Egyptian Guidelines for Management of Hip Fractures in the Elderly

Contents

Acknowledgement

We would like to acknowledge the "Hip Fractures in the Elderly" Sub-Group of the Egyptian Orthopaedic Guidelines (EOG) Scientific Committee for developing these guidelines.

Chair of the EOG Scientific Committee:

Adel Adawy, Professor of Orthopaedic Surgery, Benha University – Former Health Minister

Members of the "Hip Fractures in the Elderly" Guideline Development Group (arranged alphabetically):

Amany Ezzat Ayad	Professor of Anaesthesia, ICU and Pain, Cairo University
Elsayed Morsi Zaki Mohamed	Professor of Orthopaedic surgery, Menoufia University
Emad Samuel Boles Saweeres	Professor and Chairman of Orthopaedic Advisory Committee, The General Organisation for Teaching Hospitals and Institutes
Mariam Abdel Azim Ibrahim	Orthopaedic Physical Therapist, Assiut University
Mohamed Saleh Moustafa Hassan	Professor of Orthopaedic Surgery, Suez Canal University, Ismailia
Osama Ahmed Farouk	Professor of Orthopaedic Surgery, Assiut University Trauma Hospital, Faculty of Medicine, Assiut University
Samia Ahmed Abdul-Rahman	Professor of Geriatrics and Gerontology, Ain Shams University
Sherif Ishak Azmy Kheir	Professor of Orthopaedic Surgery, Ain Shams University

Abbreviations

AP = Antero-posterior
ASRA = American Society of Regional Anaesthesia and Pain Medicine
BCIS = Bone Cement Implantation Syndrome
CK = Creatine kinase
CVA =Cerebrovascular Accident
DA = Direct anterior approach
DVT = Deep Vein Thrombosis
ESAIC = European Society of Anaesthesiology and Intensive Care
ESRA = European Society of Regional Anaesthesia
FICB = Fascia iliaca block
FLACC scale = Face, Legs, Activity, Cry, Consolability scale
FNB = Femoral nerve block
HA = Hemiarthroplasty
HFP= Hip Fracture Program
LR = Likelihood Ratio
MI = Myocardial Infarction
MIS = Minimally invasive surgery
PE = Pulmonary Embolism
PENG = Pericapsular Nerve Group
QUADAS-2 = Quality Assessment of Diagnostic Accuracy Studies tool
RCT = Randomized Controlled Trial
THA = Total Hip Arthroplasty
VTE = Venous Thromboembolism

Glossary

- **Ambulatory**: Able to walk 10 meters or more indoor with or without assistive device prior fracture and able to walk independently out of doors with no more than the use of a stick and do not have a condition or comorbidity that makes the procedure unsuitable for them.
- **Early mobilization:** The initiation of functional movement and physical activity as soon as medically and surgically appropriate following injury, illness, or surgery, often within the first 24–48 hours. It may include sitting, standing, transfers, and assisted ambulation depending on the patient's condition and clinical recommendations.
- **Fragility fracture:** These are fractures which result from low-energy trauma (a mechanical force that would not ordinarily cause a fracture), such as a fall from standing height or less. These fractures are the main clinical consequence of osteoporosis, although they may occur in postmenopausal women even in the absence of osteoporosis.
- **Interdisciplinary care:** It is a team which consist of health care professionals from different disciplines who provide coordinated, integrated care with collectively set goals and shared resources and responsibilities.
- **Medically optimized**: Cleared by anaesthesia
- **Neuraxial / deep, non-compressible procedures**: spinal/epidural and deep plexus or deep peripheral blocks at non-compressible sites (treated like neuraxial for timing decisions).
- **Older patient/adult** typically age 60+; however, frailty and comorbidity burden are more important than chronological age.
- **Stable femoral neck fracture:** In patients with stable (impacted/non-displaced Garden's I and II) femoral neck fractures
- **Stable trochanteric fracture:** Stable trochanteric fractures are simple two-part intertrochanteric fractures with posteromedial cortical continuity and lateral wall integrity. This fracture pattern is considered stable as it will resist medial compressive loads once reduced.
- **Superficial / compressible single-shot blocks**: peripheral blocks at compressible sites (e.g., fascia iliaca plane, femoral, adductor canal). Decisions should be based on site-specific bleeding risk assessment.
- **Unstable femoral neck fracture**: displaced intracapsular fractures in which the proximal fragment contains the femoral head with or without a portion of the femoral neck and contained within the capsule and radiologically confirmed Garden type III or IV.
- **Unstable trochanteric fracture:** Unstable trochanteric fractures are fractures with comminution, posteromedial fragment, deficient lateral wall, reversed oblique, and subtrochanteric extension. This fracture pattern is considered unstable as it will drift into varus and/or medialization with exposure to compressive loads.

Executive summary

Recommendations

1. Imaging
   - 1.1. In adults with clinical suspicion of hip fracture but adequate quality negative standard X-rays (anteroposterior pelvis and lateral hip), cross-sectional imaging should be performed. Specifically:
     - 1.1.1. Magnetic resonance imaging (MRI) is the preferred modality due to higher diagnostic sensitivity and specificity for occult hip fractures. **(Strong recommendation)**
     - 1.1.2. Computed tomography (CT) should be considered when MRI is unavailable within 24 hours, contraindicated, or impractical. **(Conditional Recommendation)**
     - 1.1.3. If CT is used first and is negative despite ongoing clinical suspicion, MRI should subsequently be obtained to rule out occult fracture (unless contraindicated). **(Strong Recommendation)**.
2. Preoperative traction
   - 2.1. We advise against the routine use of preoperative traction for patients with a hip fracture. **(Conditional recommendation)**
3. Timing of surgery
   - 3.1. Perform hip fracture surgery on the day of, or the day after admission to hospital (within 48 hours); taking into consideration the patient optimization for surgery. **(Conditional recommendation)**
4. Antithrombotic Management
   - 4.1. On admission, confirm the antithrombotic agent(s), last dose time, renal function and indication (VTE prophylaxis vs therapeutic anticoagulation) before committing to neuraxial or deep regional techniques. **(Strong recommendation)**
   - 4.2. If surgery is delayed beyond the day of admission, consider pharmacological VTE prophylaxis if VTE risk outweighs bleeding risk. Ensure the last dose is at least 12 hours before surgery for low dose LMWH and at least 24 hours for high dose LMWH and fondaparinux. **(Strong recommendation)**
   - 4.3. Treat deep (non-compressible) nerve blocks like lumbar plexus or paravertebral blocks, the same way as neuraxial blocks in respect to VTE prophylaxis drugs interruption timing. For superficial (compressible) single-shot blocks like femoral nerve or fascia iliaca plane blocks, apply a site-based bleeding risk assessment and proceed when the expected benefit outweighs bleeding risk. **(Strong recommendation)**
   - 4.4. Use Annex 2: Minimum interruption intervals (summary table) for a consolidated table. Key principles:
     - 4.4.1. Dose intensity and renal function matter for LMWH and DOACs; insertion and removal of neuraxial catheters are both timing events **(Strong recommendation)**
     - 4.4.2. It is advised to check platelet count if LMWH has been used for more than 4 days due to heparin-induced thrombocytopenia risk. **(Conditional recommendation).**
   - 4.5. When neuraxial or deep catheters are used, coordinate LMWH dosing with both catheter placement and removal.
     - 4.5.1. Stop low-dose LMWH at least 12 hours before placement or removal of the catheter, and for 24 hours before placement or removal in case of high dose LMWH. **(Strong recommendation)**

4.5.2. In all cases; (low and high dose LMWH); start first LMWH dose at least 12 hours after placement and at least 4 hours after removal. **(Strong recommendation)**

4.6. Provide post-operative VTE prophylaxis according to individual risk assessment; extended prophylaxis (e.g., 28–35 days) is commonly used after hip fracture surgery. **(Conditional recommendation)**

5. Perioperative Analgesia
   - 5.1. Assess pain score immediately on presentation (at rest and on movement) and reassess within 30 minutes after any analgesic intervention; then hourly until pain is controlled, and thereafter with routine observations. **(Strong recommendation)**
   - 5.2. Offer regular paracetamol/acetaminophen every 6 hours pre- and post-operatively unless contraindicated; use intravenous dosing when oral administration is unreliable. **(Strong Recommendation)**
   - 5.3. Use opioids as rescue therapy with small, titrated doses (prefer immediate-release oral or carefully titrated IV boluses) when paracetamol alone is insufficient. Avoid initiating prolonged-release opioids in the acute perioperative phase. **(Strong recommendation)**
   - 5.4. Offer an early peripheral nerve block [e.g., fascia iliaca, femoral, or Pericapsular Nerve Group (PENG)] block when trained staff and ultrasound are available, to improve pain control and reduce systemic opioid requirements. Do not delay surgery for block placement. **(Conditional recommendation)**
   - 5.5. When opioids are used, prescribe antiemetic and bowel regimen, monitor sedation score, respiratory rate, and oxygen saturation, and screen for delirium daily. Encourage early mobilization and physiotherapy when clinically appropriate. **(Strong recommendation)**
   - 5.6. Avoid routine NSAIDs/COX-2 inhibitors in frail older hip fracture patients. Consider them only when a senior clinician documents a favourable risk-benefit assessment and there are no contraindications (renal dysfunction, high bleeding risk, active GI disease, interacting anticoagulants). **(Conditional recommendation)**
   - 5.7. Routine use of epidural analgesia for hip fracture surgery is discouraged. If used, restrict to selected cases under acute pain service or senior anaesthesia oversight, with explicit anticoagulant coordination and haemodynamic monitoring. **(Conditional recommendation)**
   - 5.8. Use a layered multimodal regimen for all hip fracture patients unless contraindicated: regular paracetamol (acetaminophen) as baseline therapy, early peripheral nerve block (single-shot fascia iliaca or femoral nerve block where available), and opioids for rescue analgesia using small, titrated immediate-release doses. Reserve short-course NSAID/COX-2 inhibitor only in carefully selected low-risk patients **(Strong recommendation)**
6. Anaesthetic management
   - 6.1. Proceed to surgery as soon as feasible once immediately reversible problems are addressed (e.g., hypoxia, hypovolaemia, severe electrolyte derangements, uncontrolled pain). **(Strong Recommendation)**
   - 6.2. Either neuraxial (spinal) or general anaesthesia is acceptable. Choose the technique that can be delivered safely and promptly given antithrombotic timing, physiological reserve, airway risk, expected surgical duration, and local expertise. **(Conditional recommendation)**
   - 6.3. Aim to maintain any change in systolic blood pressure/mean arterial pressure within approximately 20% of the patient's baseline, avoid hypoxia and hypercarbia, maintain

normothermia, and use a proactive vasopressor strategy with judicious fluids. **(Strong recommendation)**

6.4. For cemented arthroplasty, identify high-risk patients and apply BCIS (Bone Cement Implantation Syndrome) precautions: a team 'cement pause', maintain blood pressure close to baseline, optimize oxygenation, and have vasopressors immediately available. **(Strong Recommendation)**

6.5. Implement multimodal analgesia, delirium prevention measures (adequate pain control, oxygenation, hydration, sleep-wake support), and early mobilization. Coordinate VTE prophylaxis timing with any neuraxial or deep catheter use. **(Strong recommendation)**

7. Planning the theatre team
   7.1. Schedule hip fracture surgery on a planned trauma list
   7.2. Consultants or senior staff must supervise trainees and junior members of the anaesthesia, surgical, and theatre teams when they carry out hip fracture procedures **(Good practice statement)**.
8. Surgical Procedures
   8.1. Stable femoral neck fractures
      8.1.1. In patients with stable femoral neck fractures (impacted/non-displaced, Garden's I and II, Annex 6: Garden Classification of Femoral Neck Fracture), internal fixation or arthroplasty may be considered, after assessment of the patient and imaging of the hip joint. **(Conditional recommendation)**
   8.2. Unstable femoral neck fractures
      8.2.1. Arthroplasty vs Fixation
         8.2.1.1. For displaced (Garden III/IV) fractures neck femur in ambulatory or functionally independent elderly patient, HA or THA is strongly recommended over internal fixation. **(Strong Recommendation)**
      8.2.2. Unipolar/bipolar hemiarthroplasty
         8.2.2.1. Use a femoral stem design other than Austin Moore or Thompson stems for arthroplasties. Unipolar (Austin Moore or Thompson) prosthesis should be used in strictly limited conditions, e. g. Unavailable bipolar prosthesis. **(Good practice statement)**
      8.2.3. Total Arthroplasty vs Hemi Arthroplasty
         8.2.3.1. For fit, active elderly patients (≥60 years) with displaced femoral neck fractures, Total Hip Arthroplasty (THA) is suggested rather than Hemiarthroplasty (HA) to improve function and reduce revision risk. **(Conditional recommendation)**
         8.2.3.2. For frail, medically complex, or cognitively impaired patients with limited mobility, Hemiarthroplasty (HA) may be preferred due to shorter operative time and reduced perioperative risk. **(Conditional recommendation)**
         8.2.3.3. Decisions should incorporate individual patient comorbidities, cognition, pre-fracture mobility, surgical risk, and patient preference. **(Strong recommendation)**
      8.2.4. Cemented femoral stems
         8.2.4.1. Cemented stem implants are preferred in patients undergoing surgery with arthroplasty. **(Conditional recommendation)**
      8.2.5. Surgical approach
         8.2.5.1. In patients undergoing treatment of femoral neck fractures with hip arthroplasty, evidence does not show a favoured surgical approach. Select

approach based on surgeon's experience and preference. **(Good practice statement)**

8.3. Intertrochanteric fractures

8.3.1. In patients with stable intertrochanteric fractures, use of either a sliding hip screw or a cephalomedullary device is recommended. Use a dynamic hip screw (DHS) in preference to an intramedullary nail in patients with stable intertrochanteric fractures **(Strong recommendation)**

8.3.2. In patients with unstable intertrochanteric fractures, the use of cephalomedullary device is recommended. **(Strong recommendation)**

8.3.3. In patients with subtrochanteric or reverse obliquity fractures a cephalomedullary device is recommended. **(Strong recommendation)**

9. Blood transfusion

9.1. A blood transfusion threshold of no higher than 8g/dl is suggested in asymptomatic postoperative hip fracture patients. **(Conditional recommendation)**

10. Tranexamic acid

10.1. Tranexamic acid should be administered to reduce blood loss and blood transfusion in patients with hip fractures. **(Strong recommendation)**

11. Interdisciplinary/Multidisciplinary care programs

11.1. On admission, offer patients a formal, acute orthogeriatric or orthopaedic ward-based fracture program that includes the following steps (**Conditional recommendation)**:

11.1.1. Comprehensive orthogeriatric assessment to evaluate both current and baseline level of functioning

11.1.2. Rapid optimization to make patient fit for surgery

11.1.3. Identify individual goals for multidisciplinary rehabilitation to recover mobility and independence, and to achieve return to pre-fracture residence when possible

11.1.4. Offer longitudinal, coordinated, orthogeriatric and multidisciplinary review

11.1.5. Provide liaison or integration with related services, particularly mental health (delirium prevention), falls prevention, bone health, primary care and social services

11.1.6. Clinical and service governance responsibility for all stages of the pathway of care and rehabilitation, including those provided in the community.

12. Postoperative rehabilitation

12.1. In patients undergoing surgical stabilization of hip fractures, early mobilization, including functional movement within 24–48 hours postoperatively is recommended, provided the patient is medically and mobilization is consistent with the surgeon's postoperative instructions **(Strong recommendation)**

12.2. Following hip fracture surgery, weight-bearing should be initiated as early as clinically feasible, with full weight-bearing as tolerated recommended after stable fixation, unless contraindicated by surgical or patient-specific factors **(Conditional recommendation)**

12.3. Rehabilitation after hip fracture surgery should follow a structured, phased pathway, spanning the acute inpatient phase, home or inpatient rehabilitation services, and outpatient rehabilitation, aligned with the patient's recovery stage and care setting **(Conditional recommendation)**

12.4. Fall prevention strategies should begin with identification and management of underlying fall risk factors, including muscle weakness, balance deficits, cognitive impairment, medication-related side effects, orthostatic hypotension, visual impairment, and environmental hazards. These strategies should be systematically integrated into all

phases of postoperative rehabilitation following hip fracture surgery **(Conditional recommendation).**

12.5. Standardized functional and mobility outcome measures, such as the Timed Up and Go Test (TUG test), should be used regularly to guide rehabilitation progression and monitor recovery after hip fracture surgery. **(Conditional recommendation)**

12.6. Discharge planning should begin early during hospitalization and be individualized based on medical stability, functional recovery, cognitive status, family support, and access to rehabilitation services. In the Egyptian healthcare setting, most patients require a short inpatient stay followed by home-based or facility-based rehabilitation. Early discharge within 24–48 hours may be considered for selected, medically stable patients with adequate family support and rehabilitation access. Same-day or next-day discharge should be limited to exceptional cases. **(Conditional recommendation)**

12.7. Following hip fracture surgery, appropriate assistive devices should be prescribed and regularly reassessed to support safe ambulation. A walker is recommended in the early postoperative phase, with progression to a cane held in the contralateral hand to the operated limb as balance, strength, and weight-bearing tolerance improve. **(Good practice statement)**

13. Patient and carer information

13.1. It is crucial to offer the patients (or when appropriate, their carers) information about their medical diagnosis and its implications and treatment options and management plan either verbally or in printed form **(Good practice statement)**

Introduction

Hip fractures represent a major public health challenge and are among the most serious consequences of osteoporosis and falls in older adults. They are associated with substantial morbidity, mortality, loss of independence, reduced quality of life, and increased healthcare utilization. With an aging population, the incidence of hip fractures is expected to continue rising, placing an increasing burden on healthcare systems and society[1,2].

Optimal outcomes following hip fracture depend on timely diagnosis, appropriate surgical management, comprehensive perioperative care, early mobilization, multidisciplinary rehabilitation, and secondary fracture prevention. However, variations in clinical practice and institutional protocols may lead to inconsistencies in patient assessment, treatment selection, perioperative management, and rehabilitation, ultimately affecting patient outcomes[3,4].

Management of displaced intracapsular hip fractures, particularly completely displaced femoral neck fractures, remains an important area where treatment strategies may differ between institutions. Standardized, evidence-based recommendations are therefore essential to ensure that patients receive the most appropriate intervention based on current evidence, patient characteristics, functional status, and surgical expertise[5,6].

