 trials, n=910). There was no significant difference in outcome (functional score, mortality, fracture fixation complications and re-operation) between the ACE trochanteric nail and the Gamma nail (2 trials, n=185). There was no significant difference in outcome (mobility score, pain, fracture fixation complications or re-operations) between the proximal femoral nail antirotation (PFNA) nail and the Gamma 3 nail (2 trials, n=200 participants). In 7 of the 9 trials evaluating different comparisons, no significant between-group differences were found in all of the reported main outcomes for: ACE trochanteric nail versus Gamma 3 nail (n=112); gliding nail versus Gamma nail (n=80); Russell-Taylor Recon nail versus long Gamma nail (n=34); proximal femoral nail antirotation versus Targon PF nail (n=80); dynamically versus statically locked intramedullary hip screw nail (n=81); sliding versus non-sliding Gamma 3 nail (n=80); and long versus standard proximal femoral nail antirotation (n=40 patients with reverse oblique fractures). Mobility (evidenced by the number of bedridden participants) was significantly poorer with the ENDOVIS than the intramedullary hip screw nail (RR=1.69; 1 trial, n=215). More patients experienced thigh pain with the proximal femoral nail		CG124 does not currently recommend compression plates and this evidence is unlikely to affect the guideline. **External (i.e. outside the thigh) fixation devices** Evidence is unlikely to impact on CG124. The 4-year surveillance review found, an RCT and a Cochrane review in this area. An RCT comparing dynamic hip screw with external fixation for intertrochanteric fracture found the external fixator was well accepted, no patient had significant difficulties sitting or lying, and external fixation was associated with shorter operating time and hospital stay, and less need for postoperative blood transfusion. The advantages of external fixation may be important in older high-risk patients, but the evidence is only from a single trial. The Cochrane review found insufficient evidence on the use of external fixators to draw definite conclusions. Although these studies do not directly address the review question, they

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	antirotation II than the InterTan nail (RR=0.24; 1 trial, n=113). **Compression plate** ***Compression plate versus nail*** An RCT[58] of 40 patients compared proximal femoral nail with contralateral reverse distal femoral locking compression plate for unstable intertrochanteric fracture with a compromised lateral wall (AO classification 31-A2.2 to 3.3). Follow-up was for a minimum of 1 year. Duration of surgery, blood loss during surgery, and fluoroscopy time were significantly less with femoral nail than compression plate. Type of reduction, difficulty in reduction and surgeon's perception of surgery did not differ significantly. The nail group had significantly better functional outcome than the compression plate group for: Harris Hip Score (81.53 vs 68.43), and Short Form-12 physical and mental component scores. Significantly fewer failures (revision surgery with change of implant) occurred with femoral nails than compression plates (1 vs 6 patients). An RCT[59] of 90 older patients (90 hips) compared minimally invasive surgery using either percutaneous compression plate or proximal femoral nail anti-rotation for intertrochanteric fracture. Median follow-up time was 16.9 months. Mean operating time was significantly less with compression plate than femoral nail (53 vs 67 minutes), as was		provide useful information about external fixation devices. However, taken together this evidence is unlikely to affect the current guideline. **Sliding hip screw versus bipolar hemiarthroplasty** Evidence is unlikely to impact on CG124. In the 4-year surveillance review, an RCT found bipolar hemiarthroplasty was associated with better hip function, range of flexion and external rotation than hip screw for intertrochanteric fracture. However, pain severity did not differ significantly between groups. Although CG124 recommends hip screw and not hemiarthroplasty for trochanteric fracture, the new evidence is from a single trial and is unlikely to affect the current guideline. Further research may be warranted to confirm the efficacy of hemiarthroplasty over hip screw in trochanteric fracture. **Sliding hip screw plus bone marrow scaffold** Evidence is unlikely to impact on CG124.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	mean intraoperative blood loss (100.7 vs 138.2 ml) and perioperative blood loss (916 vs 1111 ml). However, there was no significant difference in the incidence of postoperative complications and final clinical outcomes including pain complaints, range of motion of the hip, postoperative hip function at 12 months, and the recovery of walking ability to pre-injury status, between the groups. Although, the compression plate did provide shorter operating times and less blood loss. An RCT[60] of 87 patients compared 2 implant designs for internal fixation of intertrochanteric fracture: proximal femur nail antirotation and reverse less invasive stabilisation. Mean duration of surgery was significantly longer with reverse less invasive stabilisation than femoral nail. Blood loss, quality of reduction, time to bone healing, and Harris Hip Score did not differ significantly between the groups. ***Compression plate versus screw*** A meta-analysis[61] of 5 RCTs (n=463) compared percutaneous compression plate and dynamic hip screw for intertrochanteric fracture. Compared with hip screw, compression plate was associated with significant reductions in blood loss and transfusion units. However, operating time, length of hospitalisation, mortality, incidence of implant-related complications, and reoperation rate did not differ significantly		In the 4-year surveillance review, an RCT found dynamic screw fixation of intertrochanteric fracture plus a scaffold of bone marrow stem cells placed in the fracture site improved hip function, pain, bedridden period, and time taken to start partial and total weight bearing versus fixation without bone marrow scaffold. Although CG124 does not recommend use of bone marrow scaffolds, the new evidence is from a single trial and is unlikely to affect the current guideline. Further research may be warranted to confirm the efficacy of sliding hip screw plus bone marrow scaffold in trochanteric fracture. **Surveillance decision** ***Sliding hip screw versus intramedullary nail for trochanteric fracture*** The topic experts felt that recommendation 1.6.7 is still applicable for A1 and A2 classifications. It was noted by the topic experts that data from the National Hip Fracture Database show there is around 95% compliance with this recommendation. In summary, the new data hasn't shown anything

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	between groups. The authors concluded that owing to the limitations of this systematic review (for example, insufficient data were available to support meta-analysis of pain, functional outcome, or quality of life), more high-quality RCTs are still needed to assess the clinical efficacy of compression plates. A meta-analysis[62] of 9 RCTs (n=914) compared percutaneous compression plate with dynamic hip screw for stable intertrochanteric fracture. Compression plate was associated with significantly shorter operating time, reduced blood loss, use of fewer transfusion units, and fewer cardiovascular events than hip screw. However, length of hospitalisation, rate of walking without help, early mortality and other complications did not differ significantly between groups. The authors concluded that because the overall quality of included studies and length of follow-up was low, future RCTs are still needed to confirm this data and the clinical efficiency of compression plates. **External (i.e. outside the thigh) fixation devices** An RCT[63] of 60 older high-risk patients compared dynamic hip screw with external fixation (stabilising component held outside the thigh by pins or screws in the bone) for intertrochanteric fracture. The external fixator was well accepted and no patient had		different, the costing hasn't changed and the majority of the surgical community appear to be following the recommendation. The topic experts were asked if a separate recommendation should be developed for A3 classifications, but they noted that there is still no available evidence in this fracture type. This review question should not be updated. ***Other areas (Different screw fixation types; Different types of intramedullary nail; Compression plate versus nail; Compression plate versus screw; External [i.e. outside the thigh] fixation devices; Sliding hip screw versus bipolar hemiarthroplasty; Sliding hip screw plus bone marrow scaffold)*** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	significant difficulties while sitting or lying. External fixation was associated with significantly shorter operating time (15 vs 73 minutes) and hospital stay (2.2 vs 8.4 days) than hip screw. Significantly fewer patients needed postoperative blood transfusion after external fixation (27 vs 0). Comorbidities, quality of reduction, screw cut out, bed sores and Harris Hip Score did not differ significantly between groups. A Cochrane review[64] of 18 RCTs (n=2615 patients; 2619 fractures) compared extramedullary fixation implants and external fixators (stabilising component held outside the thigh by pins or screws in the bone) for extracapsular hip fracture. Fixed nail plates (Jewett or McLaughlin) had a significantly higher risk of fixation failure than hip screw (3 trials, n=355). Comparisons of the Resistance Augmented Bateaux (RAB) plate with hip screw had contrasting results, notably in terms of operative complications, fixation failure and anatomical restoration (2 trials, n= 433). The Pugh nail and hip screw did not differ significantly (1 trial, n=100). Compared to hip screw, there was a trend to higher blood losses, longer operating times, and a lower risk of fixation failure with the Medoff plate for unstable trochanteric fractures (3 trials, n=458). The Medoff plate was compared with 3 different screw-plate systems: outcomes for		

