ACI NSW Agency for Clinical Innovation

THE ORTHOGERIATRIC MODEL OF CARE:

Summary of Evidence 2010

ACKNOWLEDGEMENTS

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THE ACI ORTHOGERIATRIC MODEL OF CARE DOCUMENTS INCLUDE:

Summary of Evidence

Clinical Guide

Orthogeriatric Liaison Services: Recommendations for Service Planning for Orthogeriatric Care in NSW

This document provides a summary of the available evidence to support the **Orthogeriatric Model of Care: Clinical Practice Guide** developed by members of the ACI Aged Health Network Orthogeriatric Group.

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THE ORTHOGERIATRIC MODEL OF CARE:

Summary of Evidence 2010

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FOREWARD

The purpose of this document is to provide a summary of the available evidence for best practice care of older patients admitted to hospitals with fractures, as part of the Agency for Clinical Innovation (ACI) Orthogeriatric Model of Care. It includes published guidelines from other countries and states and endeavours to integrate recent information and expert opinion.

As in all areas of clinical practice, the scientific evidence is imperfect and incomplete. Therefore, the Orthogeriatric Collaborative Group, which is a multidisciplinary group of NSW clinicians who are experienced in and dedicated to the care of these patients, has attempted to synthesise the available literature across the disciplines.

The Summary of Evidence 2010 provides the facts to support the Clinical Practice Guide 2010, which presents a clear, practical guide to the care of frail older orthopaedic patients. We hope that the resulting summary and guide are practical and easily applicable in NSW hospitals, whether or not there is an orthogeriatric service in place.

We hope this will be a useful resource for a variety of clinical staff members and trainees. We do not aim to be prescriptive, as in many cases the recommendations represent the opinions of one or more experienced clinicians when no clinical trial evidence is available to guide treatment. We have included many examples of assessment tools and documents that have been validated in studies, or developed locally and found to be useful. We would hope that anyone using this guide would choose which of these resources would work best with the staffing and systems in place locally.

We welcome feedback regarding ways in which we can continue to improve this resource.

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1 BACKGROUND

1.1 PURPOSE

The purpose of this document is to present the evidence presently available to support the Orthogeriatric Model of Care: Clinical Practice Guide. This document does not aim to replace existing Area Health Service (AHS) documents, but rather to provide facilities with information to develop and enhance their care of orthogeriatric patients.

In presenting the studies of orthopaedic care for frail older patients, it should be noted that most have focused on the hip fracture population, which makes up the majority of such patients. These studies are unlikely to be replicated in frail older patients with other types of fractures. Given the generic nature of many of the issues that are reviewed, we believe it is reasonable to extrapolate these findings to all frail fracture patients, and even in some cases to older elective joint patients.

The following information has been compiled from various hospital staff orientation documents already in use throughout greater metropolitan Sydney. Information has also been compiled from a variety of journal articles and influential documents, including Scottish Intercollegiate Guidelines Network[1]
www.sign.ac.uk/pdf/sign56.pdf
www.sign.ac.uk/pdf/sign71.pdf
and the British Orthopaedic Association "Blue Book"[2]
www.ccad.org.uk/nhfd.nsf

The British Orthopaedic Association recommends six standards of hip fracture care which can easily be adapted for all acute surgical orthogeriatric patients:

1. All patients should be admitted within four hours to an acute orthopaedic ward
2. All patients who are medically fit, should have surgery during normal working hours and within 48 hours of admission
3. All patients should be assessed and managed with a view to minimising the risk of pressure area development
4. From the time of admission all patients should have routine access to acute orthogeriatric medical support and should be managed on an orthopaedic ward.
5. All patients should be assessed to determine the need for osteoporosis management
6. All patients admitted following a fall should be assessed and offered intervention to prevent further falls.

It will be useful to continue to refer to these websites to look for updates, until Australia has a similar online resource.

1.2 DEFINITION

Orthogeriatric care is defined as specialist medical care for older patients with orthopaedic disorders that is provided collaboratively by orthopaedic and aged care services[3]. Efficient and cost effective management strategies are required to provide optimal patient care for our growing older population.

The orthogeriatric collaborative model of care is one such strategy. This model provides specialised medical, nursing and allied health staff who are involved in the joint care of patients with the orthopaedic team, as soon as they arrive in hospital and are identified using criteria agreed upon by all team members. This model has been shown to decrease length of stay, medical complications in hospital and mortality. A collaborative orthogeriatric model of care has been demonstrated in a randomly controlled trial to lead to a 45% decreased probability of major complications (delirium, CCF, pneumonia, DVT, PE, pressure ulcers, arrhythmias or myocardial infarction) or mortality. In a prospective trial of the collaborative orthogeriatric model, with a historical control population in Australia, there was a reduction of 21% in medical complications, 3% in mortality[4] and 20% in readmissions at six months for medical reasons.[5]

1.3 WHY IMPLEMENT A COLLABORATIVE MODEL OF CARE?

- **Hip fracture is a common cause of morbidity and mortality in older people** and is associated with considerable health expenditure. The rate of hip fracture increases dramatically over the age of 50. With increasing age there is an increased likelihood of medical comorbidity, functional and psychological issues, as well as medical complications in patients under the care of surgeons whose training does not, and arguably should not, encompass specialised medical care.
- **The incidence of falls and fractures increases with age**. The Health Information Exchange (HIE) revealed a total of **3,332 primary diagnosis separations** for fractured neck of femur in NSW hospitals for patients over 65 years of age for the period between June 2005 to June 2006[6]. In one representative NSW hospital, 75% of emergency surgical admissions for patients over the age of 75 were to an orthopaedic surgery service. The age of elective joint replacement patients is also increasing, leading to increased risks of medical complications in this group. A 90% increase in the number of hip fractures is expected in Australia between 1999 and 2021 based on current age-adjusted hip fracture incidence and population projections for NSW[7], leading to an increase in the proportion of frail, older patients under the care of orthopaedic surgeons.
- **Older patients with hip fractures have longer lengths of stay** compared to younger patients. Orthopaedic inpatient admissions data from Wollongong Hospital for the period 1 January to 31 December 2006 demonstrated that orthopaedic patients under 50 years of age had an average hospital stay of approximately 2.25 days, while orthopaedic patients over 80

years of age stayed an average of 8.96 days. In patients under 50 years of age, 1.1% had lengths of stay greater that 20 days compared to 10.8% of patients over 80 years of age.[8]