These Egyptian Guidelines for the Management of Hip Fractures have been developed to provide evidence-based, multidisciplinary recommendations for the assessment and management of adults with hip fractures. The guidelines aim to standardize care across healthcare settings in Egypt, improve patient outcomes, reduce complications, optimize resource utilization, and promote functional recovery and secondary fracture prevention.

Scope and purpose

These Egyptian Guidelines provide evidence-based recommendations for the multidisciplinary management of adults with hip fractures, from initial presentation through definitive treatment, rehabilitation, and secondary fracture prevention. The guideline covers the assessment and management of intracapsular and extracapsular hip fractures, including recommendations for surgical decision-making, perioperative optimization, anaesthesia, pain management, blood transfusion, thromboprophylaxis, postoperative rehabilitation, orthogeriatric care, osteoporosis management, and discharge planning.

The primary objectives of these guidelines are to:

- Standardize evidence-based hip fracture care across healthcare institutions in Egypt.
- Support appropriate surgical decision-making, including indications for internal fixation and arthroplasty in patients with femoral neck fractures.
- Promote timely surgery and optimization of physiological status before surgery.
- Provide recommendations for perioperative management, including pain control, regional anaesthesia, blood management, and thromboprophylaxis.
- Facilitate early mobilization, multidisciplinary rehabilitation, and restoration of functional independence.
- Reduce complications, mortality, hospital length of stay, and unnecessary healthcare costs.

These guidelines are designed to provide practical, evidence-informed recommendations that can be implemented across a wide range of healthcare settings while allowing clinicians to individualize management according to patient characteristics, comorbidities, available resources, and clinical judgment.

Target audience

These guidelines are intended for healthcare professionals involved in the care of patients with hip fractures, including:

- Orthopaedic surgeons
- Geriatricians
- Anaesthesiologists
- Emergency medicine physicians
- Physiotherapists
- physiatrist
- Nursing staff
- Clinical pharmacists
- Radiologists

Methods

A comprehensive search for guidelines was undertaken to identify the most relevant guidelines to consider for adaptation.

Inclusion/ exclusion criteria followed in the search and retrieval of guidelines to be adapted:

- Selecting only evidence-based guidelines (guideline must include a report on systematic literature searches and explicit links between individual recommendations and their supporting evidence)
- Selecting only national and/or international guidelines
- Specific range of dates for publication (using Guidelines published or updated in the last 3 years)
- Selecting peer reviewed publications only
- Selecting guidelines written in English language
- Excluding guidelines written by a single author, not on behalf of an organization to be valid and comprehensive, a guideline ideally requires multidisciplinary input
- Excluding guidelines published without references as the panel needs to know whether a thorough literature review was conducted and whether current evidence was used in the preparation of the recommendations

The following characteristics of the retrieved guidelines were summarized in:

- Developing organization/authors
- Date of publication, posting, and release
- Country/language of publication
- Date of posting and/or release
- Dates of the search used by the source guideline developers

All retrieved Guidelines were screened and appraised using AGREE II instrument (www.agreetrust.org) by at least three members. The panel decided on a cut-off point or ranked the guidelines (any guideline scoring above 50% on the rigor dimension was retained). The GDG decided to adapt the NICE CG124 (2025 update)[7] hip fracture management guideline and the AAOS Clinical Practice Guideline Summary[2]: Management of Hip Fractures in Older Adults.

Evidence assessment

According to WHO Handbook for Guidelines, we used the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach to assess the quality of a body of evidence, develop and report recommendations. GRADE methods are used by WHO because these represent internationally agreed standards for making transparent recommendations. Detailed GRADE information is available on the following sites:

- GRADE working group: https://www.gradeworkinggroup.org
- GRADE online training modules: https://macgrade.mcmaster.ca/grade-learning-hub/grade-for-guideline-development/
- GRADE profile software: https://www.gradepro.org

Quality of evidence was rated according to criteria in Table 1. Significance of the four levels of evidence and factors that determine how to upgrade or downgrade the quality of evidence are illustrated in Annex 1: GRADE's approach to rating quality of evidence [8]

Table 1: Quality of evidence in GRADE

Quality level	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

The strength of the recommendation
The strength of a recommendation communicates the importance of adherence to the recommendation.

Strong recommendations
With strong recommendations, the guideline communicates the message that the desirable effects of adherence to the recommendation outweigh the undesirable effects. This means that in most situations the recommendation can be adopted as policy.

Conditional recommendations
These are made when there is greater uncertainty about the four factors above or if local adaptation has to account for a greater variety in values and preferences, or when resource use makes the intervention suitable for some, but not for other locations. This means that there is a need for substantial debate and involvement of stakeholders before this recommendation can be adopted as policy.

When not to make recommendations
When there is lack of evidence on the effectiveness of an intervention, it may be appropriate not to make a recommendation.

Recommendations

Imaging options in occult hip fracture

Recommendation:

1. In adults with clinical suspicion of hip fracture but adequate quality negative standard X-rays (anteroposterior pelvis and lateral hip), cross-sectional imaging should be performed. Specifically:
   1.1. Magnetic resonance imaging (MRI) is the preferred modality due to higher diagnostic sensitivity and specificity for occult hip fractures. **(Strong recommendation, Moderate quality evidence)**
   1.2. Computed tomography (CT) should be considered when MRI is unavailable within 24 hours, contraindicated, or impractical. **(Conditional Recommendation, Moderate quality evidence)**
   1.3. If CT is used first and is negative despite ongoing clinical suspicion, MRI should subsequently be obtained to rule out occult fracture (unless contraindicated). **(Strong Recommendation, Moderate quality evidence)**

Remarks

When to Offer MRI

Clinical scenarios warranting MRI:

- Persistent **hip pain**, inability to bear weight, or other clinical signs strongly suggestive of proximal femur fracture despite **negative X-rays**.
- Patients with risk factors: older age, osteoporosis, history of a fall, severe localized pain, or inability to ambulate.
- Cases where precise delineation of fracture pattern and soft tissue injury may affect management.

Rationale:

- MRI detects **bone marrow oedema** and subtle fracture lines that are otherwise occult on both X-ray and CT. It also identifies associated injuries (e.g., pelvic fractures).

When to Offer CT

Appropriate scenarios:

- MRI is **not immediately available (e.g., within 24 hours)** due to logistical or capacity limitations.
- Patients with **MRI contraindications** (pacemakers or other non-MRI compatible implants, severe claustrophobia that cannot be managed).
- Emergently when rapid imaging is needed and immediate MRI would be delayed.

Role of CT:

- CT is more widely available in emergency settings and provides quick evaluation.
- If CT identifies a fracture, treatment can proceed without delay.
- If CT is **negative but clinical suspicion persists**, patients should proceed to MRI for definitive exclusion.

Summary of evidence

Meta-Analysis and Systematic Evidence

- A recent systematic review and meta-analysis (2024) found that **both MRI and CT have good diagnostic efficacy** in detecting occult hip fractures. However, **MRI consistently showed higher sensitivity and specificity than CT**, indicating **superior diagnostic accuracy**.[9]

Observational Comparisons

- Retrospective comparative studies indicate that:
  - MRI more reliably identifies occult fractures that are not visible on CT.[10]
  - A negative CT cannot fully exclude a hip fracture if clinical suspicion remains high.[11]
- In some cohorts, CT and MRI detected similar numbers of fractures, but when CT was negative and clinical suspicion persisted, **MRI subsequently identified fractures missed by CT**.[12]

Table 2: Diagnostic Accuracy of MRI versus CT for Occult Hip Fracture [9]

Parameter	MRI	CT
Pooled Sensitivity (Meta-analysis)	0.94 (95% CI: 0.80–0.99)	0.92 (95% CI: 0.81–0.96)
Pooled Specificity (Meta-analysis)	0.98 (95% CI: 0.94–1.00)	0.94 (95% CI: 0.87–0.97)
Positive LR	8.14 (95% CI: 5.70–108.04)	7.60 (95% CI: 5.07–34.44)
Negative LR	0.06 (95% CI: 0.01–0.22)	0.09 (95% CI: 0.04–0.21)
Area Under the ROC	~0.99 (excellent)	~0.98 (excellent)
Summary	High diagnostic accuracy; slightly superior to CT overall	Very good accuracy but slightly lower than MRI

Table 3: GRADE Assessment – Diagnostic Accuracy [9]

Outcome	MRI	CT
Overall Quality of Evidence	**Moderate** – multiple studies with QUADAS-2 assessment; consistency in pooled diagnostic performance.	**Moderate (lower than MRI)** – similar meta-analytic data but a trend toward slightly lower sensitivity; some studies highlight false negatives.
Risk of Bias	Generally low in meta-analysis; QUADAS-2 showed minimal concerns.	Similar quality in QUADAS-2, but clinical follow-up in some cohorts showed missed fractures.
Indirectness	Directly applicable to patients with suspected occult hip fracture after negative radiographs.	Same applicability.
Imprecision	Moderate (CI ranges reflect some uncertainty).	Moderate (similar CI uncertainty).
Publication Bias	Not statistically significant in meta-analyses.	Not statistically significant.

Rationale for the recommendation

- **Patient safety**: Untreated occult hip fractures can displace, leading to worse outcomes (pain, morbidity, prolonged immobility).
- **Availability**: Many centres cannot access urgent MRI; CT may be used practically.
- **Contraindications**: Standard MRI contraindications (e.g., ferromagnetic implants) increase the importance of CT as an alternative.
- **Radiation**: CT carries ionizing radiation risk, which should be balanced against clinical urgency.

- **MRI:** Highest diagnostic accuracy, no radiation exposure, sensitive to marrow oedema, consistent results across studies.
- **CT:** High specificity but lower sensitivity; potential for false negatives.

Preoperative traction

Recommendation

We advise against the routine use of preoperative traction for patients with a hip fracture. **(Conditional recommendation, High quality evidence)**

Remarks

Complications, comfort, and pain are important outcomes related to hip fracture. Not using preoperative traction ease the patient's comfort in bed, decreases pain and lowers the incidence of possible bedridden complications.

Summary of evidence

Overall, there were two high quality[13,14] and six moderate studies[15-20] addressing preoperative traction. Since 2012, one high[13] and one moderate quality study[19] investigated preoperative traction. Tosun[19] (2018) found that a position splint resulted in significant difference in immobilization comfort score (30.1/100) and pain compared to traction, whereas Endo[13] found no differences in pain. Tosun also found that preoperative traction resulted in more pre-operative complications (constipation, pressure ulcers, adhesive plaster allergy, urinary tract infections, pulmonary complications, bleeding in the fractured joint) than a position splint applied for 1 day preoperatively, whereas Endo found no significant differences in complications between traction and no traction. These results are consistent with prior evidence and strengthen the body of evidence indicating that there are no benefits of preoperative traction. The recommendation reflects that there are some instances in which traction may be required (e.g., specific cases with peri-trochanteric fractures), however, in most cases pre- operative traction should not be used.

Rationale for the recommendation

There are no known harms of implementing this recommendation. Use of alternatives to preoperative traction appeared to be acceptable to patients like positioning with pillows.

Timing of surgery

Recommendation

Perform hip fracture surgery on the day of, or the day after admission to hospital (within 48 hours); taking into consideration the patient optimization for surgery. **(Conditional recommendation, Moderate quality evidence)**

Remarks

Traditionally, hip fracture patients have not always been considered a priority group in accessing theatres and the injury itself is rarely life threatening. However, older people with a hip fracture frequently have multiple co-morbidities, limited physiological reserve and are prone to an increase in complications from prolonged bed rest. Hospitals must therefore be organised in such a way that facilitates timely and planned surgery without delays, meaning not only adequate theatre capacity for trauma surgery and availability of anaesthetists and surgeons, but also a means of rapidly assessing and optimising frail, elderly patients with multiple co-morbidities.

Summary of evidence

Systematic reviews suggested that delay past 48hr increased one-year mortality by 32%. Recent studies, however, have suggested mortality reductions by reducing time to theatre to 24hr and even 12hr from admission[21-24]

Rationale for the recommendation

Moderate evidence supports that hip fracture surgery within 48 hours of admission is associated with better outcomes, less hospital stay and is more cost effective. Taking into consideration resource availability, the panel decided to downgrade the recommendation from strong to conditional, provided that reasons for any delay are clearly documented in the patients notes.

Antithrombotic Management

1. Confirm antithrombotic status early

Recommendation:

On admission, confirm the antithrombotic agent(s), last dose time, renal function and indication (VTE prophylaxis vs therapeutic anticoagulation) before committing to neuraxial or deep regional techniques. **(Strong recommendation, Low quality evidence)**

Remarks

Document last known dose time from a reliable source (medication list, family, pharmacy, or electronic record). If timing is uncertain, manage as 'dose within the minimum interruption interval'.

Summary of evidence

The strong recommendation is based on low-certainty evidence derived from international consensus guidelines, primarily the American Society of Regional Anesthesia and Pain Medicine (ASRA) Fifth Edition Guidelines[25] and the Joint ESAIC/ESRA Guideline[26]. These guidelines emphasize that the cornerstone of safe regional anesthesia in anticoagulated patients is an accurate, timely medication history. The evidence supporting this is largely indirect, stemming from case series and root-cause analyses of catastrophic complications like spinal hematoma, where a common contributing factor was inadequate documentation or verification of anticoagulant timing. The guidelines explicitly state that agent-specific interruption intervals cannot be applied safely without knowing the exact drug, dose, last administration time, and renal function (critical for DOAC and LMWH clearance). This operational step is considered a fundamental patient safety requirement in all perioperative pathways.

Rationale for the recommendation

Timely, accurate drug history avoids unnecessary delays and reduces the risk of neuraxial or deep block hematoma from inadvertently performing a procedure within an unsafe interval.

2. VTE prophylaxis when surgery is delayed:

Recommendation:

If surgery is delayed beyond the day of admission, consider pharmacological VTE prophylaxis if VTE risk outweighs bleeding risk. Ensure the last dose is at least 12 hours before surgery for low dose LMWH and at least 24 hours for high dose LMWH and fondaparinux. **(Strong recommendation, Moderate quality evidence)**

Remarks

Continue mechanical prophylaxis when pharmacological prophylaxis is withheld. Reassess daily as renal function and bleeding risk evolve.

Summary of evidence

This strong recommendation is supported by moderate-certainty evidence from[7,27] on VTE prevention. NICE recommends that patients with hip fractures should receive pharmacological VTE prophylaxis if surgery is delayed beyond the day of admission. The specified minimum intervals (12 hours for prophylactic LMWH, 24 hours for therapeutic LMWH/fondaparinux) are based on pharmacodynamic studies of anti-Xa activity and its correlation with bleeding risk. The evidence balancing VTE risk against bleeding risk comes from large orthopaedic trials and meta-analyses,

which show that while hip fracture patients have a very high baseline VTE risk, indiscriminate pre-operative dosing increases the hazard of surgical and neuraxial bleeding. The "delay-triggered" approach is a pragmatic synthesis of this evidence, aiming to protect patients from VTE during unavoidable waits without compromising the option for regional anaesthesia or increasing intraoperative bleeding.

Rationale for the recommendation

Hip fracture patients are at high VTE risk; however, unnecessary pre-operative dosing can force neuraxial/deep procedures to be deferred. A 'delay-triggered' approach balances both risks.

3. Choose regional technique based on compressibility (deep vs superficial)

Recommendation:

Treat deep (non-compressible) nerve blocks like lumbar plexus or paravertebral blocks, the same way as neuraxial blocks in respect to VTE prophylaxis drugs interruption timing. For superficial (compressible) single-shot blocks like femoral nerve or fascia iliaca plane blocks, apply a site-based bleeding risk assessment and proceed when the expected benefit outweighs bleeding risk. **(Strong recommendation, Low quality evidence)**

Remarks

If neuraxial timing criteria are not met, general anaesthesia with a superficial compressible block is a common compromise to preserve analgesic benefit while avoiding deep needle placement.

Summary of evidence

The strong recommendation for this risk-stratified framework is based on low-certainty evidence from expert consensus, primarily outlined in the Joint ESAIC/ESRA Guideline[26]. This guideline introduces a key conceptual shift: not all regional techniques carry the same bleeding risk. The evidence underpinning this distinction is anatomical and pathophysiological. Deep, non-compressible sites (e.g., neuraxial space, deep plexus) pose a risk of concealed, expanding hematoma with potential for permanent neurological injury, as documented in case reports. In contrast, bleeding at superficial, compressible sites (e.g., fascia iliaca plane) is theoretically easier to detect and control with external pressure. While high-quality comparative studies are lacking, the framework is considered a rational approach to maximize the benefits of regional analgesia (supported by the Cochrane review by Guay et al., 2020)[28] while mitigating the most severe risks in patients on antithrombotics.

Rationale for the recommendation

Nerve blocks are generally categorized as superficial or deep based on anatomical location and tissue compressibility. Superficial nerve blocks target nerves in relatively accessible areas surrounded by compressible tissue. Examples include femoral, interscalene, and axillary blocks etc. These blocks are easier to visualize with ultrasound and pose a lower risk of serious bleeding. Deep nerve blocks, such as lumbar plexus or paravertebral blocks, involve deeper, non-compressible tissue. Compressible sites permit rapid detection and management of bleeding complications; deep sites do not. This supports a risk-stratified approach rather than a one-size-fits-all prohibition.

4. Minimum interruption intervals before neuraxial or deep procedures (summary)

Recommendation:

Use Annex 2: Minimum interruption intervals (summary table) for a consolidated table. Key principles [17,18]:

- Dose intensity and renal function matter for LMWH and DOACs; insertion and removal of neuraxial catheters are both timing events **(Strong recommendation, High quality evidence)**
- It is advised to check platelet count if LMWH has been used for more than 4 days due to heparin-induced thrombocytopenia risk. **(Conditional recommendation, Low quality evidence)**

5. Operational rules for LMWH and neuraxial/deep catheters

Recommendation:

When neuraxial or deep catheters are used, coordinate LMWH dosing with both catheter placement and removal.

- Stop **low-dose LMWH** at least 12 hours before placement or removal of the catheter, and for 24 hours before placement or removal in case of **high dose LMWH**.
- **In all cases**; (low and high dose LMWH); start first LMWH dose at least 12 hours after placement and at least 4 hours after removal.