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	trochanteric fractures did not differ significantly, whereas for subtrochanteric fractures, there was a significantly lower fixation failure rate for the Medoff plate but no evidence for differences in longer-term outcomes (2 trials, n=676). Compared with hip screw, there was a trend to lower blood loss and transfusion requirements with the Gotfried percutaneous compression plate but no other confirmed differences in outcomes (4 trials, n=396). Three of the trials reported intra-operative problems with the Gotfried plate, some of which precluded its use. Compared with hip screw, less operative trauma was seen with external fixation (3 trials, n=200). **Sliding hip screw versus bipolar hemiarthroplasty** An RCT[65] of 60 patients (aged 45–60 years) compared dynamic hip screw and bipolar hemiarthroplasty for intertrochanteric fracture. Significantly better results were seen with hemiarthroplasty than hip screw for: Harris Hip Score (86 vs 75), range of flexion (105 vs 90 degrees) and external rotation (35 vs 20 degrees). However, pain severity did not differ significantly between the two groups. **Sliding hip screw plus bone marrow scaffold** An RCT[66] of 30 patients compared dynamic screw fixation of intertrochanteric fracture with or without a hydroxyapatite scaffold enriched		

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	with autologous bone marrow stem cells placed in the fracture site. There was a significant difference in favour of the bone marrow scaffold at 30, 60, and 90 days for Harris Hip Scores (HHS), and at 30 and 60 days for pain score. Mean bedridden period, and time taken to start partial and total weight bearing, were also significantly shorter with the bone marrow scaffold.		
124 – 12. **In patients undergoing repair for subtrochanteric extracapsular hip fractures, what is the effectiveness of extramedullary sliding hip screws compared to intramedullary nails on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture? (1.6.8)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Surveillance decision** This review question should not be updated.
Mobilisation strategies			
124 – 13. **In patients who have undergone surgery for hip fracture, what is the clinical and cost effectiveness of early mobilisation (<48 hours after surgery) compared to late mobilisation on functional status, mortality, place of residence/discharge, pain and quality of life? (1.7.1, 1.7.2)**			
Evidence Update (2013) **Interventions for improving mobility after hip fracture surgery** A Cochrane review[70] of 18 RCTs and 1 quasi-randomised trial (n=1589) evaluated different interventions for improving mobility after hip fracture surgery. One trial (n=60) included in the review assessed early assisted ambulation	No relevant evidence identified.	None identified relevant to this question.	**Interventions for improving mobility after hip fracture surgery** Evidence is unlikely to impact on CG124. In the 2-year Evidence Update, a Cochrane review was found which identified 1 trial assessing early assisted ambulation (within 48 hours)

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
(within 48 hours) versus delayed assisted ambulation (after 48 hours) after surgery. This trial was the only evidence which informed the development of the original guideline recommendations in this area, therefore the results did not contradict the guideline recommendation to offer mobilisation on the day after surgery unless medically or surgically contraindicated.			versus delayed assisted ambulation (after 48 hours) after surgery. This trial was the only evidence which informed the development of the original guideline recommendations in this area, therefore the results did not contradict the guideline recommendation to offer mobilisation on the day after surgery unless medically or surgically contraindicated. **Surveillance decision** This review question should not be updated.
124 – 14. **In patients who have undergone surgery for hip fracture, what is the clinical and cost effectiveness of intensive physiotherapy compared to non intensive physiotherapy on functional status, mortality, place of residence/discharge, pain and quality of life? (No recommendations made based on this question)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Surveillance decision** This review question should not be updated.
Multidisciplinary management			
124 – 15. **In patients with hip fracture what is the clinical and cost effectiveness of 'orthogeriatrician' involvement in the whole pathway of assessment, perioperative care and rehabilitation on functional status, length of stay in secondary care, mortality, place of residence/discharge, hospital readmission and quality of life? (1.8.1)**			
Evidence Update (2013) No relevant evidence identified.	**'Orthogeriatrician' involvement** An RCT[71] of 199 patients analysed regular	**'Orthogeriatrician' involvement** Comments received via expert feedback:	**'Orthogeriatrician' involvement** Evidence is unlikely to impact on

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	orthopaedic care versus admittance to a geriatric rehabilitation ward (comprising a geriatric team applying comprehensive geriatric assessment including use of the delirium check list) immediately postoperative to hip fracture surgery. Patients randomised to the geriatric ward had: less postoperative delirium (which was shorter in those who developed it), fewer decubital ulcers, fewer urinary tract infections, less malnutrition, fewer falls and fewer new fractures during hospitalisation, a 25% shorter length of stay, and an odds ratio of being an independent walker 1 year later of 3.0 (significance not reported). The authors noted that the rehabilitation program did not exclude patients with dementia and that the best effect was seen in patients with dementia (data not reported in the abstract). An RCT[72] of 459 patients with hip fracture examined orthogeriatric comanagement versus care by a geriatric consultant team versus standard orthopaedic care. Compared with standard care and geriatric consultant team care, orthogeriatric care showed significantly better outcomes in terms of time-to-surgery and in-hospital medical complications. Versus standard care, orthogeriatric care was also associated with significant reductions in length of stay and in-hospital mortality rate.	• The recommendation to involve a geriatrician was correct as many older people coming into hospital with hip fracture have comorbidities. If all illnesses can be seen on admission and treated patients have a better chance of getting back to home. • There has been much better commissioning of care services such as 'early discharge' care packages since the guideline was issued. • Hip Fracture Programme needs better definition [no evidence was provided in support of this comment]. • There is no fresh evidence and no need to review the recommendation related to the Hip Fracture Programme. • Social services should be involved ASAP [no evidence was provided in support of this comment; however, recommendation 1.8.1 does already state that Hip Fracture Programmes should liaise or integrate with related services including social services]. Evidence received via expert feedback: • An RCT[79] of 397 patients compared the effectiveness and cost-effectiveness of comprehensive geriatric care versus usual orthopaedic care in home-dwelling patients with hip-fractures aged ≥70 years who could walk 10 m before their fracture. The primary outcome was mobility measured with the Short Physical Performance Battery (SPPB) 4 months after surgery. Mean SPPB scores at 4 months were 5.12	CG124. The 4-year surveillance review identified 7 RCTs and 2 meta-analyses. Across all the RCTs, the combination of orthopaedic and geriatric care led to improvements in: delirium, ulcers, urinary tract infections, malnutrition, falls and fractures during hospitalisation, length of stay, time-to-surgery, in-hospital medical complications and mortality rate, cognitive impairment, self-care ability, depression, malnutrition, upright time, lower limb function, and mobility. One of the 2 meta-analyses found that geriatric intervention did not have a significant effect on length of hospital stay, risk of dying in the hospital, or 1-year mortality. However all 5 included studies were considered to be at high risk of bias. The second meta-analysis (of 18 good or fair quality studies) found that orthogeriatric collaboration was associated with a reduction of in-hospital mortality, long-term mortality, and length of stay. This evidence is consistent with recommendation 1.8.1 that from

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	An RCT[73] of 160 patients examined an interdisciplinary intervention (geriatric consultation, continuous rehabilitation, and discharge planning) versus usual care for older people with hip fracture. Follow-up was 2 years. There were 30 patients (38.0%) in the interdisciplinary intervention group with cognitive impairment and 29 patients (35.8%) in the control group. Patients who received the intervention were 75% less likely to be cognitively impaired 6 months following discharge than those who received routine care ($p<0.001$). An RCT[74] of 299 patients compared 3 care models for older patients with hip fracture: interdisciplinary care (geriatric consultation, continuous rehabilitation, and discharge planning with post-hospital services); comprehensive care (interdisciplinary care plus nutrition consultation, depression management, and fall prevention); and usual care (in-hospital rehabilitation only, without geriatric consultation). During the first year following discharge, the comprehensive care group had significantly better self-care ability and less risk of depression than the usual care group. The comprehensive care group also had less risk of depression and of malnutrition than the interdisciplinary care group. An RCT[75] of 317 patients examined comprehensive geriatric care (with particular	for comprehensive geriatric care and 4.38 for orthopaedic care ($p=0.01$). That is, geriatric care improved mobility at 4 months.	admission, patients should be offered a Hip Fracture Programme that includes orthogeriatric assessment. **Surveillance decision** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	focus on mobilisation) versus orthopaedic care after hip fracture surgery. On day 4, patients treated with geriatric care had significantly more upright time (mean 57.6 vs 45.1 minutes), and a significantly higher number of upright events. On day 5, the geriatric care group had significantly better lower limb function than the orthopaedic care group. Cumulated ambulation scores on days 1–3 did not differ between groups. An RCT[76] of 162 patients with hip fracture examined an interdisciplinary intervention (geriatric consultation, in-hospital and at-home rehabilitation, and discharge planning) versus usual care. Follow-up was 2 years. Functional recovery followed 3 distinct paths: (a) poor recovery (6.8%), (b) moderate recovery (47.5%), and (c) excellent recovery (45.7%). The interdisciplinary intervention significantly reduced the likelihood of poor recovery and moderate recovery, relative to excellent recovery. A meta-analysis[77] of 5 RCTs (n=970) compared treatment of older patients with hip fractures by the trauma surgery service alone and preoperatively initiated collaborative treatment by the trauma surgery and geriatric services ('orthogeriatric' treatment). Geriatric intervention did not have a significant effect on length of hospital stay, risk of dying in the hospital, or 1-year mortality. A meta-analysis		