- **Postoperative medical complications for older patients are common,** ranging from 60-70%,[4,9] and cause increased lengths of stay and overall cost of care.[10,11] These complications impact on patients' ability to return to their previous functional status and to independent community living, and they increase mortality.
- **Comprehensive geriatric assessment and management can identify** concomitant medical and psychosocial issues, to minimise or avoid unnecessary postoperative complications and assist with early discharge planning. Multidisciplinary specialist geriatric care that is provided early and daily has been shown to reduce in-hospital mortality and medical complications in elderly patients with hip fracture.[4] A proactive, dedicated multidisciplinary team can often initiate plans for discharge preoperatively, expediting discharge.[12]
- **Accelerated rehabilitation** has been shown in a randomised controlled trial to decrease average length of stay by 20%.[13] A variety of rehabilitation options should be available for patients with hip fractures. A small number can be discharged directly to their homes with home-based or outpatient treatment to increase mobility and independence. However, the majority of older patients with hip fractures require inpatient rehabilitation which should be closely linked to orthopaedic services.[14]
- **Osteoporosis and vitamin D deficiency** is associated with most frail older patients with fracture and elective joint replacements. Replacement of vitamin D should begin as soon as deficiency is identified. Follow-up appointments to instigate treatment of osteoporosis are extremely important, but rarely provided for all post-fracture patients.
- **Assessment of risk of further fall injury** is required. Ideally the orthogeriatric service should be closely linked with a falls and fracture prevention program.
- It is important that the majority of patients are **allowed to weight bear** as tolerated (WBAT), as limited weight bearing adds approximately 14 days to the length of stay of patients with hip fractures.[15]

Examples of complications:

- **Delirium** occurs in 50-60% of older patients with hip fractures,[16,17] but is often undetected, misdiagnosed or undertreated, with severe consequences for the patient.[18,19] Delirium in older patients has been associated with longer length of stays,[20,21,22] higher hospital costs[18, 21 ,22] and poor patient outcomes,[18,20,21,22,23,24] yet it can be prevented in up to one-third of at-risk patients, and where prevention is not possible the prevalence of severe delirium can be reduced by up to 50%.[18]

  Delirium has been associated with an excess length of stay by an average of eight days following diagnosis.[23] The average cost of a hospital bed is $A967 per day.[25] Taking a conservative estimate for one patient with an undiagnosed or delayed diagnosis of delirium staying in hospital an extra four days, the cost to the Australian health system for that hospital bed alone would be $3868. If 20% of the 3332 patients with hip fracture in 2005-2006 had a delirium which could have been prevented or detected earlier and managed appropriately, the cost savings to the system would have been $2,576,088.[17,26]
- **Pressure areas** can result in a significant increase in length of stay[27] and patient mortality,[28] reducing quality of life[33] and significantly increasing the cost of patient care.[29,30] Pressure areas may also be associated with delirium,[31,32] urinary incontinence and/or hip fracture.[32,33]
- **Urinary incontinence, urinary retention and urinary tract infections** are common in frail older patients postoperatively,[34] and as mentioned can contribute to pressure sores which will impact negatively on patient well-being, recovery and length of stay.
- **Poorly controlled postoperative pain** in older patients can be due to a number of factors including an impaired ability to communicate or reluctance to report pain or take medications. Poorly controlled pain has been shown to be associated with delirium. Older patients are also more prone to adverse effects of opioids and nonsteroidal anti-inflammatory drugs, making appropriate pain medication prescription a difficult and specialised area of management.[19]
- **Polypharmacy and adverse events requiring hospitalisations** are common in older patients.[35] Unnecessary medications are costly, become increasingly complex for the patient to manage and are potentially harmful. Geriatricians are specifically trained in the management of polypharmacy in older patients.[36] Medication management in Geriatric Evaluation Management Units compared with general medical wards has been shown to reduce the number of drugs prescribed with anticholinergic effects and reduce the potential for drug-to-drug interactions.[37]

The benefits of a collaborative model of care for older orthogeriatric patients are summarised in Table 1.1.

Table 1.1: Summary of the benefits of a collaborative model of care for older orthopaedic patients.[4, 5, 19]

No	Benefit	
1	**Fewer medical complications**	reducing morbidity and mortality leading to better overall outcomes for patients
2	**Significant cost savings**	with reductions in length of stay, including acceleration to rehabilitation with the appropriate options available
3	**Medications are managed in partnership**	because the team approach for older patients with dementia and nutritional difficulties addresses the issues more easily
4	**Multi-disciplinary team approach**	including nursing and allied health professionals maximises functional outcomes for patients and promotes earlier discharge or access to rehabilitation
5	**Resolution of complex ethical issues**	because the team approach more easily addresses issues for older patients with dementia and nutritional difficulties
6	**The duration and severity of delirium**	has been shown to be decreased with care by specially trained nurses
7	**Reduced readmission rate**	has been demonstrated for medical complications
8	**Improved communication**	between the specialties, patients and their family/carers
9	**Knowledge exchange is promoted**	leading to greater understanding between specialties, providing unique opportunities for education and training

It is important to regularly evaluate orthopaedic services to maintain effectiveness and efficiency. Examples of useful outcome measures are summarised in Table 1.2.

Table 1.2: Examples of useful outcome measures for orthogeriatric care.[38]

No	Elements
1	Medical complications
2	Time to mobilise
3	Incidence of pressure ulcers
4	Assessment/treatment of further falls
5	Delirium incidence/treatment
6	Osteoporosis treatment

1.4 MODELS OF CARE

Although age is not an illness, it is an independent risk factor that can affect morbidity, mortality and perioperative outcomes. The basal function of some organs may be unaffected, yet the functional reserve may be reduced and the ability to compensate for physiological stress diminished. Therefore, it can be difficult to predict how older patients will be affected by perioperative stress.[39]

The orthogeriatric patient is not easily defined. Different orthogeriatric services have differing age ranges and criteria for access to their services. Generally, an orthogeriatric patient is one who is over the age of 70, has an orthopaedic injury or requires an elective orthopaedic procedure, and requires the care of an orthopaedic surgeon.

The orthogeriatric patient often has complex needs that require a collaborative, multidisciplinary approach, effective teamwork, coordination of care, close working partnerships and clear communication between the various specialties and services accessed by the patient.[2]

This collaborative model can take many forms and will vary from hospital to hospital, depending on the workforce and funding arrangements within the aged care and orthopaedic departments. In NSW there are four main models of orthogeriatric care:[40]

Orthogeriatric liaison/collaborative care:

The orthogeriatric patient is admitted under the orthopaedic surgeon with early and ongoing active care by a geriatrician based on agreed blanket criteria, for example all hip fracture patients >65yrs or all fracture patients >75yrs. This involves a dedicated aged care registrar who provides daily management of the patient through daily ward rounds supervised by an orthogeriatrician, and weekly to twice-weekly multidisciplinary rounds and case conferencing. The physician input begins at admission and continues efficiently through the pre- and postoperative period onto the identification and referral to rehabilitation, including secondary fracture prevention and discharge planning.