(Strong recommendation, Moderate quality evidence)

Remarks

If LMWH has been administered for more than 4 days, check platelet count before neuraxial/deep block or catheter removal. Use 1.5 or less for 'acceptable INR' where vitamin K antagonists are involved. [29]

Summary of evidence

These strong recommendations are supported by moderate-certainty evidence synthesizing pharmacodynamic data and large-scale observational safety registries. The specific time intervals for each drug class (LMWH, DOACs, fondaparinux, etc.) before neuraxial/deep blocks are meticulously detailed in the ASRA (2025)[25] and ESAIC/ESRA (2022)[26] guidelines. These intervals are derived from studies of the drug's half-life, time to maximum effect, and time for return of haemostatic function, often modified by renal function for renally cleared agents. The evidence for the critical importance of coordinating catheter removal with anticoagulant dosing is particularly strong, stemming from analysis of case reports of spinal hematoma, which identified catheter removal as a high-risk event. The operational rules for LMWH (e.g., 12-hour windows for once-daily dosing) are based on sustained clinical experience and pharmacodynamic modelling that aims to avoid peak anticoagulant activity during needle placement or catheter manipulation, thereby reducing the risk of this rare but devastating complication.

Rationale for the recommendation

Catheter placement and removal create tissue planes susceptible to bleeding. Timing anticoagulant exposure around these events reduces catastrophic but rare complications.

6. Post-operative prophylaxis duration and agent selection

Recommendation:

Provide post-operative VTE prophylaxis according to individual risk assessment; extended prophylaxis (e.g., 28–35 days) is commonly used after hip fracture surgery. **(Conditional recommendation, Moderate quality evidence)**

Remarks

Choice of agent (LMWH, DOAC, warfarin, or aspirin in selected patients) should reflect surgical plan, renal function, bleeding risk, and contraindications, and must be coordinated with any neuraxial/deep catheter use.

Summary of evidence

This conditional recommendation is based on low-to-moderate certainty evidence from various orthopaedic and thromboprophylaxis guidelines, including NICE NG89, AAOS (2021), and PROSPECT (2024)[2,27,30]. The evidence consistently identifies hip fracture surgery as a highest-risk scenario for VTE, justifying pharmacologic prophylaxis. Randomized controlled trials and meta-analyses provide moderate-certainty evidence that extended prophylaxis (e.g., 28-35 days) reduces the risk of symptomatic VTE compared to shorter (e.g., 10-14 day) regimens. However, the evidence is less clear on the net benefit, as extended therapy increases the risk of major bleeding. This trade-off leads to the conditional strength of the recommendation, necessitating individualization based on patient-specific bleeding risk, mobility, and renal function. The guidance to coordinate agent choice with neuraxial catheters is again directly informed by the ASRA/ESAIC/ESRA guidelines to prevent catheter-related hematoma.

Rationale for the recommendation

The VTE risk remains elevated after discharge. Extended prophylaxis may reduce symptomatic VTE at the cost of increased bleeding in some subgroups; thus, individualization is required.

Perioperative Analgesia

1. Structured pain assessment and reassessment:

Recommendation

Assess pain score immediately on presentation (at rest and on movement) and reassess within 30 minutes after any analgesic intervention; then hourly until pain is controlled, and thereafter with routine observations. **(Strong recommendation, Moderate quality evidence)**

- In conscious patients use the Numerical Pain Rating (NPR) score to measure pain
- In case of cognitive impairment, use observational tools (e.g., FLACC [Face, Legs, Activity, Cry, Consolability] scale) and incorporate caregiver input.
- Always document sedation score and respiratory rate after opioid escalation

Remarks

In conscious patients use the Numerical Pain Rating (NPR) score to measure pain and in case of cognitive impairment, use observational tools (e.g., FLACC [Face, Legs, Activity, Cry, Consolability] scale)[31] (Annex 3: FLACC score and Ramsay sedation score), and incorporate caregiver input. Always document sedation score[32] and respiratory rate after opioid escalation.

Summary of evidence

This recommendation is strongly supported by moderate-certainty evidence from the NICE CG124 (2025 update)[7] hip fracture management guideline. The guideline explicitly mandates structured pain assessment at presentation and after each analgesic intervention. The evidence for using observational pain scales (e.g., the FLACC scale)[31] in patients with cognitive impairment or delirium is drawn from validation studies in geriatric and postoperative populations, which show improved detection of pain compared to self-report alone. Regular reassessment protocols are linked in observational studies to more timely analgesia adjustments, reduced incidence of severe pain during movement or positioning, and a lower risk of opioid-related oversedation. This approach is foundational to the "delirium-aware" care emphasized in multidisciplinary hip fracture pathways.

Rationale for the recommendation

Early pain control enables imaging, nursing care, and positioning for anaesthesia, and reduces delirium risk. Reassessment prevents both undertreatment and oversedation.

2. Baseline analgesia: regular paracetamol (acetaminophen):

Recommendation

Offer regular paracetamol/acetaminophen every 6 hours pre- and post-operatively unless contraindicated; use intravenous dosing when oral administration is unreliable. **(Strong Recommendation, Moderate quality evidence)**

Remarks

Review maximum daily dose in low body weight, frailty, or liver disease; include all sources (drug combination tablets) of acetaminophen to avoid unintentional overdose.

Summary of evidence

The strong recommendation is based on moderate-certainty evidence from NICE CG124[7], which identifies regular scheduled paracetamol as the first-line analgesic for hip fracture patients. The evidence synthesizes data showing that paracetamol provides effective baseline analgesia with a

superior safety profile compared to NSAIDs or opioids in older adults, particularly regarding gastrointestinal, renal, and bleeding risks. The emphasis on intravenous administration when the oral route is unreliable is supported by pharmacokinetic studies in frail or acutely ill older adults demonstrating more predictable bioavailability. The caution regarding maximum daily dose (especially with combination products) is a direct application of pharmacovigilance data on acetaminophen-induced hepatotoxicity, which is cited in drug safety communications from regulatory bodies like the FDA and MHRA.

Rationale for the recommendation

Paracetamol provides baseline analgesia with a favorable safety profile compared with opioids in older adults when dose limits are respected.

3. Opioid rescue: small, titrated immediate-release dosing:

Recommendation

Use opioids as rescue therapy with small, titrated doses (prefer immediate-release oral or carefully titrated IV boluses) when paracetamol alone is insufficient. Avoid initiating prolonged-release opioids in the acute perioperative phase. **(Strong recommendation, Moderate quality evidence)**

Remarks

Start low and titrate slowly, especially in renal impairment and cognitive impairment. Implement routine bowel regimen and antiemetic when opioids are used.

Summary of evidence

This strong recommendation is grounded in moderate-certainty evidence primarily from NICE CG124[7] and reinforced by geriatric pharmacology principles. NICE recommends immediate-release opioids as rescue therapy when paracetamol is insufficient. The evidence against initiating long-acting opioids in the acute phase comes from cohort studies and expert consensus (e.g., Association of Anaesthetists guideline)[33], which associate these agents with a higher risk of sedation, respiratory depression, and delirium in opioid-naïve older patients. The "start low, go slow" titration approach is supported by pharmacokinetic data showing increased sensitivity and variable clearance in older adults, especially with renal impairment (notably for morphine metabolites). The mandatory co-prescription of a bowel regimen is based on high-quality evidence demonstrating the near-universality of opioid-induced constipation and its negative impact on recovery.

Rationale for the recommendation

Immediate-release dosing allows rapid titration to effect and reduces risk of accumulation and oversedation.

4. Early regional analgesia (single-shot block) where available:

Recommendation

Offer an early peripheral nerve block [e.g., fascia iliaca, femoral, or Pericapsular Nerve Group (PENG)] block when trained staff and ultrasound are available, to improve pain control and reduce systemic opioid requirements. Do not delay surgery for block placement. **(Conditional recommendation, Moderate quality evidence)**

Remarks

Coordinate with antithrombotic status using the deep vs superficial framework; monitor for local anaesthetic systemic toxicity and document motor block/falls risk.

Summary of evidence

The conditional recommendation is supported by moderate-certainty evidence from two key sources. First, NICE CG124[7] recommends considering a nerve block if pain is severe or to limit opioid dose. More robust, procedure-specific evidence comes from the Cochrane systematic review by Guay et al. (2020)[28], which analyzed randomized trials of peripheral nerve blocks for hip fracture. This review concluded that blocks (especially fascia iliaca compartment blocks) provide superior pain relief on movement, reduce systemic opioid consumption, and are associated with a lower risk of postoperative confusion (delirium). The recommendation not to delay surgery for a block is a pragmatic one, based on pathway analyses from NICE that prioritize timely surgery. Coordination with antithrombotic therapy is meticulously detailed in the ASRA (Kopp et al., 2025)[25] and ESAIC/ESRA (Kietaibl et al., 2022)[26] guidelines, which provide risk-stratified timing for blocks based on anticoagulant type.

Rationale for the recommendation

Blocks facilitate positioning, reduce opioid exposure, and may improve early rehabilitation participation.

5. Supportive measures and monitoring:

Recommendation

When opioids are used, prescribe antiemetic and bowel regimen, monitor sedation score, respiratory rate, and oxygen saturation, and screen for delirium daily. Encourage early mobilization and physiotherapy when clinically appropriate. **(Strong recommendation, Low quality evidence)**

Remarks

Avoid benzodiazepines unless clearly indicated; minimize anticholinergic burden.

Summary of evidence

The strong recommendation is supported by low-certainty direct evidence but is a cornerstone of multidisciplinary hip fracture care pathways like NICE CG124[7]. The evidence for routine antiemetic and bowel prophylaxis with opioids is extrapolated from high-quality studies in other surgical populations and is considered standard of care to prevent iatrogenic harm. The link between structured monitoring (sedation, respiration, oxygenation) and reduced opioid-related adverse events is supported by patient safety initiatives. The emphasis on daily delirium screening is mandated by NICE and is based on studies showing that systematic detection leads to earlier intervention. The recommendation to avoid benzodiazepines is strongly supported by multiple high-quality studies and meta-analyses (cited in geriatric and delirium guidelines) that consistently associate them with increased delirium risk, falls, and cognitive decline in older hospitalized patients.

Rationale for the recommendation

Complications from opioids (respiratory depression, delirium, constipation) are common drivers of poor outcomes and longer admissions.

6. NSAIDs and COX-2 inhibitors: selective use only:

Recommendation

Avoid routine NSAIDs/COX-2 inhibitors in frail older hip fracture patients. Consider them only when a senior clinician documents a favourable risk-benefit assessment and there are no contraindications (renal dysfunction, high bleeding risk, active GI disease, interacting anticoagulants). **(Conditional recommendation, Low quality evidence)**

Remarks

This recommendation reflects the tension between sources: NICE CG124[7] does not recommend NSAIDs for hip fracture, whereas PROSPECT recommends NSAIDs or COX-2 inhibitors as part of multimodal analgesia when appropriate.

Summary of evidence

This conditional recommendation arises from a tension between guideline sources, leading to low-certainty evidence for routine use. The PROSPECT recommendations (2024)[34] list NSAIDs or COX-2 inhibitors as a component of basic multimodal analgesia for hip fracture repair when no contraindications exist, citing evidence for their opioid-sparing and anti-inflammatory effects. However, NICE CG124 explicitly does not recommend NSAIDs for this population due to concerns about renal impairment, gastrointestinal bleeding, and interference with bone healing. This guideline's default "avoid" stance is justified by the high prevalence of these risk factors in the typical frail, older hip fracture population, as documented in large epidemiological studies. The requirement for a senior clinician's documented risk-benefit assessment is a safety mechanism to identify the minority of patients (e.g., robust, with normal renal function) who might benefit from short-term use.

Rationale for the recommendation

A default-to-avoid stance in high-risk patients reduces preventable renal and bleeding complications while allowing clinician discretion for lower-risk individuals.

7. Epidural analgesia: selected cases only:

Recommendation

Routine use of epidural analgesia for hip fracture surgery is discouraged. If used, restrict to selected cases under acute pain service or senior anaesthesia oversight, with explicit anticoagulant coordination and haemodynamic monitoring. **(Conditional recommendation, Low quality evidence)**.

- Our current practice in Egypt still permits the use of epidural anaesthesia / analgesia in selected patients with consideration of the anticoagulants use/withhold recommended duration for catheter insertion and removal, in view of the immaturity of regional blocks training especially in rural areas.

Remarks

Risks include hypotension, motor block with falls risk, urinary retention, infection, and neuraxial hematoma (timing dependent).

Summary of evidence

The strong recommendation against routine use is based on low-certainty, procedure-specific evidence from the PROSPECT Working Group (2024)[34]. PROSPECT's analysis found limited high-

quality studies demonstrating a clear advantage of epidural over systemic or peripheral nerve block techniques for hip fracture surgery, while the risks (hypotension, motor block/falls, urinary retention, infection, and neuraxial hematoma) are well-documented in the broader anaesthesia literature. The guidelines from ASRA[25] and ESAIC/ESRA[26] heavily inform the strict anticoagulant coordination required. The acknowledgment of potential use in selected cases (e.g., with Acute Pain Service oversight) reflects clinical pragmatism, allowing for its consideration in complex pain scenarios or where regional block expertise is limited, provided the stringent safety protocols for anticoagulant management and hemodynamic monitoring are followed.

Rationale for the recommendation

In this frail population, the risk and monitoring burden often outweigh incremental benefit compared with peripheral blocks and systemic multimodal regimens.

8. Multimodal analgesia: overall strategy and core components:

Recommendation

Use a layered multimodal regimen for all hip fracture patients unless contraindicated: regular paracetamol (acetaminophen) as baseline therapy, early peripheral nerve block (single-shot fascia iliaca or femoral nerve block where available), and opioids for rescue analgesia using small, titrated immediate-release doses. Reserve short-course NSAID/COX-2 inhibitor only in carefully selected low-risk patients (Strong recommendation, Moderate quality evidence)

Remarks

Tailor component selection to frailty, renal function, gastrointestinal/bleeding risk, and cognitive status. Prefer established blocks (FICB/FNB); consider newer techniques (e.g., PENG) only where local expertise exists and within protocols, as procedure-specific evidence remains limited. Avoid routine use of adjuvant techniques/drugs with insufficient procedure-specific evidence (e.g., IV dexmedetomidine/clonidine as analgesic adjuncts, routine local infiltration analgesia) outside specialist pathways. Do not delay surgery to complete the multimodal regimen; reassess pain and sedation after each escalation (Annex 4: Multimodal analgesia for hip fracture).

Summary of evidence

This recommendation is supported by convergent guidelines and systematic review of evidence. A multidisciplinary UK consensus statement endorses multimodal analgesia throughout the peri-operative pathway, defining it as combining analgesics with different mechanisms to improve analgesia and permit lower doses of individual drugs, thereby reducing adverse effects.[35] PROSPECT[34] procedure-specific guidance for hip fracture repair recommends basic multimodal analgesia with scheduled paracetamol and NSAIDs or COX-2-selective inhibitors when not contraindicated, combined with a single-shot femoral nerve block or fascia iliaca compartment block, and reserving opioids as rescue analgesia. NICE CG124[7] similarly positions regular paracetamol as first-line, immediate-release opioids as additional analgesia, and suggests adding nerve blocks when pain control is inadequate or to limit opioid dose. Evidence syntheses (e.g., Cochrane reviews)[28] demonstrate that peripheral nerve blocks reduce pain on movement and opioid consumption, with signals for reduced postoperative confusion/delirium, supporting the opioid-sparing rationale of multimodal strategies.[30] Direct trials of bundled multimodal pathways in

hip fracture are limited; therefore, overall certainty is moderate, driven by consistent benefits across components and strong expert consensus **Error! Reference source not found.**.

Rationale for the recommendation:

A multimodal regimen improves comfort and function (especially pain-on movement), reduces opioid exposure and related harms, and supports timely imaging, regional/spinal positioning, and early rehabilitation.

Anaesthetic management

1. Do not delay surgery for non-time-critical optimization:

Recommendation:

Proceed to surgery as soon as feasible once immediately reversible problems are addressed (e.g., hypoxia, hypovolaemia, severe electrolyte derangements, uncontrolled pain). **(Strong Recommendation, Moderate quality evidence)**

Remarks

Optimization should run in parallel with theatre preparation. Avoid delays for routine investigations unless they change perioperative management (Annex 5: Anaesthetic management pathway (hip fracture surgery)).

Summary of evidence

This recommendation is strongly supported by the NICE CG124 guideline[7] and its surveillance updates, which form the cornerstone of standardized hip fracture care pathways in many healthcare systems. These pathways are explicitly designed to expedite surgery once immediately reversible problems are corrected, with the primary outcome of reducing complications associated with prolonged immobility and pain. The evidence, rated as moderate certainty, is drawn from large observational studies and audits of these pathways, which consistently demonstrate that timely surgery (typically within 36 hours) is associated with lower mortality, reduced length of stay, and fewer medical complications like pneumonia and pressure sores. The rationale is that multidisciplinary, parallel processing of optimization and theatre preparation

Rationale for the recommendation

Delays increase pain, immobility-related complications, and delirium risk. Focused optimization improves safety without compromising time-to-theatre.

2. Technique selection: spinal/regional vs general anaesthesia:

Recommendation:

Either neuraxial (spinal) or general anaesthesia is acceptable. Choose the technique that can be delivered safely and promptly given antithrombotic timing, physiological reserve, airway risk, expected surgical duration, and local expertise. **(Conditional recommendation, High quality evidence)**

Remarks

If neuraxial is contraindicated or not feasible, proceed with general anaesthesia and use a peripheral nerve block when feasible for opioid-sparing.

Summary of evidence

The conditional recommendation for technique choice is primarily informed by high-certainty evidence from the landmark REGAIN trial[36], a large pragmatic randomized controlled trial. This study directly compared spinal anaesthesia to general anaesthesia in older adults undergoing hip fracture surgery and found no significant difference in the primary composite outcome of death or an inability to walk at 60 days. Critically, it also found no difference in key secondary outcomes, including the incidence of postoperative delirium. This pivotal evidence overturned the long-held assumption of neuraxial superiority. Consequently, contemporary guidelines from the Association of Anaesthetists[33] (2021) and the PROSPECT Working Group (2024)[34] explicitly state that neither

technique is preferred. The decision should be individualized, factoring in logistical constraints (e.g., timing of last antithrombotic dose as per ASRA[25]/ESAIC[26] guidelines) and patient physiology to avoid delays and ensure hemodynamic stability.

Rationale for the recommendation

Clinical heterogeneity is substantial (frailty, respiratory disease, antithrombotics). A pragmatic approach that avoids delay and preserves haemodynamic stability is likely to improve system-level outcomes.