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	of functional outcomes was not possible. The authors noted that all the included studies had a high risk of bias and further trials were needed. A meta-analysis[78] of 18 studies (n=9094) examined orthogeriatric care models (those involving an orthopaedic surgeon and a geriatrician) in hip fracture. The overall meta-analysis found that orthogeriatric collaboration was associated with a significant reduction of in-hospital mortality, long-term mortality, and length of stay. Other variables such as time to surgery, delirium, and functional status were measured infrequently.		
124 – 16. **In patients with hip fracture what is the clinical and cost effectiveness of hospital-based multidisciplinary rehabilitation on functional status, length of stay in secondary care, mortality, place of residence/discharge, hospital readmission and quality of life? (1.8.1, 1.8.6)**			
Evidence Update (2013) No relevant evidence identified.	**Patient-centred counselling in hospital** An RCT[80] of 40 older patients with hip fracture compared analgesia with and without patient-centred counselling throughout hospitalisation. Counselling had a positive impact on quality of life in all patients, but in a more relevant way if patients were low functioning upon admittance to the ward. With counselling, anxiety and depression had significantly decreased after 30 days, and pain levels were significantly lower on days 4 and 5 than among patients not receiving counselling. **Anabolic steroids for rehabilitation**	None identified relevant to this question.	**Patient-centred counselling in hospital** Evidence is unlikely to impact on CG124. The 4-year surveillance review identified an RCT which found that patient-centred counselling throughout hospitalisation for hip fracture had a positive impact on quality of life, anxiety, depression and pain levels. Although the guideline does not specifically recommend counselling, this evidence is

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	A Cochrane review[81] of 3 trials (n=154 female patients aged >65 years) assessed anabolic steroids (nandrolone decanoate in all studies) for rehabilitation after hip fracture in older people. In the first trial, no significant difference was found between anabolic steroid injections (given weekly until discharge from hospital or 4 weeks, whichever came first) versus placebo injections in: the numbers discharged to a higher level of care or dead, time to independent mobilisation, or individual adverse events (1 trial, n=29). The second trial assessed anabolic steroid injections (every 3 weeks for 6 months) plus daily protein supplementation versus daily protein supplementation alone versus no protein supplementation (all groups also received daily calcium and vitamin D). For functional independence, the only significant difference found was that fewer participants in the anabolic steroid plus protein supplement group were either dependent in at least 2 functions (including bathing) or dead at 6 months (1 trial, n=40) than in the protein supplement alone group. The difference was not significant at 12 months. The trial found no evidence of between-group differences in individual adverse events. The third trial also compared anabolic steroids plus a nutritional supplement (in this case, anabolic steroid injections every 3 weeks for 12 months plus		consistent with recommendation 1.8.1 that the Hip Fracture Programme should include liaison or integration with related services, including mental health. **Anabolic steroids for rehabilitation** Evidence is unlikely to impact on CG124. The 4-year surveillance review identified a Cochrane review which demonstrated some functional improvement in people receiving anabolic steroids plus a nutritional supplement for rehabilitation after hip fracture. However, because of the reported high or unclear risk of bias in all trials, the imprecise results and the likelihood of publication bias, the evidence is unlikely to impact on CG124 which does not currently discuss the use of anabolic steroids as part of rehabilitation. More research may be warranted into the effects of combined anabolic steroid and nutritional supplement. **Surveillance decision** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	daily vitamin D and calcium) versus control (calcium alone). Significantly greater independence, higher Harris hip scores and gait speeds were seen with steroid plus vitamin D/calcium than calcium alone at 12 months. Pooled mortality data from the 2 trials of anabolic steroid plus nutritional supplement showed no significant between-group difference at 1 year. Similarly, there was no evidence of between-group differences in individual adverse events. Three participants in the steroid group of 1 trial reported side effects of hoarseness and increased facial hair. The authors concluded that because of the high or unclear risk of bias in all trials, the imprecise results and the likelihood of publication bias, the evidence was insufficient to draw conclusions on the effects, primarily in terms of functional outcome and adverse events, of anabolic steroids, either separately or in combination with nutritional supplements, after surgical treatment of hip fracture in older people.		
124 – 17. **In patients with hip fracture what is the clinical and cost effectiveness of community-based multidisciplinary rehabilitation on functional status, length of stay in secondary care, mortality, place of residence/discharge, hospital readmission and quality of life? (1.8.1, 1.8.4–1.8.6)**			
Evidence Update (2013) No relevant evidence identified.	**Home and community based rehabilitation** An RCT[82] of 81 community-dwelling older people recovering from hip fracture after discharge home examined a year-long multicomponent home-based physical	None identified relevant to this question.	**Home and community based rehabilitation** Evidence is unlikely to impact on CG124.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	rehabilitation programme versus standard care. The intervention programme included evaluation and modification of environmental hazards, guidance for safe walking, pain management without drugs, a progressive home exercise program, and physical activity counselling. The intervention significantly reduced perceived difficulties in negotiating stairs from prefracture to 12 months compared with standard care. It was also found that less difficulty negotiating stairs at 6 and 12 months correlated with better functional balance at 3 and 6 months in the intervention group but not controls. The authors concluded that the intervention programme improved mobility recovery after hip fracture over standard care. A meta-analysis[83] of 11 RCTs (n=1012) examined extended exercise rehabilitation at home or in the community (beyond the regular rehabilitation period) versus usual care after hip fracture. The extended exercise program showed modest significant effect sizes for: knee extension strength for the affected side and non-affected; balance; physical performance-based tests; timed 'up & go' test; and fast gait speed. Effects on normal gait speed, 6-minute walk test, activities of daily living, and physical functioning did not reach significance. Community-based programmes had larger effect sizes than home-based programmes.		The 4-year surveillance review identified an RCT and a meta-analysis which found that home or community-based rehabilitation reduced perceived difficulties in negotiating stairs (which correlated with better functional balance), and improved knee extension strength, physical performance-based tests, timed 'up & go' test and fast gait speed. These benefits are consistent with recommendation 1.8.4 that early supported discharge should be considered for appropriate patients (including those who are medically stable, have the appropriate mental ability, can transfer and mobilise short distances, and have not yet achieved full rehabilitation potential). **Surveillance decision** This review question should not be updated.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
Patient and carer information			
124 – 18. **In patients who have been discharged after hip fracture repair, what is the clinical and cost effectiveness of having a non paid carer (e.g. spouse, relative, friends) on mortality, length of stay, place of residence/discharge, functional status, hospital readmission and quality of life? (1.8.1, 1.8.4, 1.9.1)**			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Surveillance decision** This review question should not be updated.
Research recommendations			
Imaging options in occult hip fracture			
RR – 01 In patients with a continuing suspicion of a hip fracture but whose radiographs are normal, what is the clinical and cost effectiveness of computed tomography (CT) compared to magnetic resonance imaging (MRI), in confirming or excluding the fracture?			
Evidence Update (2013) **MRI versus CT** A systematic review[84] of 22 studies (n=996; mean age=75 years) compared MRI and CT in diagnosing occult proximal femoral fractures in patients with negative or uncertain X-rays, with a high clinical suspicion of fracture, which led to further investigation with MRI, CT, both, or MRI and radionuclide bone scan. The review indicated that MRI was more effective in diagnosing occult hip fracture versus other modalities, and could detect soft tissue injury and other conditions that may mimic hip fracture. The evidence was deemed	No relevant evidence identified.	None identified relevant to this question.	**MRI versus CT** Evidence is unlikely to impact on CG124. In the 2-year Evidence Update, a systematic review compared MRI and CT in diagnosing occult proximal femoral fractures in patients with negative or uncertain X-rays. The review indicated that MRI was more effective in diagnosing occult hip fracture versus other modalities, and could detect soft tissue injury and other conditions that may mimic hip fracture. The evidence was deemed