Shared orthogeriatric care:

In this model the orthogeriatric patient is admitted under the care of both the orthopaedic surgeon and the geriatrician. Both teams take responsibility for pre- and postoperative multidisciplinary care as detailed above.

Consultative orthogeriatric care:

The orthogeriatric patient is admitted under the orthopaedic surgeon and the orthopaedic team manage their care. Input from the geriatrician is requested when an issue arises, but generally does not involve regular input. This model does not allow for pre-emptive assessment and management of medical issues which has been demonstrated to lead to the best outcomes.

2 ORTHOGERIATRIC CLINICAL CARE

2.1 MEDICATION MANAGEMENT

Patients' medications should be reviewed on admission, particularly to enable documentation of orders which clarify which medications are not to be withheld if the patient is fasted for surgery or other tests. This is also the ideal time to review the patient's entire current medication regimen.

Bain et al.[41] describe four steps:

1. Consider the indication for discontinuing specific medications
2. Decide which medications should to be discontinued and with what priority
3. Stop the medication/s after planning and discussion with the patient and other relevant clinicians
4. Monitor the patient for adverse side effects post cessation of the medication.

Clinical indications for cessation of medications may include:

1. Reduced benefit
2. Increased risk of adverse drug reaction
3. Medications which are unsafe for the older patient.[41]

Herbal medicines have had a dramatic increase in popularity over recent years. There are no outcome studies and only a few controlled clinical trials that consider the efficacy or adverse effects of herbal preparations on surgical patients.[42,43.] For example there is anecdotal evidence of adverse effects from herbal medicines, such as that some herbs can impede bleeding and recovery from anaesthesia.

2.2 PREVENTION AND MANAGEMENT OF DELIRIUM

Delirium is a transient mental disorder, characterised by impaired cognitive function and reduced ability to sustain or shift attention. The disturbance develops over a short period of time and generally fluctuates during the course of the day. Delirium usually only lasts for a few days but may persist for weeks or even months.[44]

Delirium is a common, preventable adverse event and can affect up to 30% of all older patients admitted to hospital.[31] It is often caused by aspects of hospitalisation, such as unfamiliar environment, ineffective pain management, immobilisation, dehydration, malnutrition, bladder catheters, sleep deprivation, effects of medications and complications of invasive procedures.[45,46]

Delirium is associated with a high mortality rate at one year[47] and can be missed by clinicians in up to two-thirds of cases due to fluctuations, the overlap with dementia, lack of formal cognitive assessments, failure to consider the diagnosis and lack of appreciation of the clinical consequences.[18, 19, 31] Mortality, institutionalisation and complication rates are higher in patients who develop delirium.[31]

Pre-existing cognitive impairment appears to be the major risk factor for delirium.[44,48,49,50] Delirium may be the only manifestation of myocardial infarction, haemorrhage, pneumonia or other source of sepsis, or of another serious disease process in older patients.

Risk Factors for Developing Delirium	Precipitating Factors for Delirium
Cognitive impairment	Infection
Dementia	Immobility
Surgery e.g. fracture neck of femur	Elimination malfunction
Fracture or trauma	Fever or hypothermia
Age of 70 years or older	Use of urinary catheter
Severe illness	Iatrogenic events
Physical frailty	Concurrent illness
Visual impairment	Use of mechanical restraint
Renal impairment	Psychoactive medications
Admission with infection or dehydration	Hypoxia
Polypharmacy	Opioids
Alcohol excess	Metabolic derangement
HIV	Sleep deprivation
Depression	Anaemia
Dehydration/Malnutrition	

Table 2.1: Risk and precipitating factors for delirium adapted from the British Geriatric Society National Guidelines and Melbourne Health Clinical Practice Guidelines.[31,44]

Risk Assessment

The relationship between predisposing (risk) and precipitating factors for the development of delirium is complex. Vulnerable older people tend to develop delirium after a smaller insult that those with fewer risk factors.[44,51] Whilst there is no overall recommended risk assessment tool other than the Inouye et al. model[51] in acute settings, and new risk factors are being investigated (such as frailty[52] and low BMI [50]), it is recommended that efforts should still be made to assess and modify presently recognised risk factors.[44]

Delirium is reported to be preventable in up to one-third of patients.[18] The literature reports a number of interventional strategies to prevent delirium but few studies have demonstrated significant reduction in the incidence and duration of delirium with such interventions.

The patient's baseline cognition before admission should be ascertained to help establish the risk for delirium and repeated cognitive assessment should be undertaken with a structured assessment tool, such as the MMSE (Mini Mental State Exam[53]) or the AMTS (Abbreviated Mental Test Score[54]) as soon as practicable.[31] The Six Item Screener (SIS) is an easily administered, quick cognitive screening tool that can be used in emergency departments or ward rounds.[55] If the patient is unable to be assessed, family/carers should be asked about the patient's previous cognitive state and diagnoses.

Diagnosis

Diagnosis is generally based on careful bedside observation and history of the previous level of cognition. Delirium can be diagnosed by using the Confusion Assessment Method (CAM) assessment tool[56] in conjunction with a cognitive assessment. Delirium is common in patients with dementia and the use of the CAM and serial measurements of cognition can help distinguish between delirium and dementia.[31]

Delirium can be defined into three subtypes: hypoactive, hyperactive and mixed. Hypoactive delirium symptoms include lethargy and markedly reduced motor activity, and has a poorer prognosis. Hyperactive delirium symptoms include agitation, inappropriate behaviour, hallucinations and increased motor activity. Mixed delirium shows fluctuating symptoms from both hypoactive and hyperactive types.[31]

Prevention and Management

Attention to possible predisposing and precipitating factors is essential. Assessment elements are listed in the following Table 2.2.

Table 2.2 Recommended clinical assessment to identify and address causes of delirium.[44]

History	Examination	Investigations
▪ Medication: History, prescription and over-the-counter ▪ Dehydration ▪ Falls ▪ Infection ▪ Bladder & Bowel function ▪ Premorbid cognitive & functional status ▪ Alcohol history ▪ Past medical & social history ▪ Dietary & fluid intake ▪ Sensory impairment	▪ Vital signs – temp., pulse, resp, BP (lying & standing), O2 sats ▪ Mental state exam – arousal, attention, disorientation ▪ Neurological exam – new signs ▪ Chest – auscultation, cough ▪ Abdomen – retention, impaction ▪ Skin – lesions, dehydration	▪ Urinalysis ▪ Full Blood Examination ▪ UREA ▪ Glucose ▪ Calcium ▪ Calcium ▪ Liver function tests ▪ Chest x-ray ▪ Cardiac enzymes ▪ ECG **Further investigations if needed** ▪ Specific cultures e.g. blood, sputum, wounds ▪ Arterial blood gases ▪ CT brain ▪ Lumbar puncture ▪ Thyroid function tests ▪ B12 and folate

Once delirium is suspected or diagnosed, it is crucial to address all potential causes, provide multidisciplinary supportive care, encourage family involvement, treat behavioural symptoms and prevent further complications.