3. Intra-operative physiological targets (common to all techniques):

Recommendation:

Aim to maintain any change in systolic blood pressure/mean arterial pressure within approximately 20% of the patient's baseline, avoid hypoxia and hypercarbia, maintain normothermia, and use a proactive vasopressor strategy with judicious fluids. **(Strong recommendation, Low quality evidence)**

Remarks

Consider invasive arterial pressure monitoring for higher-risk patients (e.g., severe aortic stenosis, significant cardiopulmonary disease, anticipated major blood loss).

Summary of evidence

While direct randomized trial evidence is of low certainty, the strong recommendation stems from a synthesis of observational studies and expert consensus detailed in the Association of Anaesthetists guideline (Griffiths et al., 2021)[33]. This guidance explicitly links intraoperative hypotension and hypoxia to increased risks of acute kidney injury, myocardial injury, and postoperative delirium in this frail population. The specific target of maintaining systolic or mean arterial pressure within 20% of baseline is a widely adopted consensus threshold to define intraoperative hypotension. The call for proactive vasopressor use and judicious fluid management is based on pathophysiological understanding of reduced autonomic reserve in older adults. The guideline emphasizes that standardized monitoring and treatment protocols improve team coordination and reduce outcome variability, even in the absence of definitive RCTs.

Rationale for the recommendation

Older hip fracture patients have limited physiological reserve. Standardized targets improve team coordination and reduce unwarranted variation

4. Cemented hemiarthroplasty and bone cement implantation syndrome (BCIS):

Recommendation:

For cemented arthroplasty, identify high-risk patients and apply BCIS (Bone Cement Implantation Syndrome) precautions: a team 'cement pause', maintain blood pressure close to baseline, optimize oxygenation, and have vasopressors immediately available. **(Strong Recommendation, Moderate quality evidence:)**

Remarks

Escalate monitoring for high-risk patients and ensure explicit communication with surgeons during femoral canal preparation and cement insertion.

Summary of evidence

The strong recommendation and moderate-certainty evidence are derived from dedicated safety analyses, most notably the Association of Anaesthetists safety guideline (2015)[30] on reducing risk from cemented hemiarthroplasty. This guideline systematically reviews case series and cohort studies documenting BCIS, characterized by hypoxia, hypotension, pulmonary hypertension, and/or cardiac arrest during cement implantation. The evidence underpinning the "cement pause" and preparedness strategy is based on root-cause analyses of adverse events, which identify communication failure and lack of readiness as contributory factors. The recommended bundle of maintaining blood pressure, optimizing oxygenation, and having vasopressors drawn up is a pragmatic response to the time-critical nature of BCIS, aimed at improving rescue success, as supported by subsequent adoption in international guidelines like those from the American Academy of Orthopaedic Surgeons (AAOS, 2021)[37].

Rationale for the recommendation

BCIS events are time-critical; preparedness and coordinated action reduce severity and improve rescue success.

5. Immediate post-operative priorities:

Recommendation:

Implement multimodal analgesia, delirium prevention measures (adequate pain control, oxygenation, hydration, sleep-wake support), and early mobilization. Coordinate VTE prophylaxis timing with any neuraxial or deep catheter use. **(Strong recommendation, Moderate quality evidence)**

Remarks

Communicate a clear post-operative plan to ward/HDU: analgesia regimen, delirium risk mitigation, respiratory support needs, and anticoagulant timing.

Summary of evidence

This strong recommendation is supported by moderate-certainty evidence synthesizing multiple guideline sources. The core principle of multimodal, opioid-sparing analgesia is strongly evidenced by the Cochrane review by Guay et al. (2020)[28], which confirms that peripheral nerve blocks provide superior pain relief and reduce opioid-related side effects. Delirium prevention is a central pillar of the NICE CG124[7] pathway, which links adequate pain control, oxygenation, and early mobilization to reduced delirium incidence. The critical need to coordinate neuraxial or deep catheter management with pharmacologic VTE prophylaxis is exhaustively detailed in the Fifth Edition ASRA Guidelines (Kopp et al., 2025)[25] and the joint ESAIC/ESRA guideline (Kietaibl et al., 2022)[26], which provide evidence-based minimum neuraxial block intervals for various antithrombotic agents. Finally, the PROSPECT recommendations[34] provide procedure-specific endorsement for a structured postoperative bundle combining these elements to facilitate early rehabilitation and improve recovery trajectories.

Rationale for the recommendation

The immediate postoperative phase is when delirium, respiratory compromise, and immobility complications often emerge; structured bundles reduce risk.

Planning the theatre team

Recommendation

- Schedule hip fracture surgery on a planned trauma list
- Consultants or senior staff must supervise trainees and junior members of the anaesthesia, surgical, and theatre teams when they carry out hip fracture procedures **(Good practice statement)**

Remarks

Hip fracture patients should be prepared for the next operative list after admission, with a senior orthopaedic surgeon and an anaesthetist attending the surgery. The presence of a dedicated team for the management of geriatric hip trauma patients is recommended.

Summary of evidence

Planning the theatre team for the management of geriatric hip trauma patients is recommended[7]. A comprehensive geriatric fracture program has been described[38,39] as an alternative approach to managing fragility fractures. An organized geriatric hip fracture program provides numerous benefits to patients with hip fractures, care providers, and health systems. Protocol-driven perioperative approaches should be employed, focusing on pre, intraoperative, and postoperative optimization of the patient to facilitate early repair of the fracture that may then translate into better outcomes and hence alleviate the individual patient's burden as well as the socioeconomic load for society. These benefits include shorter time to surgery, earlier postoperative mobilization, shorter hospital stay, reduced in-hospital mortality, and reduced postoperative complications.

Rationale for the recommendation

People with a hip fracture can experience pain and anxiety while waiting for an operation. Delays in surgery are associated with negative outcomes for mortality and return to mobility. This approach aims to reduce unnecessary delays, which are associated with negative outcomes and prolonged hospital stays for the patient. It also helps to avoid repeated fasting and potential cancellations often associated with emergency lists. A planned trauma list includes specific healthcare professionals with the expertise required for hip surgery. Senior staff supervision can help to reduce the risk of complications during the surgery. Senior supervision is a crucial factor for patients, who rate the presence of specialists as the most important factor in their preference for a planned operation, as it can reduce the risk of complications during surgery.

Stable Femoral Neck Fractures

Recommendation

In patients with stable femoral neck fractures (impacted/non-displaced, Garden's I and II**,** Annex 6: Garden Classification of Femoral Neck Fracture), internal fixation or arthroplasty may be considered, after assessment of the patient and imaging of the hip joint. **(Conditional recommendation, Low quality evidence)**

Remarks

The decision of management of undisplaced apparently stable femoral neck fractures is multifaceted and depends on several factors (Annex 6: Garden Classification of Femoral Neck Fracture). The bone quality and the sagittal tilt seen in the lateral view or CT scan affect the decision-making of internal fixation vs arthroplasty. The pre-injury functional state of the patient also affects the decision.

Summary of evidence

The decision-making of internal fixation in undisplaced femoral neck fracture is conditioned on the true stability of the fracture, Garden classifications I and II without posterior or anterior tilt [40, 41] and the relatively good bone quality for the anchor of the internal fixation tools. There is no reported superior long-term outcome of arthroplasty compared to internal fixation [42, 2, 7].

Rationale for the recommendation

Internal fixation may be the preferred treatment for physiologically fit elderly patients with Garden I and II, with posterior tilt <20°, good bone quality, independent ambulation, and reasonable life expectancy. Primary arthroplasty should be considered when the probability of fixation failure is high. It is indicated when posterior tilt >20° (Okike K et al. 2019, Papadelis E et al. 2023), associated severe osteoporosis, frailty, and poor compliance of the patient, and pre-existing hip osteoarthritis. Age >80 years with multiple risk factors is also an indication. Arthroplasty did not show superior long-term outcomes compared to internal fixation of non-displaced femoral neck fractures.

Unstable femoral neck fractures – arthroplasty vs fixation

Recommendation:

For displaced (Garden III/IV) fractures neck femur in ambulatory or functionally independent elderly patient, HA or THA is strongly recommended over internal fixation. **(Strong Recommendation, High quality evidence:).**

Remarks

Fixation is associated with high failure rates (25–40%), frequent reoperations, and inferior functional outcomes. Compared with the internal fixation group, patients that underwent hemiarthroplasty had a lower reoperation rate and an equivalent overall mortality rate [7,37,43-45]

Contraindications to arthroplasty:

1. Patient was non ambulatory pre fracture (bedbound or wheelchair- dependent)
2. Life expectancy is less than 12 months (metastatic cancer, end stage organ failure)
3. High surgical risk (ASA IV, not optimized despite best efforts)

Conclusions

In ambulatory patient with unstable fractures femoral neck, Arthroplasty is recommended over fixation

Summary of evidence

Arthroplasty is preferred when:

1. Patient is active and can benefit from better functional outcomes
2. Minimizing reoperation risk is a priority
3. Patient needs faster return to walking with less pain

Internal Fixation may be considered when:

1. Patient has low activity levels or advanced dementia
2. Patient has limited life expectancy
3. High surgical risk Favors shorter procedure time

Important Notes:

1. Mortality rate is similar in both groups (~25% at 1 year)
2. Decision should focus on expected quality of life rather than survival alone
3. Shared decision-making with patient/family is essential after explaining risks and benefits

Rationale for the recommendation

1. Reoperation Rate [46]
   - Internal Fixation: Very high (26–32%)
   - Arthroplasty: Low (6–9%)
   - Relative Risk: 0.29 (Favors arthroplasty)
     - This means the risk of reoperation is 3.4 times higher with internal fixation
2. Non-union/Avascular Necrosis (AVN)
   - Internal Fixation: Common problem (20–40%)
   - Arthroplasty: Very rare (<2%)
   - Not applicable for relative risk calculation (too rare with arthroplasty)
3. 1-Year Mortality Rate
   - Identical in both groups (~25%)
   - No statistically significant difference
4. 1-Year Functional Outcomes

- Internal Fixation: Worse mobility, more pain
- Arthroplasty: Better walking ability, less pain
- Standardized mean difference: +0.4 (Favors arthroplasty)

Unipolar/bipolar hemiarthroplasty

Recommendation

Use a femoral stem design other than Austin Moore or Thompson stems for arthroplasties. Unipolar (Austin Moore or Thompson) prosthesis should be used in strictly limited conditions, e. g. Unavailable bipolar prosthesis. **(Good practice statement, Moderate quality evidence:)**

Remarks

Where the unipolar head has a single articulation between the prosthesis and the acetabulum, the bipolar head offers a second articulation between an inner smaller head and the polyethylene liner of the larger outer head. In theory this reduces stress on the acetabular surface and thereby acetabular erosion. Acetabular erosion is believed to cause pain and impaired hip function.

Summary of evidence

RCTs comparing unipolar and bipolar, showed better Health-related quality of life and hip function for bipolar. The average four years follow-up showed less acetabular erosion by using bipolar[47-53].

Rationale for the recommendation

In spite that both replace the femoral head for hip fractures, but bipolar's dual articulation aims for better preservation of the natural socket (acetabulum), and for a better range of motion

UNSTABLE FEMORAL NECK FRACTURES - Total Arthroplasty vs Hemi Arthroplasty

Recommendation

Recommendation 1: **For fit, active elderly patients** (≥60 years) with displaced femoral neck fractures, Total Hip Arthroplasty (THA) is suggested rather than Hemiarthroplasty (HA) to improve function and reduce revision risk. **(Conditional recommendation, Moderate quality evidence)**
Recommendation 2: **For frail, medically complex, or cognitively impaired patients** with limited mobility, Hemiarthroplasty (HA) may be preferred due to shorter operative time and reduced perioperative risk. **(Conditional recommendation, Moderate quality evidence)**
Recommendation 3: Decisions should incorporate individual patient comorbidities, cognition, pre-fracture mobility, surgical risk, and patient preference. **(Strong recommendation, Moderate quality evidence)**

Remarks

The pathways below integrate **evidence quality** with **clinical risk stratification** to provide decision support.

Pathway A: Fit, Active Elderly (>60, Independent, Low Comorbidity)
Goal: Maximize postoperative function and quality of life.
Recommendation:

- **Total Hip Arthroplasty (THA)** preferred.

Rationale:

- **Functional benefit:** Moderate evidence supports better function and quality of life with THA[44].
- **Revision and survivorship:** Comparable or lower mid-term revision with THA[54].
- **Dislocation risk:** Slightly elevated but clinically acceptable in active patients[55].

Considerations:

- Use THA construct tailored to reduce dislocation risk (dual-mobility etc.)
- Ensure surgical team experience.

Pathway B: Medically Complex, High Surgical Risk (≥60, Multiple Comorbidities, Frailty)
Goal: Minimize perioperative risk and complications.
Recommendation:

- **Hemiarthroplasty (HA)** preferred.

Rationale:

- **Operative time and physiologic stress:** HA has shorter operation and less surgical complexity[56].
- **Functional demands lower:** Functional advantage of THA may be less relevant[44].
- **Dislocation risk lower:** HA has lower hip dislocation rates[55].

Pathway C: Intermediate Risk (Moderate Comorbidity, Ambulatory but Dependent)
Goal: Balance function and surgical risk.
Recommendation:

- Consider **HA** if frailty is significant; **THA** if moderate comorbidity but preserved cognition and activity.

Rationale:

- If **cognitive impairment or limited mobility**, HA likely sufficient[57].
- If **moderate risks with good activity**, THA may yield functional benefits.

Summary of evidence

The evidence suggests that THA provides slightly better functional outcomes and quality of life than HA, with comparable revision rates and mortality. HA, however, may be preferable in patients with higher surgical risk due to shorter operative time and lower dislocation risk.

A. Functional Outcomes and Quality of Life

Outcome	Evidence Source	Effect	Certainty (GRADE)	Comments
Hip function (Harris Hip Score)	RCTs + Meta-analyses	THA modestly higher HHS at 1–5 years	Moderate	Meta-analyses show small functional benefit with THA[44].
Patient-reported quality of life	Systematic reviews	Slightly better with THA	Moderate	Data from multiple systematic reviews show improved EQ-5D metrics for THA[56].
Early mobility / pain	RCTs (e.g., NEJM trial)	Trend favouring THA	Low-Moderate	Individual RCTs suggest better early function and pain control with THA[58].

B. Revision and Reoperation

Outcome	Evidence Source	Effect	Certainty (GRADE)	Comments
Revision / Reoperation rates	Meta-analyses (25 RCTs)	THA lower or similar	Moderate	Some analyses find lower revision with THA; others find no significant difference[54].
Mid-term implant survivorship	RCT/registry analyses	Comparable	Moderate	Registry and trial data suggest similar survivorship up to ~5 years[59].

C. Complications and Risks

Outcome	Evidence Source	Effect	Certainty (GRADE)	Comments
Dislocation	Observational analyses	Slightly higher with THA	Moderate	Large cohort data show increased dislocation risk with THA (absolute difference small)[55].
Operative time	Meta-analyses	Longer with THA	Moderate	Consistent finding: THA takes longer than HA[56].
Mortality	Meta-analyses	No clear difference	Low	Mortality differences not consistently significant[60].
Periprosthetic fracture / infection	Meta-analyses	Similar	Low-Moderate	Complication trends similar across groups[56].

4. Summary of Evidence

Outcome	Direction of Effect (THA vs HA)	Magnitude	Certainty (GRADE)	Source
Functional outcome (Harris Hip Score)	THA > HA	Small–moderate improvement	Moderate	RCT meta-analyses (n > 3000)
Health-related quality of life (EQ-5D)	THA > HA	Small benefit	Moderate	RCT & systematic reviews
Reoperation / Revision	Similar or lower with THA	Minimal difference	Moderate	RCT + registry
Dislocation	Higher with THA	1–2 % absolute increase	Low–Moderate	Observational + registry
Operative time	Longer with THA	+20–30 min on average	Moderate	RCT pooled
Mortality (30–90 days)	No difference	Neutral	Low	Pooled analyses
Long-term implant survival	Comparable	Neutral	Moderate	Registry data

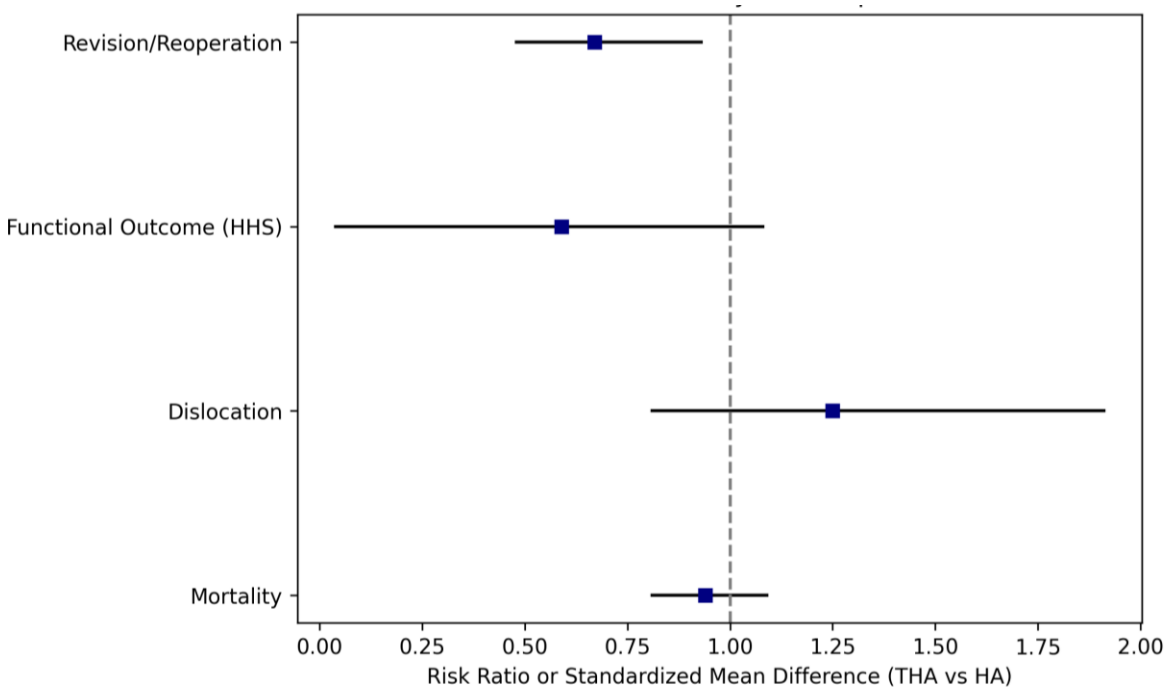


Figure 1: Forest plot summarizing comparative outcomes for THA versus HA across revision rate, functional outcome, dislocation, and mortality

Outcome	No. of Studies (RCTs)	Participants (n)	Relative Effect (95% CI)	Absolute Effect (per 1000)	Certainty (GRADE)
Revision/Reoperation[44,56]	25 RCTs	~3,100	RR 0.67 (0.48–0.93)	70 → 47 fewer events	Moderate
Functional Outcome[58,61]	18 RCTs	~2,800	SMD 0.59 (0.04–1.08)	+4 HHS points	Moderate
Dislocation[56,58]	16 RCTs + registries	>10,000	RR 1.25 (0.81–1.91)	+4 events per 1000	Low
Mortality[44,56]	22 RCTs + observational	>12,000	RR 0.94 (0.81–1.09)	No difference	Low–Moderate

Rationale for the recommendation

Fit, Active Elderly Patients Population:
Patients ≥60 years, cognitively intact, ambulatory, independent, with low surgical risk (ASA I–II).
Recommendation: Perform total hip arthroplasty (THA) rather than hemiarthroplasty to optimize function and quality of life.
Rationale:

- THA provides better functional outcomes and HRQoL.
- Revision rates are comparable or lower long-term.
- Slightly higher dislocation risk can be mitigated by surgical technique (e.g., dual-mobility cup).

