



## Strategy to Prevent Falls and Fractures in Ireland's Ageing Population

Report of the National Steering Group on  
the Prevention of Falls in Older People and  
the Prevention and Management of  
Osteoporosis throughout Life

June 2008

# Contents

List of Appendices and Technical Reports	2	
Foreword	3	
Executive Summary	5	
1.	Introduction	14
2.	Demography in Ireland	20
3.	Scale of the Problem of Fall Related Injuries in Ireland	26
4.	Economic Burden	38
5.	Risk Factors for Falls and Fractures	46
5(a)	The Risks of Falling	47
5(b)	The Risks of Fracture	53
6.	Current Services for Falls and Fracture Prevention	60
6(a)	Current Services – Falls	61
6(b)	Current Services – Fracture Prevention	65
7.	Best Practice Guidelines to Prevent and Manage Falls and Fractures in an Ageing Population	72
7(a)	Best Practice Guidelines to Prevent and Manage Falls in Older People	73
7(b)	Best Practice Guidelines to Prevent and Manage Osteoporosis and Fractures	81
8.	Strategy and Implementation	102

# List of Appendices

Appendix 1:	Members of the National Steering Group
Appendix 1a:	Members of the Falls Sub-Group Members of the Environment Working Group
Appendix 1b:	Members of the Osteoporosis Sub-Group
Appendix 2:	Moreland: Level of Evidence for falls risk factors
Appendix 3:	Examples of Fall Prevention Services in Community, Hospital, Rehabilitation and Long-Stay Settings
Appendix 4a:	Examples of Physiotherapy led multidisciplinary programmes
Appendix 4b:	Occupational Therapy submission
Appendix 4c:	Irish Nutrition and Dietetics Institute submission
Appendix 5:	List of persons/organisations contacted in consultation process
Appendix 6:	Evidence for fall prevention intervention grades, by multi-factorial assessments.

# List of Technical Reports

## **Technical Report 1:**

The economic costs of falls and fractures in people aged 65 and over in Ireland.

Technical report to NCAOP/HSE/DOHC by Brenda Gannon, Eamon O'Shea and Eibhlin Hudson, Irish Centre for Social Gerontology, National University of Ireland, Galway.

## **Technical Report 2:**

Pharmaco-Economic Study for the prescribing of prevention and treatment of osteoporosis.

## **Technical Report 3:**

Dual Energy X-ray Absorptiometry (DXA) Services in Ireland . How do we fare?

National Survey of Services in Ireland (October – December 2006);M O'Connor (HSE), S Van Der Kamp (St. Vincent's University Hospital)

## **Technical Report 4:**

Older People: The Environment and Injuries – Report of the Environmental Health Group.

## **Technical Report 5:**

Report on the consultation process with stakeholders.

## **Technical Report 6:**

Research on Emergency Department attendance due to fall related injuries among older people.

(Technical Reports available on [www.hse.ie](http://www.hse.ie))

# Foreword

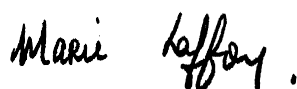
Falls in older people are a serious public health problem and a needless cause of ill-health and death. The risk of falling increases as people get older. One in three older people fall every year and two-thirds of them fall again within six months. As Ireland's population ages the burden of falls and related injuries could double over the next 25 years. Falls can be predicted and prevented.

Osteoporosis is an increasing cause of concern. One in three women and one in five men over the age of 50 years of age may have osteoporosis in Ireland. Many of them do not know they have this condition as it generally does not declare itself until the first fracture occurs. Our challenge is to prevent, diagnose and treat osteoporosis before disability from fractures occurs.

This report on *'Preventing Falls and Fractures in Ireland's Ageing Population'* is a joint strategy between the Department of Health and Children, the Health Service Executive and the National Council on Ageing and Older People. It aims to protect bone health throughout life and prevent falls in our ageing population. It provides an update of best available evidence and guidelines

to implement Falls and Osteoporosis Programmes. It explains how these services should be integrated. It shows how different health professionals who work with older people can improve bone health and minimise the impact of falls. While targeted prevention programmes aimed at high-risk groups have been shown to be effective, the key to success has to be multi-disciplinary, interagency, intersectoral and with integrated intervention.