Non-pharmacological strategies to prevent or manage delirium include

- The reduction/elimination of noxious or unfamiliar noises, such as pump alarms
- Reassurance and reorientation through the use of therapeutic activities to reduce anxiety
- Asking the family/carers to provide communication and care information as well as provide familiar reassuring personal possessions from home
- The presence of family members or one-to-one nursing
- The prevention of sleep deprivation
- Communication enhancement with eyeglasses and hearing aids
- Appropriate lighting for the time of day
- The provision of clocks and calendars.[31,44]

Medical management strategies include

- Oxygen saturation maintenance
- Regular pain relief
- Fluid and electrolyte balance
- Bowel and bladder function maintenance
- Reduction in the use of psychoactive drugs
- Nutritional enhancement
- Early mobilisation
- Prevention of postoperative complications.[44]

Overall, a patient with delirium needs a calm, comfortable environment, with frequent reassurance and reorientation and assistance to maintain a normal sleep-wake cycle.[31]

Pharmacological agents should be avoided if at all possible. A Cochrane review notes that proactive geriatric consultation for hip fracture patients and the use of prophylactic low dose haloperidol may reduce delirium severity and duration plus decrease length of stay.[57] Antipsychotic medications increase the risk of falls and may cause hypotension, and increase the risk of stroke and sudden cardiac death (via QT prolongation) in this group of patients, so potential risks versus benefits should be always considered.[58]

However, if symptoms such as hallucinations or other psychotic features are distressing to the patient, threaten the safety of the patient or others, or interrupt vital therapy, such as mechanical ventilation or central line catheters, antipsychotic medication used in the lowest dose possible may be instigated.[44] Parenteral haloperidol (IV or IM) may cause acute dystonic reactions including life-threatening laryngeal dystonia. Oral and parenteral (IV and IM) benztropine should be readily available, such as 1-2 mg orally or 1-2 mg IV/IM.[58] Benzodiazepines are only indicated in the case of benzodiazepine or alcohol withdrawal.[59]

Table 2.3: Summary of the best practice recommendations for use of antipsychotics in.[58]

Medication	Route	Dose (mg) can be repeated after 1-2 hrs	Maximum dose before senior referral
Haloperidol*	IM/PO	0.25 - 0.5mg	1mg
Risperidone	PO	0.25 - 0.5mg	1mg
Quetiapine	PO	25 mg	50mg
Olanzapine	IM	2.5 - 5mg	10mg

Note. *Benztropine 1-2 mg orally or 1-2 mg IV/IM should be readily available.

As delirium can take weeks to months to resolve, patients still require supervision and must be managed in a suitable setting. Follow-up of all patients is required due to the poor long-term prognosis associated with delirium.

Please also see your own institutions' documents/guidelines/ protocols for the management of delirium, and the Australian Clinical Practice Guidelines for the Management of Delirium in Older People at www.health.vic.gov.au/acute-agedcare.[44]

2.3 ANTITHROMBOTIC PROPHYLAXIS

Elderly patients admitted with fractures are at high risk of developing a venous thromboembolism (VTE). The best prevention against venous thromboembolism is promoting early mobility in hospital.[20,78,60] Prophylaxis needs to commence preoperatively if there is any delay in theatre.[78]

Guideline for Hip Fracture Surgery – Please refer to Venothromboembolism (VTE) Surgical and Medical Management posters and booklets 2008 for guidance in the chemical / pharmacological prophylaxis for VTE.
www.health.nsw.gov.au/policies/gl/2008/GL2008_014.html
Mechanical and pharmacological prophylactic strategies should be implemented as early as possible.

Mechanical Prophylaxis

Mechanical prophylaxis, such as compression stockings and intermittent compression devices, reduces the incidence of VTE in addition to chemical prophylaxis.[78]

Graduated compression stockings (GCS) are usually applied when a patient is admitted to hospital.[61] However, there is little evidence to support their use in the patient with a fracture.[78]
GCS are contraindicated with fragile skin or vascular insufficiency, and need to be routinely removed for skin inspection.[31]

Pharmaceutical Prophylaxis

Contraindications for anticoagulant that need to be assessed include active or high risk of bleeding, severe hepatic disease, adverse reaction to heparin, on current anticoagulation medication, renal impairment (adjust enoxaparin dose if CrCl is <30ml/min), very high risk of falls, and/or currently undergoing palliative management. For current recommendations for anticoagulant doses and duration of treatment see Table 2.4 below.

Please also check information on dose variations in renal failure and new anticoagulants in:
NSW Therapeutic Advisory Group Inc. (2010). Safe Use of Heparins and Oral Anticoagulants in Adults. NSW Department of Health.
http://www.ciap.health.nsw.gov.au/nswtag/publications/posstats/Heparin_VTEupdated082010.pdf

Table 2.4: Summary of anticoagulant prophylaxis recommendations for high risk patients from the NSW Health Venothromboembolism Surgical and Medical Management Guide.[62]

Assess Patient Risk	Recommended Anticoagulant Prophylaxis
Hip or knee arthroplasty - **if no contraindications to anticoagulant prophylaxis**	Prescribe: ▪ enoxaparin 40mg daily or ▪ dalteparin 5000U daily or for orthopaedic surgery ▪ fondaparinux 2.5mg daily (commence 6-8 hrs post-op) **Duration 5-10 days EXCEPT 28-35 days for hip arthropasty**
Hip Fracture Surgery - **if no contraindications to anticoagulant prophylaxis**	Prescribe: ▪ enoxaparin 40mg daily or ▪ dalteparin 5000U daily or ▪ LDUH 5000 TDS for hip fracture surgery ▪ fondaparinux 2.5mg daily (commence 6-8 hrs post-op) **Duration 28-35 days**
Contraindications to anticoagulant prophylaxis	
Active bleeding / high risk of bleeding e.g. haemophilia, thrombocytopaenia (platelet count <50 x $10^{9/L}$), history of GI bleeding Severe hepatic disease (INR > 1.3) / adverse reaction to heparin On current anticoagulation Other e.g. very high falls risk and palliative management	
Renal impairment with LMWH – see manufacturer's product information	

2.4 PRESSURE AREA PREVENTION

Refer to Local Policy

Department of Health NSW link:
http://www.health.nsw.gov.au/policies/PD/2005/pdf/PD2005_257.pdf

NSW Department of Health Patient Education brochure
http://www.health.nsw.gov.au/quality/pdf/pressure_ulcers_brochure.pdf.

The orthogeriatric patient admitted to hospital is at risk for the development of pressure-related injury. Immobility is a primary cause of pressure-related damage especially in the sacrum and heels. Most pressure injury is preventable, so vigilant pressure area care and repositioning are warranted.