Implementation notes:

- Use cemented femoral stems for stability.
- Consider posterior-lateral or anterolateral approaches with soft-tissue repair.
- Employ early mobilization and physiotherapy.

Frail or Medically Complex Patients Population:
Patients ≥75 years, frail, with multiple comorbidities (ASA III–IV), limited ambulation, or cognitive impairment.
Recommendation: Perform hemiarthroplasty (HA) rather than total hip arthroplasty to minimize operative risk.
Rationale:

- Shorter operative time and less blood loss.
- Lower dislocation rate.
- Functional benefit of THA less relevant due to low activity levels.

Implementation notes:

- Use cemented bipolar or unipolar head per institutional preference.
- Prioritize rapid surgery (<48 hours after fracture) and early mobilization.

Intermediate Risk / Mixed Profile Population:
Patients with moderate comorbidities (ASA II–III), ambulatory with aids, or mildly dependent.

Recommendation: Individualize the choice based on cognitive status, pre-fracture activity, and surgical expertise.

Rationale:

- THA if ambulatory and cognitively intact.
- HA if dependent, low activity, or poor bone quality.
- Engage in shared decision-making with patient and family.

Implementation Considerations

- **Institutional expertise:** THA requires advanced surgical capability; if not available, HA remains appropriate.
- **Cemented fixation:** Recommended for both THA and HA in elderly patients.
- **Dual mobility cups:** Recommended when performing THA in high-dislocation-risk patients.
- **Timing:** Surgery ideally within 48 hours of fracture to reduce mortality and complications.
- **Rehabilitation:** Early mobilization and comprehensive geriatric input improve outcomes.

Use of cement in arthroplasty

Recommendation

Cemented stem implants are preferred in patients undergoing surgery with arthroplasty.
(Conditional recommendation, High quality evidence)

Remarks

The use of cement in arthroplasty has the potential to secure the implant in an osteoporotic patient and reduce the need for revision secondary to loosening of the prosthesis.

Summary of evidence

Evidence based studies and RCTs showed that cemented fixation in THA after hip fractures is associated with lower revision rates, but similar mortality compared to cementless fixation[62-68]

Rationale for the recommendation

Some concerns exist around the use of cement and the possibility of bone cement implantation syndrome. Bone cement implantation syndrome is a poorly understood phenomenon which is characterised by one or more of the following: hypoxia, hypotension, cardiac arrhythmias, increased pulmonary vascular resistance and cardiac arrest. It can occur at a number of stages during an arthroplasty including during femoral reaming, insertion of cement or the prosthesis and at the time of reduction of the joint. Its exact aetiology and pathophysiology remain poorly understood as does an accurate figure of the true incidence of the syndrome.

Surgical Approach

Recommendation

In patients undergoing treatment of femoral neck fractures with hip arthroplasty, evidence does not show a favoured surgical approach. Select approach based on surgeon's experience and preference **(Good practice statement)**

Remarks

The data in newer studies show no difference in the dislocation rates between the different surgical approaches, including the posterior approach. This contrasts with the earlier data in older publications which showed higher dislocation rate with the posterior approach in comparison to the lateral approach.

Summary of evidence

One high quality study[69], seven moderate quality studies[70-76] and two low quality studies[77,78] were included in the evidence for this recommendation.

The high-quality study[75] compared hemiarthroplasty with the anterolateral approach to hemiarthroplasty with the direct lateral approach and reported that while there were elevated levels of serum creatine kinase (CK) observed in the anterolateral approach group, no correlation between CK levels and the Timed Up and Go test or the Trendelenburg sign at 3 months were found.

There were also 8 citations about surgical approach in the surgical treatment of femoral neck fractures with moderate evidence strength. Jianbo (2019)[70] reported on a prospective, randomized study of 100 patients. They specifically compared the clinical outcomes and complications of using either the conventional posterior approach, or with using a minimally invasive surgery (MIS) and muscle preserving approach (the Suprapath approach). There was less blood loss, and low transfusion rate in the MIS group. There was less pain, and better function within the first week in the minimally invasive group, but no differences between the groups at the 3-month interval. Repantis (2015)[73] reported on the comparative results of a prospective, randomized study in 80 patients using either a MIS approach or in using the posterior approach. It was a single-surgeon series. There was less pain in the MIS group in the short term. There was no difference in any of the other outcomes or complications up to 4 years of follow up. In another comparative study, Saxer (2018)[74] reported on the results of 190 patients using either a MIS or using the lateral approach. There was less pain, and faster ambulation in the first 3 weeks in the MIS group. There was no difference in any of the other outcomes, or in the complications between the groups. Verzellotti (2019)[76] reported on the comparative results of using the direct anterior (DA) which is muscle preserving, or in using the posterior approach in 100 patients. There was less pain in the DA group in the first month after surgery. There was no difference in the other outcomes or complications between the groups. The operative time was longer in the DA group. Parker (2015)[72] reported the comparative results of a multi-centre, prospective, randomized study in 216 patients using either the posterior or the lateral approach. There was no difference in any of the outcome measures analyzed between the groups. In a prospective, randomized study in 150 patients, Ugland (2018)[69] reported higher risk of post-surgery Trendelenburg gait when the arthroplasty was done using the lateral approach in contrast to using the anterolateral approach (more abductor muscle preserving). Two low strength articles[77,78] (Biber 2012, Skoldenberg 2010) compared the posterior approach to the direct lateral approach for performing arthroplasty in the patients with femoral neck fractures. While neither of the included studies specifically addressed any functional outcomes, they both

demonstrated statistically significant differences in dislocation rates, favouring the direct lateral approach.

Rationale for the recommendation

The existing evidence does not support superiority of one surgical approach. Future well designed RCTs should include a comparison of the anterior approach with the posterior and the lateral approach. Any future studies related to surgical approach should also include pain and functional data associated with the approaches. This may have important implications for patient selection and recovery needs such as assistive devices or therapy needs.

Sliding hip screw versus cephalomedullary intramedullary nail for stable intertrochanteric fracture

Recommendation:

In patients with stable intertrochanteric fractures, use of either a sliding hip screw or a cephalomedullary device is recommended. Use a dynamic hip screw (DHS) in preference to an intramedullary nail in patients with stable intertrochanteric fractures (**Strong recommendation, High quality evidence)**

Remarks

Stable trochanteric fractures are simple two-part intertrochanteric fractures with posteromedial cortical continuity and lateral wall integrity. This fracture pattern is considered stable as it will **resist medial compressive loads once reduced**.

Summary of evidence

Sliding hip screw versus intramedullary nail for trochanteric fracture

Parker et al. (2012)[79] compared the sliding hip screw with the Targon PF intramedullary nail in the treatment of 600 cases of trochanteric hip fracture among 598 patients (mean age=82 years, 80% women). Patients were randomised to treatment with a sliding hip screw or intramedullary nail, and all operations were either performed or supervised by a single orthopaedic surgeon. Patients were reviewed 6 weeks after discharge, and followed up at 3, 6, and 12 months after injury by a research nurse blinded to treatment.

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

Cai et al. (2016) [80] in a prospective, randomised blinded study included patients aged over 65 years with stable intertrochanteric fractures (Evans grades I and II). The patients were allocated to one of two groups treated via extramedullary or intramedullary fixation. Extramedullary (compared with intramedullary) fixation of stable intertrochanteric fractures significantly reduces perioperative blood loss but affords similar functional outcomes and times to union. In view of the morbidity and complications associated with acute anaemia and transfusions, extramedullary fixation may be the optimal choice for treatment of stable fractures, being associated with reduced blood loss.

Lewis et al. (2022)[81] included randomised controlled trials (RCTs) and quasi-RCTs comparing cephalomedullary nails with extramedullary implants for treating fragility extracapsular hip fractures in older adults. They concluded that Extramedullary devices, most commonly the sliding hip screw, yield very similar functional outcomes to cephalomedullary devices in the management of extracapsular fragility hip fractures. There is a reduced risk of infection and non-union with cephalomedullary nails; however, there is an increased risk of implant-related fracture that is not attenuated with newer designs.

Sliding hip screw versus proximal femoral locking compression plate for stable intertrochanteric fracture

Zhong B et al. (2014) [82] compared proximal femoral locking compression plate (PFLCP) and DHS fixation in intertrochanteric fractures. They concluded that PFLCP can offer better functional outcomes and fewer complications for subtrochanteric femoral fractures. DHS fixation is preferable for stable intertrochanteric fractures. For unstable intertrochanteric fractures, the value of PFLCP fixation needs to be confirmed by further clinical studies.

Rationale for the recommendation

Stable trochanteric fractures have posteromedial continuity and have lateral wall integrity that enables these fractures to resist compressive medial loads, and if they are well reduced and varus reduction is avoided, both intramedullary and extramedullary implants will maintain the fracture reduction and resist failure. This will allow early weight bearing of patients, whether they are operated upon by intramedullary or extramedullary implant. The cost of cephalomedullary devices is generally more than sliding hip screw fixation in most institutions. Cephalomedullary nail fixation reduces the length of hospital stay and fewer complications (Xu 2018), which can decrease the overall costs with cephalomedullary devices.

Cephalomedullary device – unstable intertrochanteric fractures

Recommendation:

In patients with unstable intertrochanteric fractures, the use of cephalomedullary device is recommended. **(Strong recommendation, High quality evidence)**

Remarks

Unstable trochanteric fractures are fractures with **comminution, posteromedial fragment, deficient lateral wall, reversed oblique, and subtrochanteric extension**. This fracture pattern is considered unstable as it will **drift into varus and/or medialization with exposure to compressive loads.**

Summary of evidence

In a systematic review and meta-analysis conducted by Zeelenberg ML et al. (2024)[83], current literature shows that several functional outcomes, complications, and surgical outcomes were statistically in favor of intramedullary fixation when compared with extramedullary fixation of AO/OTA 31-A2 fractures. However, as several of the differences found appear not to be clinically relevant and for many outcomes data remains sparse or heterogeneous, complete superiority of IM fixation for AO type 31-A2 fractures remains to be confirmed.

Kassem et al. (2022)[84], in another systematic review and meta-analysis to compare DHS with trochanter stabilizing plate (TSP) and short proximal femoral nails (PFNs) in unstable trochanteric fractures in terms of the functional and radiological outcomes. They concluded that the use of PFN in unstable trochanteric fractures was associated with a shorter time until union and a faster return to the pre-fracture level of activity than the DHS+TSP. However, postoperative hip function, walking independence, as well as complication and one-year mortality rates were comparable. Based on these findings, they suggested that PFN is the first-choice implant for the unstable (AO/OTA 31-A2) intertrochanteric fractures.

Lewis et al. (2022), in a systematic review, included older adults with both stable and unstable extracapsular fractures. Their findings indicate that there may be no difference between cephalomedullary nails versus dynamic fixed-angle plates

Proximal femoral locking compression plate versus intramedullary nailing for unstable intertrochanteric fracture

Zhong B et al. (2014)[82] concluded that in unstable intertrochanteric fractures, the value of PFLCP fixation needs to be confirmed by further clinical studies. Fixation with an intramedullary nail is still the best option for patients with unstable intertrochanteric fractures; however, controlled studies are needed.

Zhang S et al. (2025)[85] conducted a systematic review and meta-analysis of randomized controlled trials with the aim of summarizing the latest evidence for the effectiveness and safety of a variety of implants for fixation of intertrochanteric fractures. They concluded that InterTAN nail (ITN) clearly reduces the incidence of non-mechanical major post-surgery complications and non-specific mechanical complications; however, it is associated with an increased risk of intraoperative complications. No differences were observed between SHS and other implants regarding Harris hip score, reoperation rate, and overall mechanical complications. Most comparisons evaluating the efficacy of these implants are supported by moderate confidence of evidence. Further large-scale, longitudinal, randomized controlled trials are necessary to provide more robust and consistent evidence.

Rationale for the recommendation

Unstable intertrochanteric fractures are fractures that may have comminution, posteromedial fragment, deficient lateral wall, reversed oblique, or subtrochanteric extension. This fracture pattern is considered unstable as it will drift into varus and/or medialization with exposure to compressive loads. Fixation with an intramedullary nail is still the best option for patients with unstable intertrochanteric fractures, as it is biomechanically superior to an extramedullary implant.

Cephalomedullary device – subtrochanteric/reverse obliquity fractures

Recommendation:

In patients with subtrochanteric or reverse obliquity fractures a cephalomedullary device is recommended. **(Strong recommendation, High quality evidence)**

Remarks

Reverse obliquity fractures are a subset of intertrochanteric/peritrochanteric fractures that are an unstable pattern. Though subtrochanteric fractures are more of a proximal femur fracture, they can be a component of an intertrochanteric fracture as well.

Summary of evidence

Xie et al. (2019) [86] in a meta-analysis suggested that intramedullary fixation for subtrochanteric fracture might be superior to extramedullary fixation in terms of shorter operation time, less intraoperative blood loss, shorter length of incision, length of stay, and better functional outcomes. Meanwhile, intramedullary fixation had a lower rate of fixation failure and reoperation. Therefore, intramedullary fixation is recommended as the treatment of subtrochanteric fractures. Larger multi-centre and high-quality RCTs are required for further research.

The results of a meta-analysis conducted by Wang J et al. (2020)[87] revealed that intramedullary fixation can confer shorter union time, lower non-union, and reoperation rates compared with extramedullary fixation. They considered intramedullary nailing as the first selection for the treatment of patients with subtrochanteric fractures.
Plating may be considered in select cases, such as periprosthetic fractures, proximal deformities, or salvage situations.[88]

Rationale for the recommendation

Intramedullary nailing is the implant of choice in subtrochanteric fractures and reverse obliquity fractures. It is biomechanically superior to a surface implant.

Blood transfusion

Recommendation

A blood transfusion threshold of no higher than 8g/dl is suggested in asymptomatic postoperative hip fracture patients. **(Conditional recommendation, Moderate quality evidence)**

Remarks

Moderate-strength evidence suggests that restrictive transfusion practices reduce utilization of transfusions and may decrease infections without increasing adverse outcomes in major orthopaedic surgery. [89-93]

Initial Assessment

1. Hemodynamic status (stable/unstable)
2. Haemoglobin (Hb) level
3. Symptoms of anaemia (tachycardia, hypotension, dyspnoea, chest pain, dizziness)
4. Cardiovascular comorbidities

Decision Nodes

- Hb < 8 g/dL → transfuse
- Hb 8–10 g/dL → transfuse if symptomatic or high cardiac risk
- Hb >10 g/dL → no transfusion, monitor

Transfusion Strategy

- Restrictive strategy preferred
- Number of units per transfusion (usually 1 unit at a time, reassess Hb)
- Monitor for transfusion reactions

Reassessment

- Post-transfusion Hb
- Re-evaluate symptoms
- Repeat transfusion only if Hb < 8 g/dL or persistent symptoms

Pre-op Optimization

- Ensure hemodynamic stability
- Correct coagulopathy if present
- Proceed to surgery once stable

Optional Branches

- Non-operative/palliative care for patients with limited life expectancy or refusal of transfusion
- Consider erythropoietin or iron supplementation if appropriate

Refusal of blood transfusion

When an elderly hip-fracture patient needs transfusion but refuses [93-96]

1. Confirm capacity & informed refusal

- Assess and document decision-making capacity.
- Clearly explain:
- Why blood may be needed
- Risks of refusing transfusion (anaemia, cardiac events, death)

- Available alternatives
- Obtain written informed refusal (ideally with a witness).
- If the patient lacks capacity → follow advance directives or legally authorized surrogate.

If the patient has capacity, their refusal must be respected, even if life-threatening.

2. Clarify what is acceptable

Many patients who refuse "blood" may accept:

- Cell salvage (closed circuit)
- Acute normovolaemic haemodilution
- Albumin
- Coagulation factors (e.g., fibrinogen, PCC)
- Erythropoietin
- Iron therapy

Do not assume refusal of all blood products — ask and document precisely.

3. Optimize pre-operative haemoglobin

If surgery can be delayed safely (24–48 h max in hip fractures):

- IV iron (e.g., ferric carboxymaltose)
- Erythropoietin (EPO)
- Folic acid + vitamin B12
- Minimize blood sampling

4. Choose the least blood-loss strategy

Surgical

- Prefer hemiarthroplasty over THA when appropriate
- Cemented stems (shorter operative time)
- Meticulous haemostasis
- Minimize operative time

Anaesthetic

- Regional anaesthesia (spinal) if feasible
- Controlled hypotension (careful in elderly)
- Tranexamic acid (TXA) — IV ± topical

5. Intra- and post-operative blood conservation

- TXA significantly reduces blood loss in hip fracture surgery
- Cell salvage if acceptable
- Maintain normothermia
- Restrictive transfusion thresholds (already transfusion-free)

6. Post-operative management

- Tolerate lower Hb if patient is asymptomatic
- Oxygen therapy
- Treat anaemia aggressively with iron/EPO
- Early mobilization to reduce complications

7. Ethical & legal principles

- Autonomy overrides beneficence in a competent adult
- Forced transfusion = assault

- Thorough documentation protects both patient and physician
- Involve:
- Ethics committee (if available)
- Hospital legal team (high-risk cases)

Summary of evidence

A restrictive red blood cell transfusion strategy is supported by high-quality evidence in elderly patients with hip fractures. Randomized controlled trials, including the FOCUS trial[92], demonstrated that transfusing asymptomatic patients only when hemoglobin falls below 8g/dL does not increase mortality, cardiovascular complications, functional recovery impairment, length of hospital stay, or loss of independent ambulation compared with a liberal transfusion strategy.
International guidelines, including those from the AABB[93], NICE[91], and AAOS[2], therefore recommend a restrictive transfusion threshold for most elderly hip fracture patients, while emphasizing that symptomatic anemia, ongoing bleeding, hemodynamic instability, or evidence of tissue hypoxia may justify transfusion at higher hemoglobin levels.
For patients who decline blood transfusion, patient blood management measures such as intravenous iron, erythropoietin, tranexamic acid, meticulous surgical hemostasis, minimization of phlebotomy, optimization of oxygen delivery, and early mobilization are recommended to reduce transfusion requirements.
The evidence supporting a restrictive transfusion threshold in elderly hip fracture patients[2,7,91-93,97,98] is considered high quality, with strong consistency across randomized trials and major international guidelines.