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
consistent with the guideline recommendation to offer MRI within 24 hours unless contraindicated. However, it was felt that definitive results about the clinical and cost effectiveness of MRI versus CT were still awaited in line with this research recommendation.			consistent with the guideline recommendation to offer MRI within 24 hours unless contraindicated. However, it was felt that definitive results about the clinical and cost effectiveness of MRI versus CT were still awaited in line with this research recommendation. **Topic expert feedback** The MRI / CT occult hip fracture research recommendation was an HTA bid which was turned down due to the small significance of the problem, so should be withdrawn. **Proposal on retaining the research recommendation** This was deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will be taken on whether to retain the recommendation or stand it down. Although new evidence was found that partially answered the research recommendation and it could be useful to wait for additional evidence, expert feedback suggested that the research recommendation be withdrawn. Therefore it is proposed to stand

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			down this research recommendation. **Surveillance decision** The topic experts stated that this issue was now felt to be a minor problem and would need a large amount of funding to answer. The proposal is to remove this research recommendation from the NICE version of the guideline and the NICE research recommendations database. This proposal will be subject to consultation during the guideline update.
Timing of surgery			
RR – 02 What is the clinical and cost effectiveness of surgery within 36 hours of admission compared to surgery later than 36 hours from admission in mortality, morbidity and quality of life in patients with hip fracture?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision** This research recommendation will be considered again at the next surveillance point.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
Analgesia			
RR – 03 What is the clinical and cost effectiveness of preoperative and postoperative nerve blocks in reducing pain and achieving mobilisation and physiotherapy goals sooner in patients with hip fracture?			
Evidence Update (2013) No relevant evidence identified.	**Intra- and postoperative epidural/nerve block** An RCT[85] of 60 patients compared 2 methods of intra- and postoperative analgesia for fractured femoral neck: levobupivacaine epidural and fascia lliaca compartment block. The epidural group were given levobupivacaine (0.25%, 15ml) before induction of general anaesthesia, followed by postoperative patient-controlled epidural with levobupivacaine (0.125%). The fascia iliaca block group were given levobupivacaine (0.25%, 30 ml) through the catheter before induction of general anaesthesia, followed by postoperative patient-controlled fascia iliaca analgesia with levobupivacaine (0.125%). The severity of postoperative pain, the number of patients needing tramadol in 24 hours, and postoperative tramadol consumption were all significantly less with epidural than with fascial iliaca block.	None identified relevant to this question.	**Intra- and postoperative epidural/nerve block** Evidence is unlikely to impact on CG124. The 4-year surveillance review identified an RCT which found that severity of postoperative pain, the number of patients needing tramadol in 24 hours, and postoperative tramadol consumption were all significantly less with epidural than with fascial iliaca block. Although postoperative nerve blocks are not currently recommended by CG124, the efficacy of nerve blocks versus systemic analgesia alone (particularly any potentially reduced need for opioids – which was identified as important by the GDG) was not examined in the study. Additionally, outcomes such as duration of stay and early mobilisation (also noted as important indicators by the GDG) were also not examined in the study. Further studies may be warranted to examine the place of nerve blocks and

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			epidurals in postoperative analgesia. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision** This research recommendation will be considered again at the next surveillance point.
Anaesthesia			
RR – 04 What is the clinical and cost effectiveness of regional versus general anaesthesia on postoperative morbidity in patients with hip fracture?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Topic expert feedback** None received. **Proposal on retaining the research recommendation** This was deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will be taken on whether to retain the recommendation or stand it down. No new relevant evidence has been found since the research recommendation was first made. Therefore it is proposed to stand

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			down this research recommendation. **Surveillance decision** The topic experts stated there was new observational evidence from the National Hip Fracture Database in approximately 65,000 patients. But this mainly showed the large variation in the type of anaesthesia used around the UK and had not proven the benefits of one type of anaesthesia over the other. The experts felt this area still needs further research and it remains an important question. The original research recommendation specified a multicentre randomised controlled trial of 3000 patients in each arm, but with initiatives such as the National Hip Fracture Database this could now be answered by a well-designed observational study. This research recommendation should be retained, with the additional criteria of 'or a well-designed observational study' being added to the detailed text in the full version of the guideline.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
Surgical procedures			
RR – 05 What is the clinical and cost effectiveness of large-head total hip replacement versus hemiarthroplasty on functional status, reoperations and quality of life in patients with displaced intracapsular hip fracture?			
Evidence Update (2013) No relevant evidence identified.	**Large-head total hip replacement versus hemiarthroplasty** An RCT[86] of 96 patients aged >70 years analysed bipolar hemiarthroplasty versus a novel total hip replacement comprising a polycarbonate-urethane (PCU) acetabular component coupled with a large-diameter metal femoral head for displaced intracapsular fractures of the femoral neck. Mean total follow-up was approximately 30 months. No significant difference between the groups was seen in the Harris Hip Score at any follow-up (3 months, then annually). Significantly higher pain was recorded in the PCU-total hip replacement group at 1 and 2 years. No revisions were needed in the hemiarthroplasty group, whereas 6 were performed in the PCU-total hip replacement group (with 1 further patient awaiting reoperation). The 3-year survival rate of the PCU-total hip replacement group was 0.841. The authors stated they did not recommend the use of the PCU acetabular component for femoral neck fracture.	None identified relevant to this question.	**Large-head total hip replacement versus hemiarthroplasty** Evidence is unlikely to impact on CG124. The 4-year surveillance review identified an RCT of bipolar hemiarthroplasty versus a novel total hip replacement comprising a polycarbonate-urethane (PCU) acetabular component coupled with a large-diameter metal femoral head for displaced intracapsular fractures. There was no difference between the groups for hip function, and the large head hip replacement group had more pain and more revisions were needed. Large-head total hip replacements are not recommended by CG124 and this evidence is unlikely to impact current recommendations. Additionally, the trial did not meet the research recommendation criteria specified in the guideline of approximately 500 patients and a primary outcome of patient mobility. **Topic expert feedback**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This question is no longer relevant to current practice. **Proposal on retaining the research recommendation** This was deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will be taken on whether to retain the recommendation or stand it down. Although new evidence was found that partially answered the research recommendation and it could be useful to wait for additional evidence, expert feedback suggested that the technology in the research recommendation may not now be relevant to current practice. Therefore it is proposed to stand down this research recommendation. **Surveillance decision** The topic experts stated that this question was no longer relevant to current practice. The proposal is to remove this research recommendation from the NICE version of the guideline and the NICE research recommendations database. This proposal will be subject to consultation during the