Risk Assessment:

A risk assessment tool identifies patients' risk factors so that prevention strategies can be employed. Commonly used tools include the Waterlow and the Braden, however clinical judgement should also be exercised to identify risk factors.[63]

Pressure, shearing and friction are all extrinsic factors that need to be removed or diminished to prevent pressure-related tissue damage in the orthogeriatric patient. Manual handling devices should be used correctly to minimise friction or shearing damage. The frequency of repositioning and turning should be determined by the patient's condition, risk assessment score and routine skin inspections.[64]

The development of pressure injuries, especially on the heel, can be caused by decreased mobility. Ineffective pain management may cause the patient to be reluctant to move. Pressure-related injury leads to further increased pain, especially when weight bearing through the affected leg, thus increasing the disability, so additional heel pressure-relieving devices should be used.[65]

Alternating mattresses should be considered as a first-line preventative strategy for older patients admitted with fractures. Strategies to relieve pressure must also be instigated when the patient is sitting out of bed.[64]

2.5 PAIN MANAGEMENT

Pain is a distressing sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.[66] Pain is undertreated in the frail orthopaedic patient. There is evidence that older patients often have more poorly controlled pain than younger patients.[67] There are multiple causes for this, including reluctance or inability of an older person to request analgesia, reluctance of medical staff to prescribe analgesia in frail patients and the presence of cognitive impairment which makes assessment of pain levels difficult especially in relation to nursing administration of PRN medications. Pain can be severe and ongoing following orthopaedic injury and surgery.[68] A pain regime should commence in the emergency department and continue post-discharge. There is evidence that a fascia iliaca compartment block is very effective preoperatively.[69] A pain regime should be documented in the clinical notes and this information communicated to the patient's GP to continue optimal pain management following discharge.

Assessment of the patient with dementia and/or delirium

Patients who experience untreated pain are at a greater risk of delirium than those with optimal pain relief.[20] Cognitively impaired patients are more likely to be undertreated for acute pain.[31,70]

As all hip fracture repair procedures are painful, patients who cannot voice discomfort must be assumed to still require regular analgesia. Staff should be educated about non-verbal signs of pain assessment in patients with dementia and/or delirium. Behaviours such as restlessness, frowning, grimacing, grunting, groaning, withdrawal or refusal to move may indicate pain in those who cannot communicate their level of pain.[71,72]

Treatment

Providing a combination of two or more analgesic medications with differing analgesic mechanisms is considered best practice. Older frail patients may not tolerate opioids very well. Therefore multiple analgesia modalities should be considered to allow the use of lower doses of opioids. The usual regimen would include routine doses of paracetamol with small doses of opioids, with the availability of additional PRN opioid doses. Nonsteroidal anti-inflammatory drugs should be avoided in older people. Older patients with delirium or dementia patients who are resistant to taking oral medications may benefit from a low-dose analgesic patch.[73]

2.6 MANAGEMENT OF OSTEOPOROSIS

Osteoporosis costs Australia about $7 billion annually. The risk of death is two to three times higher after a major osteoporotic fracture than in the general population.[74]

Definition

Bone is defined as hard tissue in a continual state of flux and is built up by osteoblasts (formation), then remodelled and resorbed by osteoclasts.[75] Net bone loss, both in trabecular and cortical bone, occurs when the rate of bone resorption is greater then bone formation. In women, peak bone mineral density (BMD) is maintained until menopause, but then declines by 15% per decade.[75] In men, bone resorption becomes established after the age of 20 and then bone mineral density declines by 4% per decade.[75] The World Health Organisation (WHO) defines osteoporosis as "a disease characterised by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk".[76] Due to the high risk of multiple fractures related to osteoporosis, it is considered essential to prevent and/or treat the disease to maintain health, independence and quality of life in the older population.[77] It is forecast that one in twelve men and one in three women over the age of 50 will sustain an osteoporotic fracture.[78]

Fracture sites most commonly associated with osteoporosis are the thoracic and lumbar spine, the distal radius and the proximal femur.[78] The risk of fracture is related to two major factors: the frequency of falls and more specifically bone mass changes. Other factors, such as immobility or smoking, may have a dual effect, both directly on bone mass density and also the increasing risk of falls[79] (see Table 2.5).

Primary Risk Factors

The primary risk factors for osteoporosis are summarised and listed in Table 2.5.

Table 2.5: List of evidence based risk factors that act as predictors for osteoporosis. Adapted from SIGN Nos.[71,78] & [56,79]

Major Risk Factors	
Falls	Impaired physical function and repeated falls are related to increasing fracture risk which in turn is related to the risk of osteoporosis.
Previous Fracture	Patients with one or more fragility fracture/s should be investigated and targeted for osteoporosis treatment.
Non-Modifiable Risk Factors	
Age	A decrease in bone mineral density (BMD) occurs with increasing age particularly after menopause.
Sex	Women are at higher risk of osteoporosis due to smaller bones and lower total bone mass. Bone loss in men is less than in women but more likely due to secondary causes such as immobility and smoking.
Ethnicity	White women are 2.5 times more likely to develop osteoporosis than Afro-Caribbean women who have a higher peak bone mass, slower rate of bone loss and higher BMD.
Reproductive Factors	Early menopause is consistent with low BMD which decreases particularly rapidly in early menopausal years
Family History of Osteoporosis	Men and women with a family history of osteoporosis have a lower BMD. As the number of family members with osteoporosis increases the individual BMD decreases. Family history should not only include maternal, paternal and sister history but also presence of kyphosis and low impact trauma fracture after the age of 50.
Modifiable Risk Factors	
Weight	Low body mass index (BMI) and weight loss are indicators, with a two-fold higher bone loss for those in the lowest third (tertile) of BMI than those in the highest third (tertile). Post-menopausal women are considered at increased risk of osteoporosis if they have below-average BMI. Low body weight = BMI <18.5.
Smoking	Female smokers are at higher risk of hip fracture than non-smokers. Male smokers have greater bone loss at the trochanter. The BMD of smokers is 2% lower with each decade after menopause than non-smokers.
Alcohol	There is inconsistent evidence for alcohol as a risk factor for low BMD. Most studies did not include people with excessive alcohol consumption.
Exercise	Both men and women who had a sedentary adolescent life are considered at high risk of osteoporosis. Post-menopausal women who currently exercise are shown to have a higher BMD whereas those who have an inactive lifestyle are at high risk of lower BMD.
Diet	There is a positive association between BMD in adult premenopausal women (45-49) and past dietary intake of milk with inconsistent evidence between current calcium intake and low BMD but a positive correlation with BMD and vitamin D levels. No other consistent evidence has been found between BMD and other dietary factors.

Secondary Risk Factors

Osteoporosis should be considered a possibility in patients with common conditions listed in Table 2.6.