Rationale for the recommendation

A **restrictive transfusion strategy** is recommended for most elderly patients with hip fractures. Current high-quality evidence demonstrates that using a **haemoglobin threshold of 8 g/dL** (unless the patient is symptomatic or has ongoing bleeding) is **safe and effective**. Compared with a liberal transfusion strategy, it does **not increase**:

- 30- or 60-day mortality
- Cardiovascular complications
- Functional recovery
- Independent walking ability
- Length of hospital stay
- Discharge destination

Restrictive transfusion also reduces unnecessary exposure to blood products and transfusion-related complications while conserving healthcare resources (Annex 7: Blood transfusion in elderly hip fracture patients (flowchart)).

Tranexamic acid

Recommendation

Tranexamic acid should be administered to reduce blood loss and blood transfusion in patients with hip fractures. **(Strong recommendation, High quality evidence)**

Remarks

Tranexamic acid was not associated with higher incidence of mortality or symptomatic thromboembolic events.

1. Assess Patient Eligibility

- Confirm hip fracture requiring surgery (intracapsular or extracapsular)
- Age > 65 years
- Check for **contraindications**:
    - Active thromboembolic disease (DVT, PE)
    - History of stroke or myocardial infarction within 6 months
    - Active intravascular clotting disorder
    - Known hypersensitivity to TXA
    - Severe renal impairment

2. Decide on Route and Dose

- **IV TXA** is preferred
- Typical regimen:
    - **Bolus:** 1 g IV preoperatively (within 30 min before incision)
    - **Optional second dose:** 1 g IV postoperatively or infusion over 8 hours in high-risk bleeding patients
- **Adjust dose for renal impairment**

3. Timing of Administration

- Preoperative: ideally at induction of anaesthesia
- Some protocols allow additional intraoperative/topical dose if significant bleeding risk

4. Monitor Patient

- Watch for thromboembolic complications
- Monitor haemoglobin postoperatively
- Assess need for transfusion

5. Postoperative Considerations

- Early mobilization
- Thromboprophylaxis as per institutional protocol (e.g., LMWH or DOAC)
- Reassess bleeding risk and renal function

6. Contraindicated Patients

- Avoid TXA if active clotting risk or severe renal impairment
- Consider alternative blood conservation strategies

Summary of evidence

High-quality evidence demonstrates that **tranexamic acid (TXA)** significantly reduces perioperative blood loss and the need for allogeneic blood transfusion in elderly patients undergoing hip fracture

surgery without increasing the risk of venous thromboembolism (VTE), myocardial infarction, stroke, or all-cause mortality[99-101].
Multiple randomized controlled trials[102] and meta-analyses[99-101] have consistently shown reductions in **total blood loss (approximately 200–400 mL)** and **transfusion rates (relative reduction of approximately 30–50%)** compared with placebo or standard care. These benefits are observed across different surgical procedures, including hemiarthroplasty, total hip arthroplasty for fracture, and internal fixation.
Current evidence indicates that both **intravenous and topical TXA** are effective. Intravenous administration is supported by the largest body of evidence, while topical TXA provides a reasonable alternative when systemic administration is contraindicated. No clear superiority of one route over the other has been demonstrated.
Large observational studies and systematic reviews have found **no significant increase in symptomatic deep vein thrombosis, pulmonary embolism, myocardial infarction, stroke, or mortality** when TXA is used in appropriately selected patients receiving standard thromboprophylaxis.
Based on the consistency of evidence, major international organizations, including the **American Academy of Orthopedic Surgeons (AAOS)[2]** and the **National Institute for Health and Care Excellence (NICE)[7]**, recommend considering routine TXA administration in hip fracture surgery unless contraindications exist.

Strength of Evidence

Outcome	Quality of Evidence	Overall Conclusion
Reduction in perioperative blood loss	High	Significant reduction
Reduction in blood transfusion	High	Significant reduction
Reduction in postoperative hemoglobin drop	High	Significant benefit
Risk of DVT/PE	High	No significant increase
Risk of myocardial infarction or stroke	Moderate–High	No significant increase
Mortality	Moderate	No increase in mortality
Length of hospital stay	Moderate	Little or no consistent benefit

Guideline Statement

High-certainty evidence supports the use of tranexamic acid in elderly patients undergoing hip fracture surgery. TXA consistently reduces perioperative blood loss and transfusion requirements without increasing thromboembolic or cardiovascular complications when used with standard venous thromboembolism prophylaxis. Therefore, routine perioperative administration of TXA should be considered in the absence of contraindications (Annex 8: Tranexamic acid (TXA) in elderly hip fracture patients).

Rationale for the recommendation

Patients with hip fractures may benefit from TXA to reduce blood loss and subsequent transfusion. Use of tranexamic acid in hip fracture patients may result in lower blood loss and transfusion rates compared to placebo in several high-quality studies. Studies were unable to detect any difference in adverse events with use of tranexamic acid such as infection, wound complication, DVT, CVA, PE or MI[7,37,102-107]

Interdisciplinary care programs

Recommendation

On admission, offer patients a formal, acute orthogeriatric or orthopaedic ward-based fracture program that includes the following steps:

- Comprehensive orthogeriatric assessment to evaluate both current and baseline level of functioning
- Rapid optimization to make patient fit for surgery
- Identify individual goals for multidisciplinary rehabilitation to recover mobility and independence, and to achieve return to pre-fracture residence when possible
- Offer longitudinal, coordinated, orthogeriatric and multidisciplinary review
- Provide liaison or integration with related services, particularly mental health (delirium prevention), falls prevention, bone health, primary care and social services
- Clinical and service governance responsibility for all stages of the pathway of care and rehabilitation, including those provided in the community.

(Conditional recommendation, High quality evidence)

Remarks

Hip Fracture Program (HFP):

It is a comprehensive interdisciplinary evidence-based model of immediate and longitudinal interdisciplinary assessment, management and discharge planning[7]. Instead of the traditional model of orthopaedic care followed by routine transfer for rehabilitation elsewhere (e.g. orthopaedic or general rehabilitation units), interdisciplinary model provides many benefits including expediting and organizing both assessment and care in the acute hospital, promoting prompt discharge (wherever possible) to the patient's normal home setting. It is more cost-effective compared to traditional model as established following the latest NICE CG124 (Clinical Guideline 124) evidence review[7,108].

Prompt, effective analgesia, anaesthesia and surgery, coordinated with structured, medical and multidisciplinary management from presentation to hospital discharge, are therefore needed and have been shown to deliver improved outcomes cost-effectively[7].

The medical and multidisciplinary 'ortho-geriatrician' role was developed by physicians in clinical gerontology but is applicable to the care of hip fractures in adults of all ages[109].

Summary of evidence

A RCT (Randomized Clinical Trial)[110] of 199 patients analysed admittance to a geriatric rehabilitation ward (comprising a geriatric team applying comprehensive geriatric assessment) versus regular orthopaedic care immediately postoperative to hip fracture surgery. Patients randomized to geriatric ward had less postoperative delirium (being shorter in those who developed it), fewer pressure ulcers, less malnutrition, fewer urinary tract infections, fewer falls, fewer new fractures during hospitalization, shorter hospital length of stay, and a 3-fold odds ratio of walking independently 1 year after. They also found that the best effect was seen in patients with dementia. Another RCT[111] of 459 patients with hip fracture compared orthogeriatric co-management 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 hospital length of stay and in-hospital mortality.

Rationale for the recommendation

Ortho-geriatric team involvement in care provision for hip fracture patients from admission to discharge reduces complications, improves both in-hospital and long-term outcomes and reduces cost of care.

Postoperative Rehabilitation

1. Timing of Mobilization

Recommendation

In patients undergoing surgical stabilization of hip fractures, early mobilization, including functional movement within 24–48 hours postoperatively is recommended, provided the patient is medically and mobilization is consistent with the surgeon's postoperative instructions **(Strong recommendation, High quality evidence)**

Remarks

Mobilization should begin with bed mobility and progress to sitting, standing, and assisted ambulation as tolerated. Progression should be individualized according to pain levels, hemodynamic stability, cardiopulmonary status, and overall medical condition. Delays in mobilization may be necessary in cases of medical instability but should be minimized whenever possible.

Summary of evidence

Multiple randomized controlled trials[112] and systematic reviews[113,114] have consistently demonstrated that early mobilization following hip fracture surgery is associated with reduced postoperative complications, including pneumonia, thromboembolic events, delirium, and pressure injuries. Early mobilization has also been shown to improve functional recovery, reduce length of hospital stay, and enhance the likelihood of returning to pre-fracture mobility levels. Across studies, mobilization initiated within the first 24–48 hours is superior to delayed mobilization strategies.

Rationale for the recommendation

Early mobilization mitigates the adverse physiological effects of prolonged bed rest, supports cardiovascular and pulmonary function, and promotes neuromuscular activation necessary for recovery of mobility, independence, and overall functional outcomes.

2. Weight-Bearing

Recommendation

Following hip fracture surgery, weight-bearing should be initiated as early as clinically feasible, with full weight-bearing as tolerated recommended after stable fixation, unless contraindicated by surgical or patient-specific factors **(Conditional recommendation, Low quality evidence)**

Remarks

In cases of uncertain fixation stability, complex fracture patterns, or compromised bone quality, temporary partial or restricted weight-bearing may be considered. Decisions should be guided by operative findings, implant stability, surgeon recommendations, patient cognitive status, and safety within the rehabilitation environment.

Summary of evidence

Available evidence, primarily from observational studies[115] and cohort analyses[2,116-118], suggests that early weight-bearing after stable fixation does not increase the risk of implant failure, non-union, or reoperation. Several studies report improved functional outcomes and earlier return to ambulation with early weight-bearing strategies[119]. However, high-quality randomized controlled trials specifically comparing weight-bearing protocols after hip fracture surgery remain limited.

Rationale for the recommendation

Early weight-bearing facilitates functional recovery, improves patient confidence during ambulation, and reduces complications related to immobility, while allowing clinicians to individualize care based on surgical stability and patient safety considerations.

3. Rehabilitation Pathway

Recommendation

Rehabilitation after hip fracture surgery should follow a structured, phased pathway, spanning the acute inpatient phase, home or inpatient rehabilitation services, and outpatient rehabilitation, aligned with the patient's recovery stage and care setting **(Conditional recommendation, Low Quality evidence)**

Remarks

The rehabilitation pathway should prioritize early mobility and functional independence during hospitalization, followed by progressive strengthening, balance training, and gait restoration after discharge. Coordination among healthcare providers across settings is essential to ensure continuity of care.

Summary of evidence

Studies evaluating multidisciplinary and continuity-based rehabilitation models[120,121] demonstrate improvements in mobility, functional outcomes, and discharge disposition. However, variability in rehabilitation protocols, intensity, and care settings limits the ability to identify a single optimal pathway. Evidence supports the concept of structured progression rather than any specific standardized protocol.

Rationale for the recommendation

A structured rehabilitation pathway ensures continuity of care, promotes timely progression of functional goals, optimizes resource utilization, and addresses the evolving physical and functional needs of patients recovering from hip fractures.

4. Fall Prevention

Recommendation

Fall prevention strategies should begin with identification and management of underlying fall risk factors, including muscle weakness, balance deficits, cognitive impairment, medication-related side effects, orthostatic hypotension, visual impairment, and environmental hazards. These strategies should be systematically integrated into all phases of postoperative rehabilitation following hip fracture surgery **(Conditional recommendation, High quality evidence)**

Remarks

Fall prevention interventions should include fall risk assessment, balance and strength training, home based exercise program, medication review, environmental hazard modification, vision assessment, and appropriate prescription and training in assistive device use.

Summary of evidence

Strong evidence from randomized controlled trials and meta-analyses[122-124] demonstrates that multifactorial fall prevention programs significantly reduce fall risk in older adults. Although many

studies include broader geriatric populations, evidence supports similar benefits in individuals recovering from hip fracture, who are at particularly high risk for recurrent falls and secondary fractures.

Rationale for the recommendation

Patients recovering from hip fractures are vulnerable to recurrent falls due to residual weakness, balance impairment, and fear of falling. Addressing modifiable risk factors is essential to ensure long-term safety, preserve functional gains, and prevent secondary injuries.

5. Outcome Assessment

Recommendation

Standardized functional and mobility outcome measures, such as the Timed Up and Go Test (TUG test), should be used regularly to guide rehabilitation progression and monitor recovery after hip fracture surgery. **(Conditional recommendation, Low quality evidence)**

Remarks

Outcome measures should be feasible, clinically meaningful, and sensitive to change in older adults. Assessments may include measures of mobility, balance, gait performance, activities of daily living, and pain.

Summary of evidence

Although outcome measures such as gait speed, Timed Up and Go, and functional mobility scales are widely used in clinical practice and research, evidence supporting the superiority of any single tool in guiding rehabilitation outcomes remains limited. Current evidence[125,126] supports consistent and repeated use of standardized measures rather than reliance on subjective assessment alone.

Rationale for the recommendation

Regular outcome assessment facilitates individualized goal setting, enhances communication among care providers, and allows early identification of delayed recovery, complications, or need for modification of the rehabilitation plan.

6. Discharge Planning After Hip Fracture Surgery

Recommendation

Discharge planning should begin early during hospitalization and be individualized based on medical stability, functional recovery, cognitive status, family support, and access to rehabilitation services. In the Egyptian healthcare setting, most patients require a short inpatient stay followed by home-based or facility-based rehabilitation. Early discharge within 24–48 hours may be considered for selected, medically stable patients with adequate family support and rehabilitation access. Same-day or next-day discharge should be limited to exceptional cases. **(Conditional recommendation, Low quality evidence)**

Remarks

Discharge planning should address discharge destination, functional readiness (safe transfers and assisted ambulation), caregiver education, provision of walking aids, and coordination of outpatient or home-based rehabilitation. Family caregivers play a central role in post-discharge care in Egypt and should be included early in planning and education.

Summary of evidence

Hip fracture specific randomized evidence for same-day discharge is limited. Observational studies indicate that structured, early discharge planning improves care transitions and functional outcomes without increasing readmissions when rehabilitation continuity is ensured. Evidence from elective arthroplasty populations shows that same-day or 1-day discharge can be safe in selected patients, supporting a readiness-based rather than time-based discharge approach, though direct extrapolation to hip fracture patients should be cautious[127,128].

Rationale for the recommendation

Early and coordinated discharge planning reduces risks associated with prolonged hospitalization, including delirium and deconditioning, and supports safe transition to rehabilitation. Discharge timing should prioritize patient safety, caregiver preparedness, and continuity of rehabilitation rather than length of stay alone.

7. Assistive Devices (Walker and Cane)

Recommendation

Following hip fracture surgery, appropriate assistive devices should be prescribed and regularly reassessed to support safe ambulation. A walker is recommended in the early postoperative phase, with progression to a cane held in the contralateral hand to the operated limb as balance, strength, and weight-bearing tolerance improve. **(Good practice statement, Low quality evidence)**

Remarks

Assistive device selection should be individualized based on balance capacity, lower-limb strength, pain, cognitive status, and environmental demands. Proper fitting, patient education, and supervised training are essential. Transition from a walker to a cane should be guided by functional performance rather than time since surgery alone.

Summary of evidence

Systematic reviews and biomechanical studies demonstrate that walkers provide greater stability during early postoperative ambulation, while cane use improves gait efficiency during later recovery. Biomechanical evidence consistently shows that using a cane in the contralateral hand reduces hip joint reaction forces and hip abductor demand on the operated side. Clinical practice guidelines support this progression strategy, although randomized controlled trials specific to hip fracture populations remain limited[126,129].

Rationale for the recommendation

Assistive devices enhance safety and confidence during ambulation after hip fracture surgery. Using a cane in the contralateral hand optimizes biomechanical unloading of the operated hip, improves gait symmetry, and reduces fall risk while promoting progressive independence.

Patient and carer information

Recommendation

It is crucial to offer the patients (or when appropriate, their carers) information about their medical diagnosis and its implications and treatment options and management plan either verbally or in printed form **(Good practice statement)**.

Remarks

Family, friends and carers can provide support to patients to prepare for the first few weeks after discharge. From simple tasks like measuring the heights of patient's bed, toilet and chair to providing physical and emotional support, the role of carers is important for the patients. Decision making process must be based on information, involving family and carers can be crucial in cases where the patient is incapacitated due to delirium and can help as proxy in making informed medical decisions.

Summary of evidence

The care burden following hip fracture may decrease over time; however, it often lasts for over 12 months. Caregivers tend to experience the greatest stress for the first 2 months post-fracture, with the stress being associated with increased care demands and care cost[130-133]. Educating them beforehand sets realistic expectation to carers.

Rationale for the recommendation

Providing clear information to patients and carers supports shared decision-making, treatment adherence, realistic expectations, and active participation in rehabilitation, ultimately contributing to safer and more patient-centred care. Details should include their exact diagnosis, choices available for analgesia and other medications, surgical procedures, choices of anaesthesia, possible complications, postoperative care and rehabilitation plans, short and long term expected outcomes and which healthcare professionals are involved[7].

Clinical indicators for monitoring

Different healthcare systems around the world monitor implementation of their hip fracture management guideline recommendations in elderly through various Key Performance Indicators (KPIs). This section contains suggested KPIs for Egyptian hip-fracture care based on the above guidelines. It is the belief of the Guideline Development Group (GDG) that inclusion of as many of the suggested KPIs as one of the Presidential Healthcare Initiatives is the best way to monitor performance of different hospitals/healthcare regions or organization and insure implementation of best practice across the country. The GDG members are ready to contribute to such initiatives upon request.