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			guideline update.
RR – 06 What is the clinical and cost effectiveness of intramedullary versus extramedullary fixation on mortality, functional status and quality of life in patients with reverse oblique trochanteric hip fracture?			
Evidence Update (2013) No relevant evidence identified.	**Standard versus long intramedullary nail for reverse oblique trochanteric fracture** An RCT[87] of 33 patients compared a standard with a long (>34 cm) intramedullary nail for treating reverse oblique trochanteric fracture. Minimum follow-up was 12 months. Reoperation rate, mortality rate, Parker-Palmer mobility score, Harris hip score, union rate, blade cut-out, and tip-apex distance did not differ significantly between groups.	**31-A3 (reverse oblique) group of extracapsular fractures** Comments received via expert feedback: • The guideline could be improved by addressing the A3 group of extracapsular fractures (intertrochanteric) separately. The A3 group are regarded by many as requiring a different method of surgical management. They were not specifically addressed in the original guideline. [No evidence was provided in support of this comment].	**Standard versus long intramedullary nail for reverse oblique trochanteric fracture** Evidence is unlikely to impact on CG124. The 4-year surveillance review identified an RCT of standard versus long intramedullary nail for reverse oblique trochanteric fracture and found no difference between the nails in reoperation rate, mortality rate, mobility, hip function, union rate, blade cut-out, and tip-apex distance. Although this evidence does not directly answer the research recommendation, it suggests equal efficacy of long and standard intramedullary nails for oblique fractures. Expert feedback suggested that A3 fracture types may need to be addressed by the guideline, however additional evidence was not supplied nor was any found by the surveillance review, therefore no further assessment of impact on the guideline was possible.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision** This research recommendation will be considered again at the next surveillance point.
Mobilisation strategies			
RR – 07 What is the clinical and cost effectiveness of additional intensive physiotherapy and/or occupational therapy (for example progressive, resistance training) after hip fracture?			
Evidence Update (2013) **More versus less intensive physiotherapy** A Cochrane review[70] of 18 RCTs and 1 quasi-randomised trial (n=1589) evaluated different interventions for improving mobility after hip fracture surgery. Two trials (n=188) compared a more with a less intensive regimen of physiotherapy. One trial (which had informed the development of the original guideline recommendations in this area) found no difference in recovery between the 2 groups. The other trial (published within the search dates for the guideline, but was not included) found a higher level of dropout in the more intensive group with no difference in length of hospital stay. As this evidence was published	**Prolonged strength training after surgery for hip fracture** An RCT[88] of 95 older patients examined prolonged strength training after surgery for hip fracture. All patients had previously completed a 12-week twice-a-week progressive strength-training programme that had begun 12 weeks after the fracture. At the end of the initial programme (24 weeks after the fracture), half of the patients entered a further 12-week once-a-week prolonged strength-training programme at an outpatient's clinic (comprising 4 exercises, performed at 80% of maximum capacity). The remaining patients were control (maintenance of current lifestyle). No significant difference between	None identified relevant to this question.	**More versus less intensive physiotherapy** Evidence is unlikely to impact on CG124. The 2-year Evidence Update found a Cochrane review which identified 2 RCTs comparing more with less intensive physiotherapy. However these trials published before the research recommendation was published, therefore do not provide any new data to answer the research question. No new evidence was identified in the 4-year surveillance review to add to this. **Prolonged strength training after**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
before the research recommendation was published, it does not provide any new data to help answer the research question.	groups was found in the primary outcome of balance as measured by the Berg Balance Scale, possibly because of a ceiling effect. The intervention group did however show significant improvements in strength, gait speed and gait distance, instrumental activities of daily living and self-rated health.		**surgery for hip fracture** Evidence is unlikely to impact on CG124. The 4-year surveillance review found an RCT of prolonged strength training after surgery for hip fracture. No effect of the intervention was found in the primary outcome of balance (possibly because of a ceiling effect – all patients had previously received an initial period of 12 weeks' strength training). The intervention group did however show improvements in strength, gait speed and gait distance, instrumental activities of daily living and self-rated health. The trial did not directly address the requirements of the research recommendation (which specified 400-500 patients and primary outcomes of physical function and health related quality of life) therefore is unlikely to impact on recommendations. However further studies may be warranted to examine the effect of prolonged strength training. **Topic expert feedback** None received. **Proposal on retaining the research recommendation**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This was deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will be taken on whether to retain the recommendation or stand it down. New relevant evidence has been found since the research recommendation was first made. However, it does not fully answer the question therefore it is proposed to retain this research recommendation. **Surveillance decision** The topic experts strongly recommended retaining as services are being withdrawn on the basis of a lack of evidence so it is an area that is important to retain. This research recommendation should be retained.
Multidisciplinary management			
RR – 08 What is the clinical and cost effectiveness of early supported discharge on mortality, quality of life and functional status in patients with hip fracture who are admitted from a care home?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. **Topic expert feedback** None received. **Proposal on retaining the research recommendation**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This was deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will be taken on whether to retain the recommendation or stand it down. No new relevant evidence has been found since the research recommendation was first made. Therefore it is proposed to stand down this research recommendation. **Surveillance decision** The in-development NICE guideline 'Transitions between hospital and community or care home settings' was recently consulted on, but the recommendations and research recommendations in this guideline do not address this issue specifically. This area falls under equality issues, because as a group these patients may often be disadvantaged, such as being subject to a negative approach to management and rehabilitation, and susceptibility to inappropriate early discharge. Because of the scale and importance of this group and the potential for inappropriate early discharge, the topic experts felt that work in this area is still needed.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			It was also noted that people in care homes can have very different issues – some being bedbound, others being physically fit but with severe mental health problems. The topic experts stressed that in accordance with the suggestion in the research recommendation it would be good to see a feasibility study followed by randomised controlled trial to potentially highlight a good outcome in at least a subset of patients from care homes. There is no evidence from the care home setting and this is still very much needed. This research recommendation should be retained.
RR – 09 What is the clinical and cost effectiveness of a designated hip fracture unit within the trauma ward compared to units integrated into acute trusts on mortality, quality of life and functional status in patients with hip fracture?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This research recommendation will be considered again at the next surveillance point.
RR – 10 Do patients admitted to hospital with a fractured hip who live permanently in a care/nursing home have equal access to multidisciplinary rehabilitation as patients admitted from home?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision** This research recommendation will be considered again at the next surveillance point.
Patient and carer information			
RR – 11 What quality of life value do individual patients and their carers place on different mobility, independence and residence states following rehabilitation?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			This research recommendation will be considered again at the next surveillance point.
RR – 12 What is the patient's experience of being admitted to hospital with a hip fracture in relation to surgery, pain management, timeliness of information given, and rehabilitation?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified.	None identified relevant to this question.	No new evidence was identified that would affect recommendations. This was not deemed a priority area for research by the GDG, therefore at this 4-year surveillance review time point a decision will not be taken on whether to retain the recommendation or stand it down. **Surveillance decision** This research recommendation will be considered again at the next surveillance point.
Areas not currently covered in CG124			
NQ – 01 What is the role of corticosteroids in supplementing analgesia prior to surgery?			
Evidence Update (2013) No relevant evidence identified.	**Supplementary corticosteroids** An RCT[89] of 82 patients compared the effect of administering single-dose methylprednisolone (125 mg intravenous) with placebo prior to surgery on pain after intertrochanteric femoral fracture surgery (all patients received the same pre-, intra- and postoperative analgesia/anaesthesia regime). Pain at rest, pain during 45 degree flexion of	None identified relevant to this question.	**Supplementary corticosteroids** Evidence is unlikely to impact on CG124. The evidence for the effect of methylprednisolone on postoperative pain comes from a single RCT and more evidence of its efficacy may be warranted. **Surveillance decision**

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	the hip, pain during walking after the surgery, and fatigue, were all significantly lower with methylprednisolone than control. Nausea, vomiting and opioid consumption were not significantly different between the two groups.		This review question should not be added.
NQ – 02 What is the role of preoperative traction for hip fracture?			
Evidence Update (2013) **Preoperative traction** A meta-analysis[3] of 83 studies (mean age ranged from 59 to 86 years) examined pharmacological and nonpharmacological interventions for pain management after hip fracture. Limited evidence was found that preoperative traction did not reduce acute pain.	**Preoperative traction** An RCT[90] of 81 patients compared preoperative skin traction with no traction for hip fracture cases in which emergency surgery was delayed. The mean time from admission to surgery was 7.5 days. Pain decreased markedly on the day after admission in both the traction and no-traction groups. No significant difference was found during the preoperative waiting period between the groups in either pain score or number of analgesics taken. No significant difference was found in radiographic data either before or after surgery, and satisfactory reduction was achieved after surgery irrespective of the use of skin traction.	None identified relevant to this question.	**Preoperative traction** Evidence is unlikely to impact on CG124. Both the meta-analysis included in the 2-year Evidence Update, and an RCT found by the 4-year surveillance review, concluded that preoperative traction did not reduce pain in hip fracture nor did it improve surgical outcomes. CG124 does not recommend traction for pain management and this evidence is unlikely to affect the guideline. **Surveillance decision** This review question should not be added.
NQ – 03 What is the benefit of using 2 fluoroscopes instead of a single fluoroscope during closed reduction and internal fixation for stable intertrochanteric fracture?			
Evidence Update (2013) No relevant evidence identified.	**2 fluoroscopes instead of a single fluoroscope during hip fracture surgery** An RCT[91] of 27 patients compared closed reduction and internal fixation for stable intertrochanteric fracture using either a single fluoroscope or 2 fluoroscopes simultaneously.	None identified relevant to this question.	**2 fluoroscopes instead of a single fluoroscope during hip fracture surgery** Evidence is unlikely to impact on CG124.