Table 2.6: Secondary risk factors for osteoporosis. Adapted from SIGN No. 71[78]

Secondary Causes of Osteoporosis	
Vitamin D deficiency	Inflammatory bowel disease
Anorexia nervosa	Renal disease
Chronic liver disease	Long term corticosteroid use
Hyperparathyroidism	Rheumatoid arthritis
Coeliac disease	Male hypogonadism

Prevention

Osteoporosis can be prevented by an adequate intake of calcium and vitamin D over a lifetime, with increased amounts particularly after menopause in women and after 70 years of age in men.[80] See recommended dosages below.

Exposure of the hands, face and arms or equivalent area of skin to sunlight for 6-8 minutes per day most days in summer is necessary to produce adequate amounts of vitamin D. More time would be needed in winter. Exposure should occur before 10am and after 3pm for moderately fair-skinned people.[80]

Exercise programs in isolation have not been shown to be effective in preventing osteoporosis, but can be successful when combined with other interventions. Weight-bearing exercise programs should concentrate on strength, balance and flexibility.[79]

Assessment

Along with a thorough medical and social history, other tests recommended to assist in diagnosing osteoporosis are listed in Table 2.7. Most hip fracture patients have underlying osteopenia or osteoporosis and are therefore are at risk of further fractures.[39] However, most of the following blood test results are generally normal in patients with osteoporosis.

Table 2.7: Investigations recommended to exclude other causes of bone mineral loss. Adapted from Osteoporosis Australia.[81]

Typical Investigations	
Initial Investigations	**Additional Investigations**
Serum Calcium Parathyroid Hormone (PTH)	Total Alkaline Phosphatase & Albumin
Serum 25-hydroxy-vitamin D (25-OH Vit D)	Erythrocyte Sedimentation Rate (ESR)
Thyroid Function Test (TFT)	Protein electrophoreses
Liver Function Test (LFT)	
Serum Creatinine	
Full Blood Count (FBC)	

The 'gold standard' diagnostic test for osteoporosis is Dual–Energy X-ray Absorptiometry (DEXA or DXA) of the spine and hip.[78,81] DEXA measures BMD at multiple sites, lateral spine, anteroposterior (AP) spine, forearm, heel, proximal femur and/or total body.[78] A low BMD is the major determinant for the diagnosis of osteoporosis.[78]

Plain x-rays are helpful for indicating whether osteopenia is present, but they do not allow quantitative assessment of bone density.[78,81] X-rays can be useful for diagnosing symptomatic and asymptomatic vertebral fractures in high risk patients showing anterior vertebral body loss of height.[81] If a plain x-ray report notes 'severe osteopenia' it is acceptable to refer the patient for DEXA.[78] It is not necessary for a patient to have repeat DEXA unless it will influence treatment.[78]

Treatment

Non-pharmacological Treatment

Regular weight-bearing exercise, such as walking, should be encouraged to promote good bone and general health. However, exercise alone has not been shown to be effective in fall and fracture prevention. In most clinical trials, combined interventions can be worthwhile in falls prevention such as: weight bearing exercise programs that focus on strength, balance training and flexibility; identification and modification of environmental hazards; education; cognitive assessments; dietary change; medication change or review; and hip protectors. It is unclear which subset of these interventions is effective, therefore multiple appropriate interventions should be offered as indicated by individual comprehensive patient assessments. Note that all post-fracture patients are at increased risk of falls.[79]

For men and women at high risk of hip fracture, especially those in aged care facilities, it is recommended that hip protectors be worn, though issues with compliance should be recognised.[79]

Pharmacological Treatment

Calcium

For those patients who are unable to maintain dietary calcium, supplementation can be effective but appears to have the most benefit in late menopause with significant increases in BMD at the hip. The recommended daily intake of calcium is 1300 mg daily for women over 50 years and men over 70 years.[79]

Calcium plus vitamin D

The daily requirement for vitamin D is at least 400 – 800 IU for adults, but may be 800-1200 IU or 20-50 micrograms for people with limited sun exposure, such as those living in aged care facilities or those who wear concealing clothing.[78] Vitamin D action enhances calcium absorption.[80] Combined therapy of calcium and vitamin D has been shown to significantly reduce non-vertebral fractures by 26% and hip fractures by 35% in the frail elderly (80+ years) with a diagnosis of osteoporosis.[78]

Hormone Replacement Therapy (HRT)

HRT is not approved by the Therapeutic Goods Administration (TGA) for the prevention and treatment of osteoporosis.[81] There is no randomised control trial to study the relationship of hip fractures and HRT administration. There is good evidence that bone mass is preserved and fair evidence that HRT reduces the incidence of fracture during treatment, however most acquired bone protection was lost within five years of treatment ceasing.[79] The complex risks and benefits of HRT should be considered individually for each woman[78] as there is a small risk of breast cancer, an increased risk of venous thromboembolism (VTE), and HRT that is not combined with progesterone increases the risk of endometrial cancer.[78] While there is no evidence of any benefit from HRT in protection from coronary heart disease, one study demonstrated an excess risk of both stroke and myocardial infarction.[78]

Bisphosphonates

Bisphosphonates such as alendronate, risedronate and etidronate reduce the rate of bone turnover and preserve bone mass by inhibiting resorption of bone by osteoclasts.[79,81] Bisphosphonates have been shown to significantly increase bone density at hip sites.[79] Recurrent fractures and mortality have been shown to be reduced following an annual infusion of zoledronic acid given within several weeks to 90 days after hip fracture.[82] These agents should only be started once the patient is vitamin D-replete, after any major dental work has been performed with awareness and management of risk factor for osteonecrosis of the jaw,[83] and must be accompanied by ongoing vitamin D and calcium supplementation.[82]

Generally oral bisphosphonates should be taken on an empty stomach in the morning with a large glass of water. The patient should then stay upright for at least 30 minutes before eating, due to the side effect of mild to moderate gastrointestinal discomfort.[81] Bisphosphonates come in a variety of forms; some can be taken daily while others are taken weekly.[78]

Selective Oestrogen Receptor Modulators (SERMs)

SERMs, such as raloxifene, act as antagonists and agonists and increase BMD in the hip and spine, but have not been shown to reduce non-vertebral fractures.[78,81]

2.7 MANAGEMENT OF NUTRITION

Studies in Australia and the United States have shown that up to 85% of nursing home residents, between 23% and 62% of hospitalised patients and 15% of home bound elderly suffer from protein energy malnutrition, with a concurrent increase in morbidity and mortality.[84] Malnutrition is a common but often overlooked issue with significant consequences in hospital patients, increasing the risk of complications and with deleterious effects on recovery.[85,86,87]