A. Registry and case capture KPIs:

Without complete case capture, outcome comparisons are unreliable. The Fragility Fracture Network (FFN) recommends an audit dataset for countries starting hip-fracture registries (https://fragilityfracturenetwork.org)

- **Case capture rate**: The percentage of all patients aged 60 or older with a low-energy hip fracture who are entered into a local or national registry.
- **Minimum dataset completeness**: The percentage of records that include complete information about age, sex, residence, mobility, cognitive status, ASA, fracture type, operation, surgery time, and discharge status.
- **Pre-fracture function documented**: The percentage of patients with documented pre-fracture mobility/ADL and cognitive function.

B. Emergency department and preoperative KPIs:

- **Time from hospital arrival to X-ray/diagnosis:** The median time from the emergency department (ED) arrival to the confirmed diagnosis.
- **Pain assessment:** The percentage of patients with documented pain scores at presentation and repeatedly after administration of analgesia.
- **Analgesia within 30 minutes:** The percentage of patients who receive appropriate analgesia within 30 minutes of arrival or diagnosis.
- **Preoperative medical optimization:** The percentage of patients with anaemia, anticoagulation, dehydration, electrolytes, diabetes, heart failure, arrhythmia/ischemia, or chest infection assessed and addressed promptly.

C. Surgical-timing KPIs:

- **Surgery within 48 hours of presentation:** The percentage of patients who are operated on within 48 hours of arrival at the operating hospital.
- **Reason for surgical delay documented:** The percentage of delayed cases with documented medical or systemic reasons for the delay.
- **Planned trauma list access:** The percentage of cases that are done on the planned trauma/urgent orthopaedic list, not repeatedly postponed by elective work.
- **Senior surgeon/anaesthetist involvement:** The percentage of cases that are supervised or performed by a consultant or senior-trained surgeon and anaesthetist.

D. Orthogeriatric/medical co-management KPIs:

- **Orthogeriatric/physician review:** Geriatrician, internist, or trained perioperative physician review within 24 hours.
- **Cognitive impairment/delirium risk screening:** on admission and postoperatively.
- **Nutrition screening:** within 24–48 hours.
- **Pressure-ulcer risk assessment** and prevention plan documentation.
- Pharmacological or mechanical **VTE prophylaxis plan** documented unless contraindicated.
- **Medication review:** Prompt review of medications by a geriatrician or an internist for appropriateness and polypharmacy on admission within 48 hours from admission.

E. Operation choice and surgical-quality KPIs:

- **Operation appropriate to the fracture type:** Percentage receiving evidence-based fixation/arthroplasty according to the fracture pattern and patient fitness.
- **Implant choice documentation:** Percentage with documented implant type, fixation method, approach, and surgeon grade.
- **Immediate mobilization and weight-bearing plan:** Percentage operation notes specifying unrestricted/full weight bearing unless contraindicated.
- **Reoperation rate:** Reoperation within 30/120 days.
- **Surgical-site infection rate:** Deep/superficial infection within 30/90 days.

F. Anaesthesia and perioperative KPIs:

- **ASA grade documented:** Percentage with ASA grade recorded preoperatively.
- **Choice of anaesthesia spinal vs general discussed when feasible:** Percentage with anaesthetic plan documented.
- **Postoperative acute pain plan documented:** Percentage with documented multimodal analgesia plan.

G. Mobilisation, rehabilitation, and discharge KPIs:

- **Out of bed by day 1 after surgery:** Percentage mobilised out of bed by the first postoperative day, unless contraindicated.
- **Weight-bearing status documented:** Percentage with clear postoperative weight-bearing instruction.
- **Discharge rehabilitation plan documented:** Percentage discharged with a written rehab and follow-up plan.
- **Return to original residence:** Percentage of patients discharged back to original residence at 120-day follow-up.

H. Secondary fracture prevention KPIs:

- **Osteoporosis risk assessment:** Percentage of patients assessed for osteoporosis or fracture risk before discharge or within 12 weeks.
- **Calcium/vitamin D status addressed:** Percentage of patients with supplementation or documented contraindications/clinical decisions.
- **Anti-osteoporosis medication started or planned:** Percentage of eligible patients discharged on therapy or with a follow-up appointment.

- **Falls risk assessment:** Percentage of patients assessed for falls risk before discharge or within 12 weeks.
- **Sarcopenia/nutrition intervention:** Percentage of patients with nutrition/sarcopenia risk plans if abnormal.

I. Outcome KPIs:

- **In-hospital mortality:** Death before discharge.
- **Length of hospital stay:** Admission to discharge from acute care.
- **30-day readmission:** Any unplanned readmission.
- **Reoperation within 30/120 days:** Any return to the operating room related to hip fracture surgery.
- **Pressure ulcer during admission:** New pressure ulcer after admission.
- **Delirium incidence:** New delirium during admission.

We can classify these KPIs into a three-level model:

Core mandatory KPIs:

- Case capture, surgery timing, medical review, mobilization, discharge status, and mortality.

Quality-improvement KPIs:

- Analgesia, delirium, nutrition, pressure ulcers, implant choice, and rehabilitation.

Secondary prevention KPIs:

- Osteoporosis treatment falls assessment and prevention.

Research gaps

During the preparation of the above guidelines, the GDG have identified several gaps in current research and evidence-based literature. The following list is not exhaustive but could be useful to guide different scientific bodies (universities, research centres and healthcare organisations) in developing their research plans.

1. Epidemiology and National Burden in Egypt

Egypt has emerging data on hip-fracture incidence and geographic variation. However, there is still a lack of a comprehensive national hip-fracture registry that covers public, university, military, insurance, and private hospitals.

Key research gaps include:

- Determining the true national incidence of fragility hip fractures by governorate, sex, age group, and rural/urban residence.
- Developing national risk assessment tools to identify patients at risk of fractures early.
- Identifying seasonal variations, fall locations, mechanisms of injury, and delays in presentation.
- Assessing mortality rates after hip fractures in Egyptian patients at 30 days, 120 days, and 1 year.
- Collecting national data on return to mobility, return home, dependency, and caregiver burden.
- Understanding the cost of hip-fracture care in Egypt, including out-of-pocket expenses.

Possible research questions include:

- Determining the true annual incidence of low-energy hip fractures among Egyptians aged ≥60 or ≥65 years.
- Investigating whether outcomes differ between Upper Egypt and Lower Egypt.
- Assessing the proportion of patients who die within 30 days and 1 year after hip fractures in Egypt.
- Analysing the direct and indirect costs of hip-fracture care for Egyptian families.

2. Time-to-Surgery and Causes of Surgical Delay

Internationally, timely surgery is considered a crucial quality indicator. The World Health Organization (WHO) has proposed indicators focused on surgery within 48 hours and pharmacological osteoporosis treatment after hip fractures. The National Institute for Health and Care Excellence (NICE) recommends surgery on the day of admission or the day after.

Key research gaps include:

- Determining the actual time from admission to surgery in Egyptian hospitals.
- Identifying the medical and system-related causes of delays.
- Understanding the reasons behind delays due to factors such as theatre availability, implant availability, blood products, ICU beds, finance, consent, and anaesthesia clearance.
- Exploring the relationship between delays and mortality, complications, length of stay, and cost.

Possible research questions include:

- Determining the percentage of older Egyptian hip-fracture patients who receive surgery within 48 hours.

- What are the top five reasons for surgery after 48 hours?
- Are system delays more common than medical delays?
- Does a dedicated hip-fracture trauma list improve the time to surgery?

3. Orthogeriatric and multidisciplinary care gaps

Orthogeriatric care is widely recommended, but LMIC studies reveal that specialist orthogeriatric expertise is often unavailable, senior medical input is inconsistent, and care pathways vary significantly between institutions.

Key research gaps:

- Availability of geriatricians or internists for hip-fracture co-management in Egyptian hospitals.
- Effect of physician-led perioperative optimization on the time to surgery, delirium, medical complications, and mortality.
- Feasible Egyptian model: orthogeriatrician, internal medicine physician, anaesthetist-led optimization clinic, or nurse-led pathway.
- Role of multidisciplinary hip-fracture rounds.

Possible research questions:

- Does physician/geriatric co-management reduce complications in older Egyptian hip-fracture patients?
- What is the minimum feasible orthogeriatric model for Egyptian university hospitals?
- Can a structured multidisciplinary hip-fracture pathway reduce mortality and length of stay?
- What training do orthopaedic and medical residents need for geriatric trauma care?
- Can orthogeriatric care integration reduce cost of hip fractures in Egypt.

4. Pain management and regional nerve-block gaps

NICE recommends immediate analgesia, repeated pain assessment, and consideration of nerve blocks when analgesia is inadequate or to limit opioid use.

Key research gaps:

- Time to first analgesia in Egyptian emergency departments.
- Use of pain scores in cognitively intact versus impaired patients.
- Availability and effectiveness of fascia iliaca, femoral nerve, or PENG blocks.
- Impact of nerve blocks on opioid use, delirium, mobilization, and patient comfort.

Possible research questions:

- What proportion of hip-fracture patients receive analgesia within 30 minutes?
- Are regional blocks feasible in Egyptian emergency departments?
- Does fascia iliaca or PENG block reduce delirium or opioid requirement?
- Are pain scores reliably documented in older patients with cognitive impairment?

5. Surgical-treatment and implant-selection gaps.

Guidelines recommend procedure selection based on fracture type, pre-fracture function, and medical fitness. NICE recommends arthroplasty for displaced intracapsular fractures, cemented implants for arthroplasty, extramedullary fixation for most trochanteric fractures, and intramedullary fixation for subtrochanteric fractures.

Key research gaps include:

- Current implant choices in Egypt for displaced intracapsular, trochanteric, and subtrochanteric fractures.
- Cemented versus uncemented hemiarthroplasty outcomes in Egyptian patients.
- Use and outcomes of THA versus hemiarthroplasty in active older adults.
- Implant availability and cost-effectiveness.
- Reoperation, infection, dislocation, and peri-implant fracture rates.

Possible research questions include:

- What implants are actually used for hip fractures in Egyptian trauma centers?
- Is cemented hemiarthroplasty associated with better mobility and fewer reoperations in Egypt?
- Which Egyptian patients benefit from total hip arthroplasty after displaced femoral neck fracture?
- What is the reoperation rate after DHS, cephalomedullary nail, and hemiarthroplasty?

6. Anaesthesia and perioperative-risk gaps

NICE recommends offering spinal or general anaesthesia after discussing risks and benefits and considering intraoperative nerve blocks.

Key research gaps include:

- Spinal versus general anaesthesia outcomes in older Egyptian hip-fracture patients.
- Anaesthesia-related delay.
- Bone-cement implantation syndrome incidence and prevention.
- Perioperative protocols for anticoagulated patients.
- Availability of high-dependency or ICU beds for frail patients.

Possible research questions include:

- Does anaesthetic type influence delirium, hypotension, mortality, or mobilization?
- How often does anticoagulation delay surgery?
- What is the incidence of complications related to cement during hemiarthroplasty?
- Can a standard anticoagulation reversal protocol reduce the time to surgery?

7. Mobilization and rehabilitation gaps

NICE recommends physiotherapy assessment and mobilization on the day after surgery unless contraindicated, with daily mobilization thereafter. However, LMIC service-readiness work shows variation in mobilization and weight-bearing protocols.

Key research gaps:

- Availability of physiotherapy in Egyptian trauma wards, especially on weekends.
- Time to first mobilization after surgery.
- Barriers to mobilization, such as pain, fear, family reluctance, staffing, lack of walking aids, and surgeon restrictions.
- Effect of early mobilization on pneumonia, pressure ulcers, length of stay, and functional recovery.
- Post-discharge rehabilitation access.

Possible research questions:

- What percentage of Egyptian hip-fracture patients mobilize by postoperative day 1?

- What are the main barriers to early mobilization?
- Does early mobilization reduce length of stay and complications?
- Is a caregiver-assisted rehabilitation program feasible after discharge?

8. Osteoporosis and secondary-fracture prevention gaps

Egyptian data show a significant osteoporosis treatment gap. In a multicenter study, 82.1% of eligible postmenopausal women and 100% of eligible men were not receiving osteoporosis therapy before their index fragility fracture.

Key research gaps:

- Proportion of hip-fracture patients discharged on anti-osteoporosis medication.
- DXA access and whether DXA should delay treatment.
- Creating alternative osteoporosis screening methods in areas where DXA is not available (e.g.; calcaneal US)
- Use of vitamin D, calcium, bisphosphonates, denosumab, or anabolic therapy after hip fracture.
- Medication adherence at 6 and 12 months.
- Feasibility and effectiveness of Fracture Liaison Service models in Egypt.

Possible research questions:

- What proportion of Egyptian hip-fracture patients receive osteoporosis treatment after discharge?
- Does an FLS reduce secondary fractures and improve medication adherence?
- Is a “treat-first, DXA-later” strategy appropriate for Egyptian hip-fracture patients?
- What are the barriers to osteoporosis treatment in men after hip fracture?

9. Falls, sarcopenia, and frailty gaps

Egyptian osteoporosis-gap data revealed that falls, sarcopenia, and functional disability were significantly associated with fracture risk, underscoring the need for multifactorial prevention strategies rather than focusing solely on bone density.

Key research gaps include:

- Prevalence of sarcopenia and frailty among Egyptian hip-fracture patients.
- Validation of Arabic frailty and sarcopenia tools in acute trauma settings.
- Relationship between frailty, surgical delay, complications, and mortality.
- Effectiveness of nutrition, protein supplementation, vitamin D, and strength/balance training.

Possible research questions include:

- Which frailty score best predicts mortality after hip fracture in Egyptian patients?
- Is SARC-F a useful screening tool in Egyptian trauma wards?
- Does nutritional supplementation improve mobilization and recovery?
- Can falls-risk assessment reduce recurrent falls after hip fracture?

10. Nutrition and pressure-ulcer prevention gaps

The FFN's minimum dataset includes pressure ulcer development during admission, while its extended dataset includes nutritional assessment because nutrition is a modifiable factor in hip-fracture recovery.

Key research gaps include:

- Malnutrition prevalence in older Egyptian hip-fracture patients.
- Use of nutritional screening tools such as MNA or MUST.
- Relationship between malnutrition and infection, pressure ulcers, delayed mobilization, and mortality.
- Frequency and severity of pressure ulcers on admission versus hospital-acquired ulcers.

Possible research questions include:

- What is the prevalence of malnutrition in older Egyptian hip-fracture patients?
- Does nutrition screening predict complications?
- Does early protein supplementation reduce pressure ulcers and length of stay?
- How many pressure ulcers are present on admission due to delayed presentation?
- What are the causes of delayed presentation in Egyptian population?

11. Patient-reported outcome and quality-of-life

Patient-reported outcome and quality-of-life gaps after geriatric hip fracture remain significant research areas. A systematic review revealed substantial heterogeneity in patient-reported outcome measures, poor reporting of missing data, inconsistent reporting of effect size, and inadequate interpretation of patient-reported outcomes.

Key research gaps include:

The development of Arabic-validated patient-reported outcomes (PROMs) for hip fracture recovery, identifying patient priorities after hip fracture, exploring quality-of-life outcomes beyond mortality, and investigating fear of falling and confidence levels after surgery.

Possible research questions

- Which Arabic PROM is most suitable for Egyptian hip-fracture patients?
- What outcomes do Egyptian patients and caregivers consider most important?
- Does early surgery improve quality of life at 120 days?
- How does fear of falling affect rehabilitation and return to independence?

Update of the guideline

This guideline will be updated whenever there is new evidence

Annexes

Annex 1: GRADE's approach to rating quality of evidence

Significance of the four levels of evidence

Quality level	Current definition	Previous definition
High	We are very confident that the true effect lies close to that of the estimate of the effect	Further research is very unlikely to change our confidence in the estimate of effect
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
Very low	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect	Any estimate of effect is very uncertain

A summary of GRADE's approach to rating quality of evidence

Study design	Initial quality of a body of evidence	Lower if	Higher if	Quality of a body of evidence
Randomized trials	High ⟹	Risk of Bias −1 Serious −2 Very serious Inconsistency −1 Serious −2 Very serious Indirectness −1 Serious −2 Very serious Imprecision −1 Serious −2 Very serious Publication bias −1 Likely −2 Very likely	Large effect +1 Large +2 Very large Dose response +1 Evidence of a gradient All plausible residual confounding +1 Would reduce a demonstrated effect +1 Would suggest a spurious effect if no effect was observed	High (four plus: ⊕⊕⊕⊕) Moderate (three plus: ⊕⊕⊕◯) Low (two plus: ⊕⊕◯◯) Very low (one plus: ⊕◯◯◯)
Observational studies	Low ⟹			

Annex 2: Minimum interruption intervals (summary table)

These intervals apply to neuraxial and deep/non-compressible procedures. For superficial/compressible single-shot blocks, apply site-based risk assessment.