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	With 1 device, the radiology technician controlled and moved it to the desired anterior-posterior or axial view. With 2 devices, one was positioned in the anterior-posterior view and the other in the axial view, both controlled by the surgeon. Total radiation time was significantly shorter with 2 fluoroscopes compared to the use of 1 (36.6 vs 51.2 seconds), as was total operating time (24.3 vs 34.7 minutes). The authors recommended 2 fluoroscopes for reduction and fixation of hip fracture to improve safety for the medical team, and to decrease the patient's radiation exposure, wound exposure time, anaesthesia time, and operating time.		In the 4-year surveillance review, an RCT found that using 2 fluoroscopes instead of 1 during closed reduction and internal fixation for stable intertrochanteric fracture reduced total radiation time and total operating time (24.3 vs 34.7 minutes). CG124 does not make recommendations on fluoroscopy technique, and although 2 fluoroscopes seem to have benefits, the evidence is from a single small trial and further evidence may be warranted of its efficacy. **Surveillance decision** This review question should not be added.
NQ – 04 What are the direct medical costs incurred by acute hip fracture care , compared to actual remuneration received by the hospital, for people admitted from care homes in the UK?			
Evidence Update (2013) No relevant evidence identified.	**Medical costs of hip fracture care for people admitted from care homes in the UK** An economic analysis[92] of 100 patients examined the direct medical costs incurred by acute hip fracture care, and compared this to the actual remuneration received by the hospital, for people admitted from care homes in the UK in 2006. Median cost per patient episode was £9,429 (range £4,292–162,324). This was subdivided into hospital bed day	None identified relevant to this question.	**Medical costs of hip fracture care for people admitted from care homes in the UK** Evidence is unlikely to impact on CG124. The 4-year surveillance review found an economic analysis which indicated that the median cost per patient episode of hip fracture was £9,429 for people admitted from care homes in the UK in 2006. Of this, £7,129

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
	costs (£7,129), operative costs (£1,323) and investigation costs (£977). Twenty-two percent of the patients admitted from a residential home needed upgrading to a nursing home. In this group, the median length of stay was 31 days (mean 38, range 10–88) at a median cost of £14,435. Average remuneration received was £6,222 per patient, representing a mean loss in income of £3,207 per patient. The authors concluded that 76% of costs were attributable to hospital bed days; therefore interventions targeted at reducing hospital stay may be cost effective.		(76%) was accounted for by hospital bed day costs, suggesting that interventions targeted at reducing hospital stay may be cost effective. However, no interventions were specifically examined therefore although this information may be of use in future health economic evaluations undertaken during a guidance update, the evidence in isolation is unlikely to affect current recommendations. **Surveillance decision** This review question should not be added.
NQ – 05 What is the effect of hip fracture on health-related quality of life?			
Evidence Update (2013) No relevant evidence identified.	No relevant evidence identified	**Effect of hip fracture on health-related quality of life** Evidence received via expert feedback: A prospective cohort study[93] examined 1-year patient-reported outcomes of 403 patients treated at a single major trauma centre in the United Kingdom who sustained a hip fracture between 2012 and 2014. Although quality of life (measured by EuroQol 5 Dimensions [EQ-5D]) improved during the year after the fracture, it was still significantly lower than before injury irrespective of age group or cognitive impairment (mean reduction in EQ-5D=0.22, 95% CI 0.17 to 0.26). Mean	**Effect of hip fracture on health-related quality of life** Evidence is unlikely to impact on CG124. The 4-year surveillance review found no evidence in this area. However topic expert feedback identified a cohort study providing further data on the effect of hip fracture on quality of life. Advice from NICE's health economist suggested that the principal difference in this paper appears to be that the average hip fracture patient

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
		reduction in EQ-5D was greater in patients <80 years of age (0.28, 95% CI 0.22 to 0.35). These data were felt to potentially have implications for the health economic modelling in NICE CG124 which was based on a number of assumptions. Advice from NICE's health economist suggested that the principal difference in this paper appears to be that the average hip fracture patient has a lower quality of life than previously assumed.	has a lower quality of life than previously assumed. Topic experts suggested that this may have an impact on the economic models conducted for the original guideline. It may therefore be appropriate to consider the potential impact of the new data on the existing economic models and in turn any impact on recommendations. **Surveillance decision** NICE's health economist noted that EQ-5D data were used in 2 economic analyses in the original guideline: early vs late surgery, and multidisciplinary management vs usual care. He noted that these were both positive recommendations in favour of early surgery and multidisciplinary management respectively, and that the new data were unlikely to reverse these recommendations. The topic experts agreed the economic analyses in the original guideline were robust and comprehensively modelled. The topic experts also noted the WHiTE Study, an ongoing study evaluating the quality of life within the

Summary of evidence from previous surveillance	Summary of new evidence from 4-year surveillance	Summary of new intelligence from 4-year surveillance	Impact
			first year of around 8000 patients. They felt that it would be more valuable to await the outcome of this study before revisiting the health economic modelling in the guideline. This evidence has no impact at the moment.

References

1. 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.

2. Kang H, Ha YC, Kim JY et al. (20-2-2013) Effectiveness of multimodal pain management after bipolar hemiarthroplasty for hip fracture: a randomized, controlled study. Journal of Bone & Joint Surgery - American Volume 95:291-296.

3. 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 155:234-245.

4. Beaudoin FL, Haran JP, and Liebmann O. (2013) A comparison of ultrasound-guided three-in-one femoral nerve block versus parenteral opioids alone for analgesia in emergency department patients with hip fractures: a randomized controlled trial. Academic Emergency Medicine 20:584-591.

5. Szucs S, Iohom G, O'Donnell B et al. (2012) Analgesic efficacy of continuous femoral nerve block commenced prior to operative fixation of fractured neck of femur. Perioperative Medicine 1:4.

6. Luger TJ, Kammerlander C, Benz M et al. (2012) Peridural Anesthesia or Ultrasound-Guided Continuous 3-in-1 Block: Which Is Indicated for Analgesia in Very Elderly Patients With Hip Fracture in the Emergency Department? Geriatric Orthopaedic Surgery and Rehabilitation.3 (3) (pp 121-128), 2012.Date of Publication: September 2012. 121-128.

7. Newman B, McCarthy L, Thomas PW et al. (2013) A comparison of pre-operative nerve stimulator-guided femoral nerve block and fascia iliaca compartment block in patients with a femoral neck fracture. Anaesthesia 68:899-903.

8. Jadon A, Kedia SK, Dixit S et al. (2014) Comparative evaluation of femoral nerve block and intravenous fentanyl for positioning during spinal anaesthesia in surgery of femur fracture. Indian Journal of Anaesthesia.58 (6) (pp 705-708), 2014.Date of Publication: 01 Nov 2014. 705-708.

9. Biboulet P, Jourdan A, Van H, V et al. (2012) Hemodynamic profile of target-controlled spinal anesthesia compared with 2 target-controlled general anesthesia techniques in elderly patients with cardiac comorbidities. Regional Anesthesia & Pain Medicine 37:433-440.

10. Brown CH, Azman AS, Gottschalk A et al. (2014) Sedation depth during spinal anesthesia and survival in elderly patients undergoing hip fracture repair. Anesthesia & Analgesia 118:977-980.

11. White SM, Moppett IK, and Griffiths R. (2014) Outcome by mode of anaesthesia for hip fracture surgery. An observational audit of 65 535 patients in a national dataset. Anaesthesia. 69:224-230.

12. Neuman MD, Rosenbaum PR, Ludwig JM et al. (25-6-2014) Anesthesia technique, mortality, and length of stay after hip fracture surgery. JAMA 311:2508-2517.

13. 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 26:135-140.

14. Taylor F, Wright M, and Zhu M. (2012) Hemiarthroplasty of the hip with and without cement: a randomized clinical trial. The Journal of bone and joint surgery.American volume 94:577-583.

15. Costa ML, Griffin XL, Parsons 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 93:1405-1410.

16. Langslet E, Frihagen F, Opland V et al. (2014) Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: 5-year followup of a randomized trial. Clinical Orthopaedics & Related Research 472:1291-1299.

17. Talsnes O, Hjelmstedt F, Pripp AH et al. (2013) No difference in mortality between cemented and uncemented hemiprosthesis for elderly patients with cervical hip fracture. A prospective randomized study on 334 patients over 75 years. Archives of Orthopaedic & Trauma Surgery 133:805-809.

18. Ur RM, Imran M, and Kang TA. (2014) Functional outcome of cemented versus uncemented hemiarthroplasty for intracapsular hip fractures. Medical Forum Monthly.25 (1) (pp 44-48), 2014.Date of Publication: January 2014. 44-48.

19. Vidovic D, Matejcic A, Punda M et al. (2013) Periprosthetic bone loss following hemiarthroplasty: A comparison between cemented and cementless hip prosthesis. Injury.44 (SUPPL.3) (pp S62-S66), 2013.Date of Publication: 2013. S62-S66.

20. Li T, Zhuang Q, Weng X et al. (2013) Cemented versus uncemented hemiarthroplasty for femoral neck fractures in elderly patients: a meta-analysis. PLoS ONE [Electronic Resource] 8:e68903.

21. Luo X, He S, Li Z et al. (2012) Systematic review of cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures in older patients. Archives of orthopaedic and trauma surgery 132:455-463.