Malnutrition is defined as an imbalance or deficiency of calories, protein, energy, vitamins and minerals which cause quantifiable adverse effects on body tissue and function as well as clinical outcomes.[88,89] Malnourished patients are at risk of more complications than other patients of 'normal' weight, leading to functional decline, longer lengths of stay and increasing frailty, resulting in a decline in the quality of life, high mortality and high health care costs.[89,90]

The term undernutrition is '…primarily used in the context of deficient energy or protein intake or absorption and is often described as protein energy malnutrition'.[88] Undernutrition is associated with increased risk of deep vein thrombosis (DVT), pressure sores, respiratory and cardiac complications, perioperative mortality and multi-organ failure.[89]

A large majority of hip fracture and older orthopaedic patients are malnourished prior to being hospitalised and show a rapid decline in their nutritional status in the first 1-2 weeks after admission.[85,86] Surgery and injury can produce stress responses which include the release of stress hormones and inflammatory mediators, causing catabolic reactions leading to the breakdown of fat, protein and glycogen and the release of free fatty acids, amino acids and glucose into the blood. These elements are then diverted from their normal function, such as healing, immune response and physical activity.[91]

Malnutrition, combined with the catabolic response to surgery, can lead to multiple issues such as: further muscle wasting and impaired muscle strength and function, which hinder postoperative recovery, rehabilitation and wound healing due to protein depletion; plus increased hospital mortality due to low serum albumin levels, increased sepsis, pneumonia, deep vein thrombosis, pressure sores, fatigue, mental apathy, delirium and delayed bone healing.[39,86,87] In addition, it has been found that elderly women with only slightly sub-optimal nutritional status have an increased risk of osteoporosis, due to the effect of undernutrition on bone health.[92]

Hospitalisation and illness are often linked with a negative energy balance because energy requirements are high for recovery from illness and intake tends to be poor leading to worsening nutritional status.[86] Optimal nutrition requires a multidisciplinary approach with routine nutritional screening, assessment of intake and referral to a dietician when necessary.[85] In a study of 25 consecutive patients admitted with a fractured neck of femur, one-third of the patients who required nutritional support were not referred to a dietician.[85] Measures to minimise the catabolic stress response from surgery and support anabolism include perioperative preparation such as minimal fasting periods, adequate fluid balance, pre- and postoperative nutrition support, optimal postoperative analgesia and mobilisation.[93]

Clinicians need to understand why these patients are at high risk of further malnutrition. Possible reasons include a reluctance or inability to eat due to delayed gastric emptying that causes a patient to feel satiated for longer, a decreased sense of smell and taste that may blunt the appetite, immobility, pain, nausea and vomiting due to anaesthetic, opioid administration or ileus, drug side effects, delirium, lack of meal choice, lack of assistance with food consumption, unfamiliar foods and meal times, unpleasant environment, dental/eating problems, preoperative fasting and long delays for surgery.[85,87,89]

Dementia and early medical complications are major independent risk factors for inadequate postoperative nutrition.[87,94] Studies have shown that patients with dementia have a poorer nutritional and functional status than those of the same age and comorbidities and normal cognition.[94] Patients with dementia may not comprehend the need to eat, forget they have just eaten or not be able to chew or swallow.[89] Overall, the orthogeriatric patient is less likely to compensate by eating more after long periods of restricted food intake.[85]

In summary, the link between fracture recovery and nutritional status is complex, and blood markers of protein depletion, such as pre-albumin, albumin and transferrin are to some extent affected by responses to injury, infection and fluid shifts.[93] It is suggested that when malnutrition becomes advanced, the possibility of improvement declines significantly.[95]

Screening

Nutritional screening and assessment have the potential for substantial prognostic and therapeutic benefits.[89] However, there is no consensus regarding the best method of identifying nutritionally compromised patients.[96,97,98,99] It is even claimed that all screening tools overestimate malnutrition in the elderly hospitalised patient.[97]

Nutritional screening tools must be quick and easy to use to be of practical use in an acute setting.[88] Nutritional status will alter during hospitalisation and therefore rescreening at regular intervals during the admission will be necessary.[88]

Screening tools

There are a number of screening tools currently available: the Malnutrition Universal Screening Tool (MUST), the Nutritional Risk Score (NRS), the Nutritional Screening Tool (NST), the Subjective Global Assessment (SGA) and the Mini Nutritional Assessment (MNA). Of these, the MNA is recommended for older people, as it is a simple tool specifically developed for people over the age of 65,[89,95,100,101,102] and is said to identity those at risk of undernutrition before significant changes in albumin levels or weight occur.[89]

Table 2.8: The ESPEN key recommendations for perioperative nutritional care.[102]

No	Key Aspects
1	Provide preoperative nutritional screening and assessment.
2	Integrate nutrition into the patient's management/ care plan.
3	Avoid long periods of fasting preoperatively. Fasting from midnight is unnecessary with most patients. Those patients with no specific risk of aspiration may drink clear fluids up to two hours before anaesthesia and solids up to six hours before.
4	Encourage oral supplements in patients who do not meet their energy needs from food.
5	Commence normal diet/food intake as early as possible postoperatively.
6	Maintain metabolic control e.g. blood glucose monitoring.
7	Reduce factors which contribute to the catabolic stress response from injury and surgery.
8	Mobilise early.

The European Society of Parenteral and Enteral Nutrition (ESPEN) recommends the use of the MNA for older people because it includes different facets of nutritional status including dietary habits, comorbidities and anthropometric measurements, such as weight loss, height and weight, as well as subjective nutritional assessment.[84,102] The MNA score as a predictor of outcomes, adverse clinical events and mortality[102,103] has been validated by three studies of over 600 older people[95] and has been described as being highly sensitive (96%), predictive (97%), specific (98%), reproducible and easy to administer.[84,103]

As surgery can be a predictive factor of malnutrition,[97] screening is recommended for all older surgical patients.[98] Rubenstein developed a short form MNA (MNA-SF) of just six questions, instead of the original 18, which can be administered in about threeminutes.[104] Immobile bedbound patients and those with cognitive impairment require more time for screening. The MNA-SF has a high correlation with the full MNA, is on par with the full MNA in predicting serum albumin, and has a high diagnostic accuracy. Patients diagnosed as 'at risk' by the MNA -SF require further assessment with the full MNA. Preoperative orthopaedic patients are difficult to weigh, unless a lifter with scales attached is available. Routine screening in these patients can prove difficult.