Drug (generic [trade])	Dose category (examples)	Minimum hold before neuraxial/deep	Superficial/compressible single-shot blocks
LMWH: enoxaparin [Clexane/Lovenox]; dalteparin [Fragmin]; tinzaparin [Innohep]	Low dose (prophylaxis); e.g., enoxaparin ≤40 mg/day	≥12 h (if CrCl <30: halve dose or extend to 24 h)	May proceed; next dose at routine time (site-based risk assessment)
	High dose (>50 IU anti-Xa/kg/day or therapeutic); often BID	≥24 h (if CrCl <30: halve dose or extend to 48 h)	May proceed; next dose at routine time (site-based risk assessment)
Unfractionated heparin (UFH) [Heparin]	Low-dose SC UFH (≤200 IU/kg/day)	≥4 h	May proceed; next dose at routine time (site-based risk assessment)
	High-dose UFH (IV or SC)	IV: ≥6 h; SC: ≥12 h (or until aPTT/anti-Xa/ACT returns to local normal range)	May proceed; next dose at routine time (site-based risk assessment)
Fondaparinux [Arixtra]	Low dose (≤2.5 mg/day)	≥36 h (if CrCl <50: ≥72 h)	May proceed; next dose at routine time (site-based risk assessment)
	High dose (>2.5 mg/day)	Not recommended; if unavoidable, consider ~4 days or level-guided (specialist decision)	Site-based; consider alternative strategy
Vitamin K antagonist: warfarin [Coumadin]	Therapeutic	Stop ~5 days; proceed when INR is normal/acceptable per local policy	Site-based; deep/non-compressible sites require INR target
Direct anti-Xa DOACs: rivaroxaban [Xarelto]; edoxaban [Lixiana/Savaysa]; apixaban [Eliquis]	Low dose	Rivaroxaban/edoxaban: ≥24 h (≥30 h if CrCl <30); apixaban: ≥36 h	May proceed; next dose at routine time (site-based risk assessment)
	High dose	≥72 h (or level-guided in renal impairment where available)	May proceed; next dose at routine time (site-based risk assessment)
	Low dose	≥48 h	May proceed; next dose at routine time (site-based risk assessment)

Direct thrombin inhibitor DOAC: dabigatran [Pradaxa]	High dose	≥72 h (or level-guided if CrCl <50)	May proceed; next dose at routine time (site-based risk assessment)
Aspirin [Aspirin]	Low dose (≤200 mg/day)	No mandatory hold	No mandatory hold
	High dose (≥200 mg/day)	≥3 to 7 days	Site-based; consider risk–benefit
Clopidogrel [Plavix]	P2Y12 inhibitor	≥5 to 7 days	Site-based; consider risk–benefit
Ticagrelor [Brilinta]	P2Y12 inhibitor	≥5 days	Site-based; consider risk–benefit
Prasugrel [Effient]	P2Y12 inhibitor	≥7 days	Site-based; consider risk–benefit

Operational catheter notes (LMWH): once-daily prophylaxis: first LMWH dose ≥12 h after needle/catheter placement; remove catheter ≥12 h after last LMWH dose; next dose ≥4 h after catheter removal. Twice-daily prophylaxis: remove neuraxial catheter before initiating LMWH; delay LMWH ≥4 h after catheter removal; and if LMWH used >4 days, check platelet count before neuraxial/deep procedures or catheter removal.

Annex 3: FLACC score and Ramsay sedation score

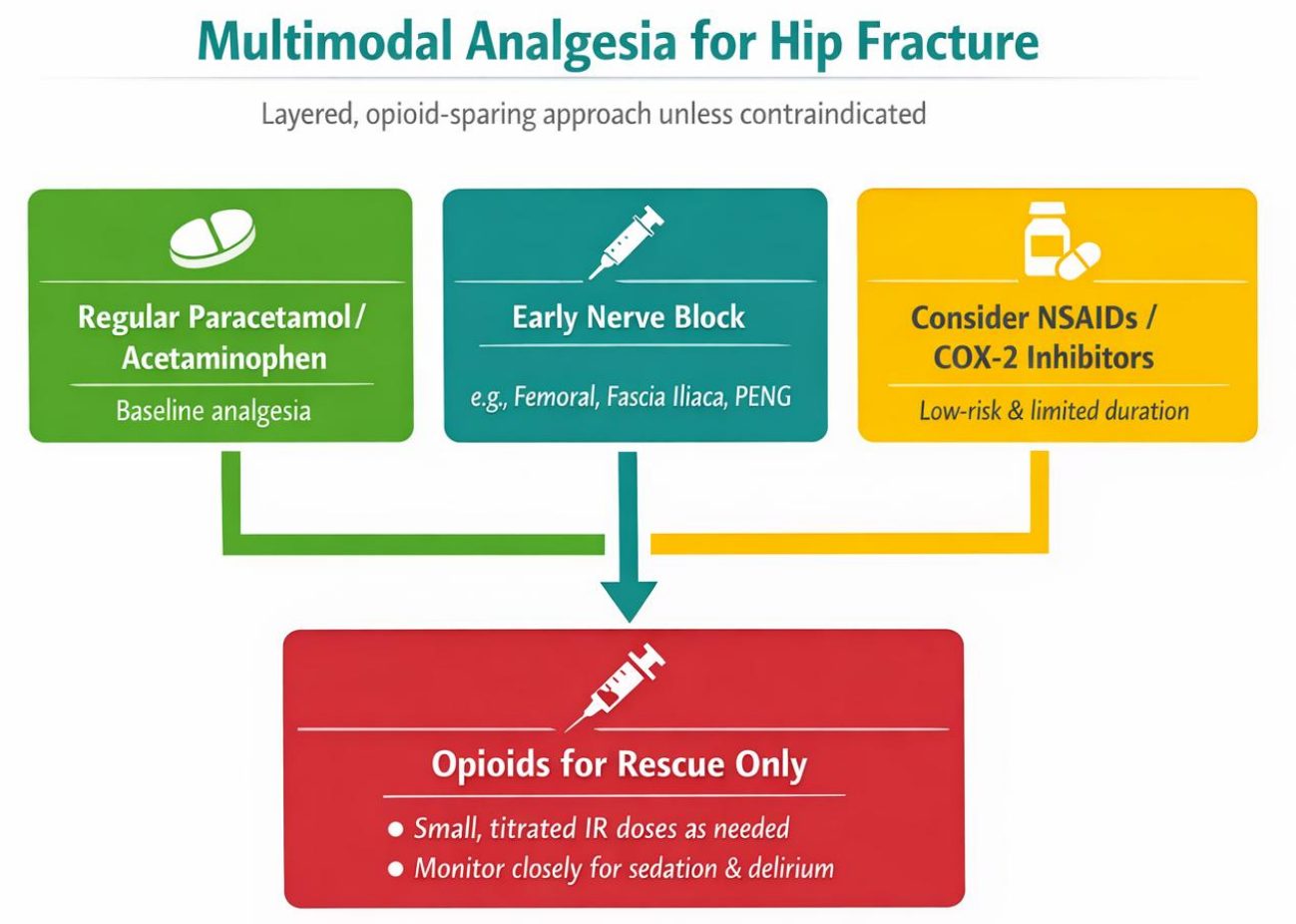
FLACC Score

CATEGORY	0 POINTS	1 POINT	2 POINTS
Face	Disinterested	Occasional grimace, withdrawn	Frequent frown, clenched jaw
Legs	No position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Normal position	Squirming, tense	Arched, rigid, or jerking
Cry	No crying	Moans or whimpers	Constant crying, screams or sobs
Consolability	Content, relaxed	Distractible	Inconsolable

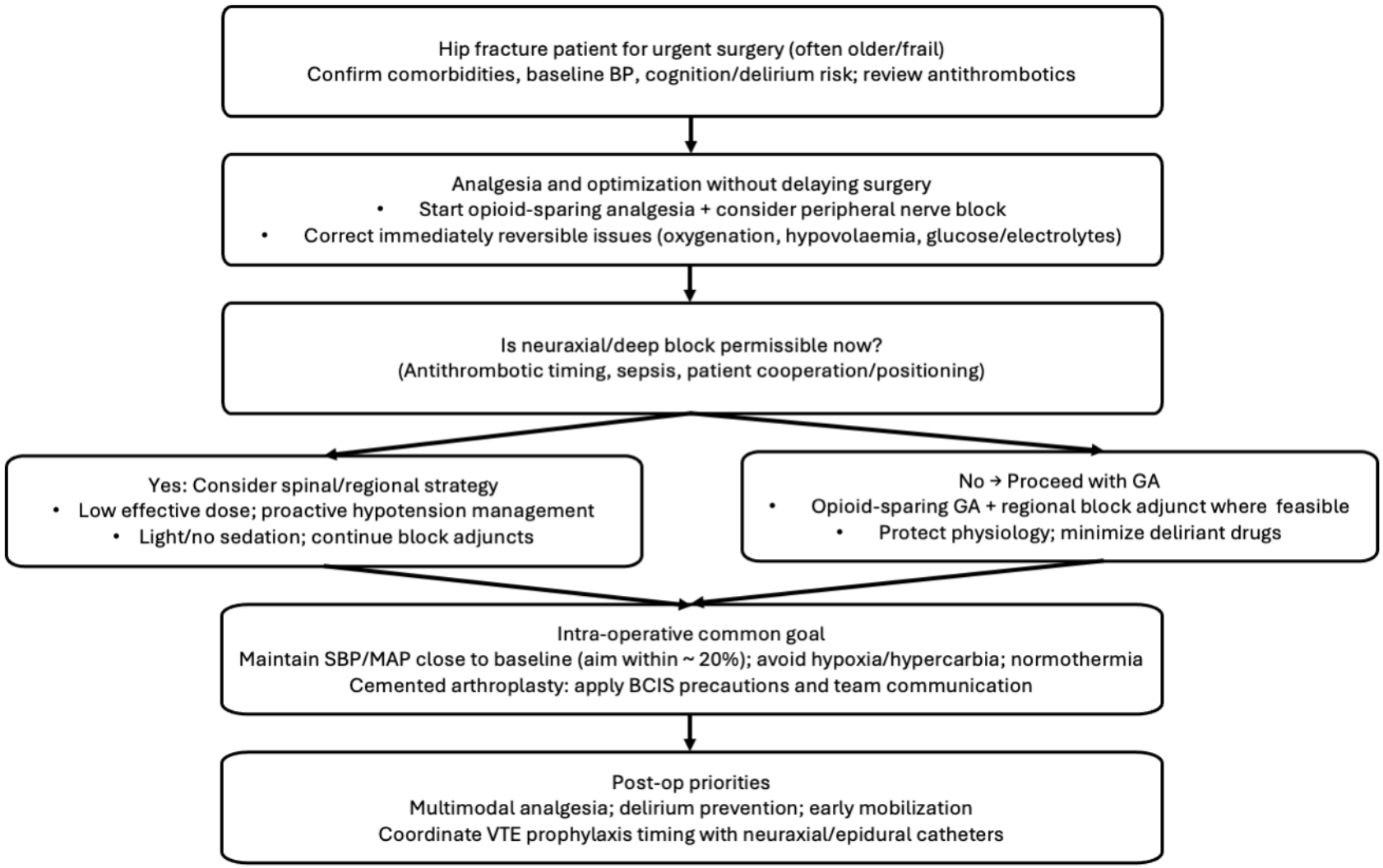
Ramsay Sedation Score

Score	Description
1	Anxious and agitated or restless, or both
2	Cooperative, orientated, and tranquil
3	Drowsy, but responds to commands
4	Asleep, brisk response to light glabellar tap or loud auditory stimulus
5	Asleep, sluggish response to light glabellar tap or loud auditory stimulus
6	Asleep and unarousable

Annex 4: Multimodal analgesia for hip fracture



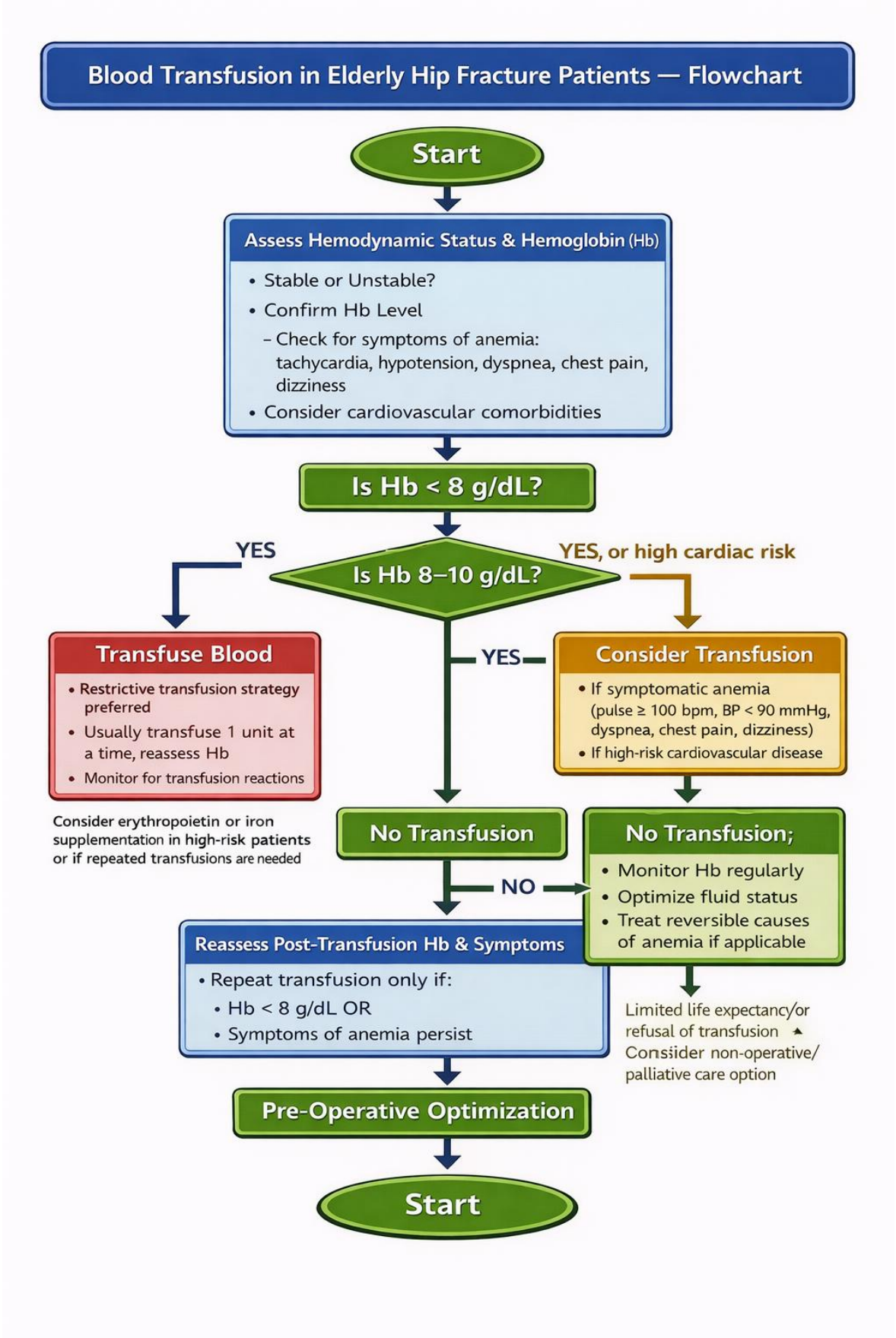
Annex 5: Anaesthetic management pathway (hip fracture surgery)



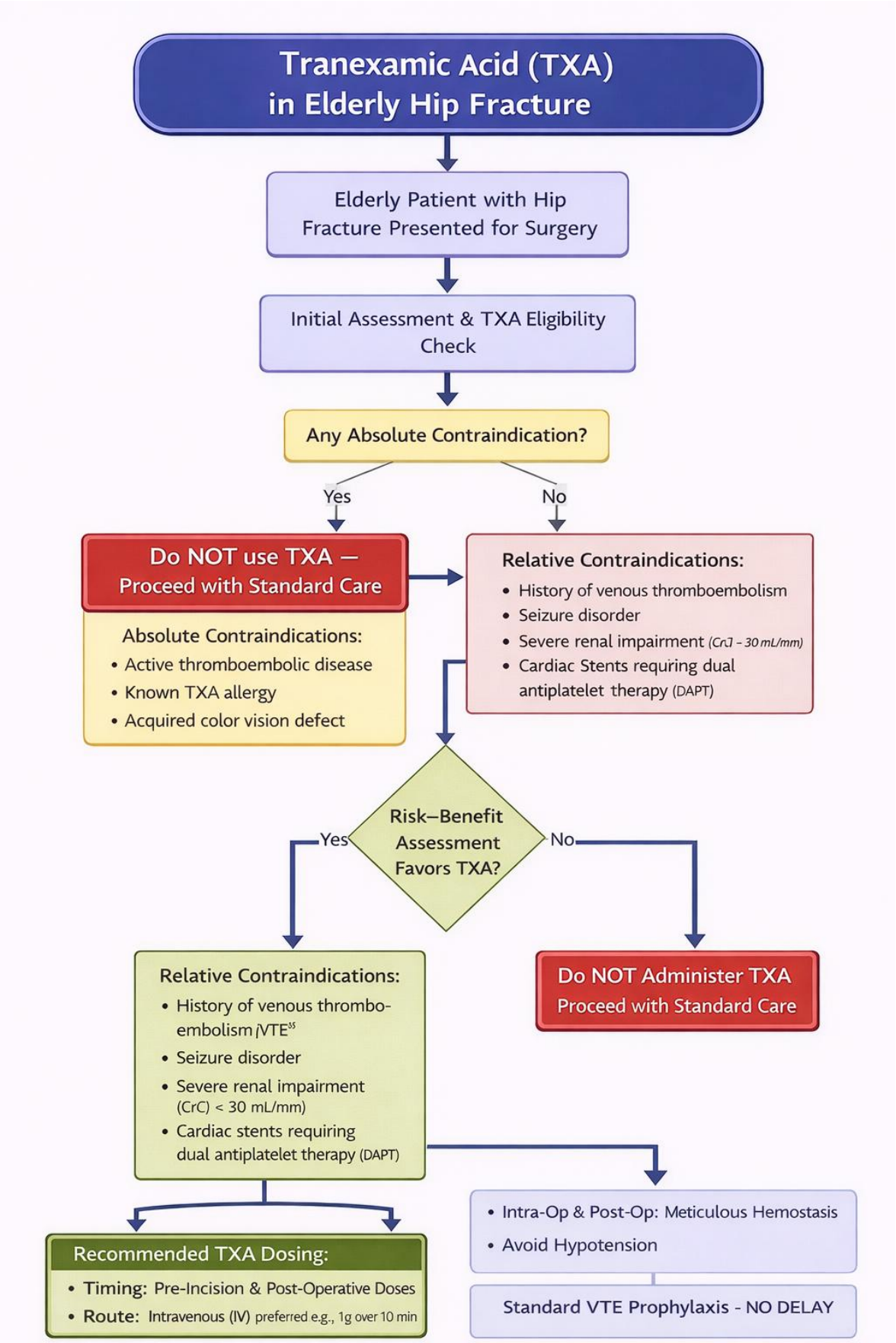
Annex 6: Garden Classification of Femoral Neck Fracture

Type	Description	Displacement	Fracture Line	Stability
Type I	Incomplete valgus impacted fracture	None (impacted in valgus)	Incomplete, doesn't traverse full width of neck	Stable
Type II	Complete fracture	Non	fragments not displaced	Stable
Type III	Complete fracture	Partial displacement femoral head rotated into varus	Complete, with partial displacement	Unstable
Type IV	Complete fracture	Complete displacement of femoral head	Complete, totally displaced fragments	Unstable

Annex 7: Blood transfusion in elderly hip fracture patients (flowchart)



Annex 8: Tranexamic acid (TXA) in elderly hip fracture patients



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