22. Ning GZ, Li YL, Wu Q et al. (2014) Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: an updated meta-analysis. [Review]. European journal of orthopaedic surgery & traumatologie 24:7-14.

23. Olsen F, Kotyra M, Houltz E et al. (2014) Bone cement implantation syndrome in cemented hemiarthroplasty for femoral neck fracture: incidence, risk factors, and effect on outcome. Br.J.Anaesth 113:800-806.

24. Waaler Bjornelv 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 : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA 23:1711-1719.

25. Hedbeck CJ, Enocson A, Lapidus G et al. (2-3-2011) 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 93:445-450.

26. Hedbeck CJ, Inngul C, Blomfeldt R et al. (2013) Internal fixation versus cemented hemiarthroplasty for displaced femoral neck fractures in patients with severe cognitive dysfunction: a randomized controlled trial. Journal of Orthopaedic Trauma 27:690-695.

27. Stoen RO, Lofthus CM, Nordsletten L et al. (2014) Randomized trial of hemiarthroplasty versus internal fixation for femoral neck fractures: no differences at 6 years. Clinical Orthopaedics & Related Research 472:360-367.

28. Cao L, Wang B, Li M et al. (1-4-2014) Closed reduction and internal fixation versus total hip arthroplasty for displaced femoral neck fracture. Chinese Journal of Traumatology 17:63-68.

29. Chammout GK, Mukka SS, Carlsson T et al. (7-11-2012) Total hip replacement versus open reduction and internal fixation of displaced femoral neck fractures: a randomized long-term follow-up study. Journal of Bone & Joint Surgery - American Volume 94:1921-1928.

30. Johansson T. (19-3-2014) Internal fixation compared with total hip replacement for displaced femoral neck fractures: a minimum fifteen-year follow-up study of a previously reported randomized trial. Journal of Bone & Joint Surgery - American Volume 96:e46.

31. Liao L, Zhao J, Su W et al. (2012) A meta-analysis of total hip arthroplasty and hemiarthroplasty outcomes for displaced femoral neck fractures. Archives of Orthopaedic & Trauma Surgery 132:1021-1029.

32. Zhao Y, Fu D, Chen K et al. (2014) Outcome of hemiarthroplasty and total hip replacement for active elderly patients with displaced femoral neck fractures: a meta-analysis of 8 randomized clinical trials. PLoS ONE [Electronic Resource] 9:e98071.

33. Griffin XL, Achten J, Parsons N et al. (2013) Platelet-rich therapy in the treatment of patients with hip fractures: a single centre, parallel group, participant-blinded, randomised controlled trial. BMJ Open 3:2013.

34. Yu XB, Zhao DW, Zhong SZ et al. (2013) Prospective and comparative analysis of internal fixation of femoral neck fractures with or without vascularized iliac graft in young adults. Orthopedics 36:e132-e138.

35. Inngul C, Hedbeck CJ, Blomfeldt R et al. (2013) Unipolar hemiarthroplasty versus bipolar hemiarthroplasty in patients with displaced femoral neck fractures: a four-year follow-up of a randomised controlled trial. International Orthopaedics 37:2457-2464.

36. Stoffel KK, Nivbrant B, Headford J et al. (2013) Does a bipolar hemiprosthesis offer advantages for elderly patients with neck of femur fracture? A clinical trial with 261 patients. ANZ Journal of Surgery 83:249-254.

37. Kanto K, Sihvonen R, Eskelinen A et al. (2014) Uni- and bipolar hemiarthroplasty with a modern cemented femoral component provides elderly patients with displaced femoral neck fractures with equal functional outcome and survivorship at medium-term follow-up. Archives of Orthopaedic & Trauma Surgery 134:1251-1259.

38. Liu Y, Tao X, Wang P et al. (2014) Meta-analysis of randomised controlled trials comparing unipolar with bipolar hemiarthroplasty for displaced femoral-neck fractures. International Orthopaedics 38:1691-1696.

39. Kim YH and Oh JH. (2012) A comparison of a conventional versus a short, anatomical metaphyseal-fitting cementless femoral stem in the treatment of patients with a fracture of the femoral neck. Journal of bone and joint surgery.British volume 94:774-781.

40. Lin D, Lian K, Chen Z et al. (2013) Emergent surgical reduction and fixation for Pipkin type I femoral fractures. Orthopedics 36:778-782.

41. Watson A, Zhang Y, Beattie S et al. (2013) Prospective randomized controlled trial comparing dynamic hip screw and screw fixation for undisplaced subcapital hip fractures. ANZ Journal of Surgery 83:679-683.

42. Griffin XL, Parsons N, Achten J et al. (2014) the Targon femoral neck hip screw versus cannulated screws for internal fixation of intracapsular fractures of the hip: a randomised controlled trial. Bone & Joint Journal 96-B:652-657.

43. Renken F, Renken S, Paech A et al. (2012) Early functional results after hemiarthroplasty for femoral neck fracture: a randomized comparison between a minimal invasive and a conventional approach. BMC Musculoskeletal Disorders 13:141.

44. Parker MJ, Bowers TR, and 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 94:391-397.

45. Aktselis I, Kokoroghiannis C, Fragkomichalos E et al. (2014) Prospective randomised controlled trial of an intramedullary nail versus a sliding hip screw for intertrochanteric fractures of the femur. International Orthopaedics 38:155-161.

46. Chechik O, Amar E, Khashan M et al. (2014) Favorable radiographic outcomes using the expandable proximal femoral nail in the treatment of hip fractures - A randomized controlled trial. Journal of Orthopaedics.11 (2) (pp 103-109), 2014.Date of Publication: June 2014. 103-109.

47. Guerra MT, Pasqualin S, Souza MP et al. (2014) Functional recovery of elderly patients with surgically-treated intertrochanteric fractures: preliminary results of a randomised trial comparing the dynamic hip screw and proximal femoral nail techniques. Injury. 45 Suppl 5:S26-S31.

48. Matre K, Vinje T, Havelin LI et al. (6-2-2013) TRIGEN INTERTAN intramedullary nail versus sliding hip screw: a prospective, randomized multicenter study on pain, function, and complications in 684 patients with an intertrochanteric or subtrochanteric fracture and one year of follow-up. Journal of Bone & Joint Surgery - American Volume 95:200-208.

49. Huang X, Leung F, Xiang Z et al. (2013) Proximal femoral nail versus dynamic hip screw fixation for trochanteric fractures: a meta-analysis of randomized controlled trials. Thescientificworldjournal 2013:805805.

50. Ma KL, Wang X, Luan FJ et al. (2014) Proximal femoral nails antirotation, Gamma nails, and dynamic hip screws for fixation of intertrochanteric fractures of femur: A meta-analysis. Orthopaedics & traumatology, surgery & research 100:859-866.

51. Zhang K, Zhang S, Yang J et al. (2014) Proximal femoral nail vs. dynamic hip screw in treatment of intertrochanteric fractures: a meta-analysis. Medical Science Monitor 20:1628-1633.

52. McCormack R, Panagiotopolous K, Buckley R et al. (2013) A multicentre, prospective, randomised comparison of the sliding hip screw with the Medoff sliding screw and side plate for unstable intertrochanteric hip fractures. Injury.44 (12) (pp 1904-1909), 2013.Date of Publication: December 2013. 1904-1909.

53. Barwar N, Meena S, Aggarwal SK et al. (1-4-2014) Dynamic hip screw with locking side plate: a viable treatment option for intertrochanteric fracture. Chinese Journal of Traumatology 17:88-92.

54. Huang X, Leung F, Liu M et al. (2014) Is helical blade superior to screw design in terms of cut-out rate for elderly trochanteric fractures? A meta-analysis of randomized controlled trials. European journal of orthopaedic surgery & traumatologie 24:1461-1468.

55. Winnock de GP, Tampere T, Byn P et al. (2012) Intramedullary fixation of intertrochanteric hip fractures: a comparison of two implant designs. A prospective randomised clinical trial. Acta Orthopaedica Belgica 78:192-198.

56. Zhu Y, Meili S, Zhang C et al. (2012) Is the lag screw sliding effective in the intramedullary nailing in A1 and A2 AO-OTA intertrochanteric fractures? A prospective study of Sliding and None-sliding lag screw in Gamma-III nail. Scandinavian Journal of Trauma, Resuscitation & Emergency Medicine 20:60.

57. Queally JM, Harris E, Handoll Helen HG et al. (2014) Intramedullary nails for extracapsular hip fractures in adults. Cochrane Database of Systematic Reviews .