Nutrition screening and assessment must be integrated into the overall care plan for all patients, and take into consideration social, personal, psychological and physical aspects.[105] Screening should be performed on admission and repeated weekly if required.[105,106,107] A complete assessment should be followed by a nutritional program which reflects ethical, cultural and clinical considerations for the individual.[105]

Nutritional Supplements

When patients do not meet their energy needs from food, or have been assessed as undernourished or malnourished, they may be prescribed oral nutritional supplements containing protein and energy. A Cochrane review[108] concluded that oral supplements for older people could produce small but steady weight gains and that there is some evidence oral protein and energy supplements for hip fracture patients, along with other patients with non-malignant disorders, reduced complications and death. However, these studies did not show any reduction of length of stay, benefit to functional outcome or quality of life. While oral liquid supplements are widely used and are more acceptable and potentially safer for the older person than nasogastric enteral feeds, some older patients appear unwilling or unable to drink them. Some patients do not find them palatable and adverse effects, such as nausea or diarrhoea, have also been reported. It is therefore not enough to offer only oral supplements. Instead, patients should have a range of options for improving nutritional intake, both in hospital and longer term, through the provision of appealing and agreeable foods and advice on appropriate diets.[108]

An important aspect of nutrition is assistance with feeding or meal set-up, as older people may become malnourished in hospital when simply unable to access their meals. As a full meal tray with three courses can be very daunting for a cognitively impaired patient, arranging the meal in the order to be consumed or providing one course at a time to avoid confusion are possible strategies.[108] The ESPEN key recommendations for perioperative care are summarised in Table 2.8.[102]

2.8 FALLS PREVENTION

Refer to National Guidelines and NSW Department of Health Policy.

National Guidelines[109]

www.health.gov.au/internet/safety/publishing.nsf/content/FallsGuidelines

NSW Policy: Fall Injury Among Older People – Management Policy to Reduce Fall Injury Among Older People
www.health.nsw.gov.au/policies/PD/2005/pdf/PD2005_353.pdf

Definition: A fall is defined as an unexpected event in which the person comes to rest on the ground, floor or lower level.[110]

Incidence

Approximately a third of people aged 65+ will fall each year with the rate increasing with advancing years. A fall can threaten a person's wellbeing and quality of life.[111] The impact of a fall can lead to reduced physical activity through fear of falling and a loss of independence with an increase in the rate of admission to residential care facility. Falls are the leading cause of injury-related hospitalisation in older people with a fall recorded as the cause of presentation to the Emergency Department (ED) in up to 18% of people aged 65 and older.[112,113] Of those people presenting to ED following a fall, over 50% are subsequently admitted to hospital. Ninety-five percent of hip fractures result from a fall. Patients admitted with a fracture, have an increased chance of falling and fracturing again within the next three months after presentation and therefore represent an important group in terms of risk identification and opportunities to intervene to reduce the chances of future fall related injury.[114]

Assessment of cause

A thorough patient examination and history is required to understand the cause of a fall, enable treatment and actions for prevention of further falls. Patients admitted with a fall related injury should routinely have access to an occupational therapy home and safety assessment. Most falls have multiple contributing factors, which can include specific medications, sensory deficits, gait disorders, orthostatic hypotension, syncopal events due to cardiac or neurological causes. All treatable causes should be investigated and managed appropriately.

Falls Risk

Patients admitted to a hospital setting, either via the emergency department or as a planned admission, should have a falls risk screen undertaken. The most commonly used screen in NSW is the Modified STRATIFY.[115] Where people are identified as high risk, further assessment and tailored intervention is required to minimise risk whilst in hospital.

Falls Prevention

There are a number of evidence based approaches to falls and fracture prevention.[109,116] Multifaceted assessment linked to intervention has been shown to be effective in a number of studies.[116] Most successful multifaceted intervention programs include a comprehensive assessment of both physical and cognitive abilities with interventions linked to the identified deficits.

Challenging balance seems to offer the best results in terms of an exercise intervention. Tai Chi is an example of a program that challenges balance. Balance training and exercise needs to

continue over time. Other approaches to preventing falls include extraction of cataracts, avoiding multifocal and bifocal glasses whilst outdoors, discontinuation of centrally acting medications.[116]

A detailed review of falls risk assessment and approaches to intervention is beyond the scope of this document and readers are encouraged to refer to the existing National Falls Guidelines for further information: Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Hospitals, Residential Aged Care Facilities and Community Care 2009 www.health.gov.au/internet/safety/publishing.nsf/content/FallsGuidelines

Related Links and Resources for Falls Prevention Strategies

Falls Prevention Strategies: NSW Falls Prevention Program, Clinical Excellence Commission: www.cec.health.nsw.gov.au/programs/falls-prevention.html

Hip Protectors

Hip protectors are designed to absorb energy and transfer load from the bone to surrounding tissue.[117] There is evidence to show that hip protectors do reduce fractures in a health care facility however compliance in wearing the hip protectors is poor due to patients finding them uncomfortable.[20,118]

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GLOSSARY

ABG	Arterial Blood Gas
ACI	Agency for Clinical Innovation
AHS	Area Health Service
AMTS	Abbreviated Mental Test Score
BP	Blood Pressure
BMD	Bone Mineral Density
BMI	Body Mass Index
Ca	Calcium
CAM	Confusion Assessment Method
CCF	Congestive Cardiac Failure
CNC	Clinical Nurse Consultant
COPD	Chronic Obstructive Pulmonary Disease
CRF	Chronic Renal Failure
CRP	C-Reactive Protein
CT	Computed Tomography
ECG	Electrocardiogram
EUC	Electrolytes Urea Creatinine
DEXA/DXA	Dual-Energy X-ray Absorptiometry
DVT	Deep Venous Thrombosis
EDD	Estimated Date of Discharge
ESPEN	European Society of Parental and Enteral Nutrition
FBC	Full Blood Count
FEV	Forced Expiratory Volume
FFP	Fresh Frozen Plasma
FVC	Forced Vital Capacity
GCS	Graduated Compression Stockings
GP	General Practitioner
Hb	Haemoglobin
HRT	Hormone Replacement therapy
INR	International Normalised Ratio – blood clotting test
IM	Intramuscular
JMO	Junior Medical Officer
IDC	Indwelling Catheter
IU	International Units
IV	Intravenous
IVC	Intravenous Cannula
IVF	Intravenous Fluids
LDUH	Low Dose Unfractionated Heparin
LFTs	Liver Function Tests
LMWH	Low Molecular Weight Heparin
LVEF	Left Ventricular Ejection Fraction
MMSE	Mini Mental State Examination
MNA	Mini Nutritional Assessment
NBM	Nil By Mouth
NSAIDs	Non Steroidal Anti-Inflammatory Drugs
NUM	Nursing Unit Manager
O2	Oxygen
PTH	Parathyroid Hormone
PRN	Pro Re Nata – as needed but not more often than 4th hourly
QT	Represents the duration of activation and recovery of the ventricular muscle measured during an ECG
RMO	Resident Medical Officer
TFTs	Thyroid Function Tests
SERMs	Selective Oestrogen Receptor Modulators
SIGN	Scottish Intercollegiate Guidelines Network
SIS	Six Item Screener
WHO	World Health Organisation
VTE	Venothromboembolism

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