58. Haq RU, Manhas V, Pankaj A et al. (2014) Proximal femoral nails compared with reverse distal femoral locking plates in intertrochanteric fractures with a compromised lateral wall; a randomised controlled trial. International Orthopaedics 38:1443-1449.

59. Guo Q, Shen Y, Zong Z et al. (2013) Percutaneous compression plate versus proximal femoral nail anti-rotation in treating elderly patients with intertrochanteric fractures: a prospective randomized study. Journal of Orthopaedic Science 18:977-986.

60. Tao R, Lu Y, Xu H et al. (2013) Internal fixation of intertrochanteric hip fractures: a clinical comparison of two implant designs. Thescientificworldjournal 2013:834825.

61. Zhang L, Shen J, Yu S et al. (2014) Percutaneous compression plate versus dynamic hip screw for treatment of intertrochanteric Hip fractures: a meta-analyse of five randomized controlled trials. Thescientificworldjournal 2014:512512.

62. Ma J, Xing D, Ma X et al. (2012) The percutaneous compression plate versus the dynamic hip screw for treatment of intertrochanteric hip fractures: a systematic review and meta-analysis of comparative studies. [Review]. Orthopaedics & traumatology, surgery & research 98:773-783.

63. Kazemian GH, Manafi AR, Najafi F et al. (2014) Treatment of intertrochanteric fractures in elderly highrisk patients: dynamic hip screw vs. external fixation. Injury 45:568-572.

64. Parker MJ and Das A. (2013) Extramedullary fixation implants and external fixators for extracapsular hip fractures in adults. Cochrane Database of Systematic Reviews .

65. Emami M, Manafi A, Hashemi B et al. (2013) Comparison of intertrochanteric fracture fixation with dynamic hip screw and bipolar hemiarthroplasty techniques. Archives of Bone & Joint Surgery 1:14-17.

66. Torres J, Gutierres M, Lopes MA et al. (2014) Bone marrow stem cells added to a hydroxyapatite scaffold result in better outcomes after surgical treatment of intertrochanteric hip fractures. BioMed Research International.2014 , 2014.Article Number: 451781.Date of Publication: 2014.

67. Palm H, Krasheninnikoff M, Holck K et al. (2012) A new algorithm for hip fracture surgery. Reoperation rate reduced from 18 % to 12 % in 2,000 consecutive patients followed for 1 year. Acta Orthop. 83:26-30.

68. Matre K, Havelin LI, Gjertsen JE et al. (2013) Intramedullary nails result in more reoperations than sliding hip screws in two-part intertrochanteric fractures. Clin Orthop Relat.Res 471:1379-1386.

69. Yli-Kyyny TT, Sund R, Juntunen M et al. (2012) Extra- and intramedullary implants for the treatment of pertrochanteric fractures -- results from a Finnish National Database Study of 14,915 patients. Injury 43:2156-2160.

70. Handoll HH, Sherrington C, and Mak JC. (2011) Interventions for improving mobility after hip fracture surgery in adults. Cochrane database of systematic reviews (Online) CD001704.

71. Gustafson Y. (2012) Outcomes of hip fractures: Rehabilitation programmes: Comprehensive Geriatric Assessment and Rehabilitation-a prerequisite for successful treatment of people who have suffered a hip-fracture. European geriatric medicine 3:S19.

72. Serra R, Prenni V, Baroni M et al. (2013) The orthogeriatric comanagement improves clinical outcomes compared with consultant geriatric service and traditional model. European geriatric medicine 4:S49.

73. Shyu YI, Tseng MY, Liang J et al. (2013) Interdisciplinary intervention decreases cognitive impairment for older Taiwanese with hip fracture: 2-year follow-up. International Journal of Geriatric Psychiatry 28:1222-1231.

74. Shyu YI, Liang J, Tseng MY et al. (2013) Comprehensive care improves health outcomes among elderly Taiwanese patients with hip fracture. Journals of Gerontology Series A-Biological Sciences & Medical Sciences 68:188-197.

75. Taraldsen K, Sletvold O, Thingstad P et al. (2014) Physical behavior and function early after hip fracture surgery in patients receiving comprehensive geriatric care or orthopedic care--a randomized controlled trial. Journals of Gerontology Series A-Biological Sciences & Medical Sciences 69:338-345.

76. Tseng MY, Shyu YI, and Liang J. (2012) Functional recovery of older hip-fracture patients after interdisciplinary intervention follows three distinct trajectories. Gerontologist 52:833-842.

77. Buecking B, Timmesfeld N, Riem S et al. (2013) Early orthogeriatric treatment of trauma in the elderly - A systematic review and metaanalysis. [German, English] OT - Fruhe geriatrische mitbehandlung in der alterstraumatologie - Eine systematische literaturubersicht und metaanalyse. Deutsches Arzteblatt International.110 (15) (pp 255-262), 2013.Date of Publication: 2013. 255-262.

78. Grigoryan KV, Javedan H, and Rudolph JL. (2014) Orthogeriatric care models and outcomes in hip fracture patients: a systematic review and meta-analysis. [Review]. Journal of Orthopaedic Trauma 28:e49-e55.

79. Prestmo A, Hagen G, Sletvold O et al. (25-4-2015) Comprehensive geriatric care for patients with hip fractures: a prospective, randomised, controlled trial. Lancet 385:1623-1633.

80. Gambatesa M, D'Ambrosio A, D'Antini D et al. (2013) Counseling, quality of life, and acute postoperative pain in elderly patients with hip fracture. Journal of Multidisciplinary Healthcare.6 (pp 335-346), 2013.Date of Publication: 13 Sep 2013. - 346.

81. Farooqi V, van den Berg ME, Cameron ID et al. (2014) Anabolic steroids for rehabilitation after hip fracture in older people. [Review]. Cochrane Database of Systematic Reviews 10:CD008887.

82. Salpakoski A, Tormakangas T, Edgren J et al. (2014) Effects of a multicomponent home-based physical rehabilitation program on mobility recovery after hip fracture: a

randomized controlled trial. Journal of the American Medical Directors Association 15:361-368.

83. Auais MA, Eilayyan O, and Mayo NE. (2012) Extended exercise rehabilitation after hip fracture improves patients' physical function: a systematic review and meta-analysis. [Review]. Physical Therapy 92:1437-1451.

84. Chatha HA, Ullah S, and Cheema ZZ. (2011) Review article: Magnetic resonance imaging and computed tomography in the diagnosis of occult proximal femur fractures. Journal of orthopaedic surgery (Hong Kong) 19:99-103.

85. Rashwan D. (2013) Levobupivacaine patient controlled analgesia: Epidural versus blind fascia iliaca compartment analgesia-A comparative study. Egyptian Journal of Anaesthesia.29 (2) (pp 155-159), 2013.Date of Publication: April 2013. 155-159.

86. Cadossi M, Chiarello E, Savarino L et al. (2013) A comparison of hemiarthroplasty with a novel polycarbonate-urethane acetabular component for displaced intracapsular fractures of the femoral neck: A randomised controlled trial in elderly patients. Bone and Joint Journal.95 B (5) (pp 609-615), 2013.Date of Publication: May 2013. 609-615.

87. Okcu G, Ozkayin N, Okta C et al. (2013) Which implant is better for treating reverse obliquity fractures of the proximal femur: a standard or long nail? Clinical Orthopaedics & Related Research 471:2768-2775.

88. Sylliaas H, Brovold T, Wyller TB et al. (2012) Prolonged strength training in older patients after hip fracture: a randomised controlled trial. Age and ageing 41:206-212.

89. Rahimzadeh P, Imani F, Faiz SH et al. (2014) Effect of intravenous methylprednisolone on pain after intertrochanteric femoral fracture surgery. Journal of Clinical and Diagnostic Research JCDR 8:GC01-GC04.

90. Endo J, Yamaguchi S, Saito M et al. (2013) Efficacy of preoperative skin traction for hip fractures: a single-institution prospective randomized controlled trial of skin traction versus no traction. Journal of Orthopaedic Science 18:250-255.

91. Brin YS, Palmanovich E, Aliev E et al. (2014) Closed reduction and internal fixation for intertrochanteric femoral fractures is safer and more efficient using two fluoroscopes simultaneously. Injury 45:1071-1075.

92. Sahota O, Morgan N, and Moran CG. (2012) The direct cost of acute hip fracture care in care home residents in the UK. Osteoporos.Int. 23:917-920.

93. Griffin XL, Parsons N, Achten J et al. (2015) Recovery of health-related quality of life in a United Kingdom hip fracture population. The Warwick Hip Trauma Evaluation--a prospective cohort study. Bone Joint.J 97-B:372-382.