Developing a Fall and Osteoporosis Prevention Programme is a sound economic investment. It is estimated that the current yearly economic costs of falls in older people is approximately €400 million. This could increase to €2 billion in the next 25 years in the absence of a strategic approach to this serious and preventable problem.



Dr Marie Laffoy  
Assistant National Director  
Population Health Directorate

# Executive Summary

## Introduction

Ireland has an ageing population. Today 11% are aged 65 years or over (468,000). By 2031 that proportion will increase to 18% i.e. to over one million older people. The biggest increase will be among those who are 80 years of age or more. Fall related injuries are a major problem in older people. It is estimated that one in every three people over the age of 65 years and one in two people over the age of 80 years fall every year. Older people are more likely to suffer serious injuries, disability, psychological consequences and death following a fall than other age groups. Fall related injuries represent a large expenditure to the health service and the problem is increasing as the population ages.

This report was produced by the National Steering Group on the *Prevention of Falls and Fractures in an Ageing Population*. The Group was established in 2006 as a joint initiative between the Health Service Executive, The National Council on Ageing and Older People and the Department of Health and Children to develop an integrated national strategy to prevent falls in older people and improve bone health in the whole population. The report shows that a structured approach to Fall Prevention and Bone Health is imperative in Ireland and it provides evidence-based interventions for implementation.

The terms of reference of the Steering Group were to:

- Identify the components of an effective Fall Prevention / Fracture Prevention strategy in an ageing population based on best practice.
- Document the extent of the problem of falls and osteoporosis in Ireland and the impact on the health service including costs to the health service.

- Document the services currently in place to prevent falls and promote bone health in Ireland
- Consult with multidisciplinary stakeholders regarding the development of the integrated strategy.
- Develop a system-based, integrated model of care for those at risk of falls and poor bone health including an evaluation framework.

Two sub-groups of the Steering Group were established. The first sub-group examined the problem of falls in older people and a separate group examined the environmental aspects. The second sub-group addressed bone health and osteoporosis. Electronic literature searches were conducted on best-practice. Research was conducted on:

- The health impact of fall related injuries in Ireland and internationally
- Accuracy of HIPE coding of external cause of injury
- The economic burden of fall related injuries
- Emergency Department workload due to falls
- Pharmacological prescribing of osteoporosis medication in Ireland
- Availability and utilisation of DXA facilities nationally
- Environmental aspects and safety of the built environment in preventing falls.

In addition consultation took place with key groups and an assessment of existing services was undertaken.

There are three main themes in the report:

1. **The Scale of the Problem of Falls and Fractures due to Poor Bone Health in our Ageing Population.**
2. **The Risk Factors for Falls and Osteoporosis, a Picture of Current Services and Best Practice for Primary and Secondary Intervention.**
3. **The Approach to the Development and Implementation of an Integrated Strategy.**

### 1. The Scale of the Problem of Falls and Fractures due to Poor Bone Health in our Ageing Population

Information on the demographic shift in Ireland is provided in Chapter 2. By 2031 there will be an additional 500,000 older people living in Ireland. While our life expectancy and disability free life expectancy have been increasing these demographic trends set new challenges to our health service and for older people's health. The priority is to ensure older people can live, work and be active for as long as possible.

The impact of fall related deaths and injury for the health service is shown in Chapter 3. Information from European Injury Registers indicate that 10% of older people need medical treatment for an injury every year and falls cause 75% of these injuries. In addition 2-3% of all injured older people require hospital admission. Falls kill more older people than all other age groups. In Ireland approximately 250 older people die from falling every year and overall three-quarters of all fall related deaths are over 65 years of age. Death rates in this age group have been increasing in recent years. Fall related deaths increase with age over 65 years and they are significantly higher in older females.

Approximately 7,250 older people are admitted to hospital for treatment of fall related injuries every year, utilising 5.2% of the 1.8 million hospital bed days used by older people. Their average length of hospital stay following a fall is 12.7 days (the average length of stay for all causes in this age group is 11.5 days). Hip fractures are one of the most serious injuries due to a fall. They result in approximately 2,800 hospital admissions each year and 80% are over 75 years of age; their length of hospital stay is

18 days; less than one-third go directly home after their hospital treatment. The inpatient cost of treating a hip fracture is €12,600. Overall the inpatient cost of fall related injuries among older persons is currently estimated at €59 million and inpatient hip fractures cost is estimated at €35 million. It is clear that the full picture of the impact of falls is greater than the above data indicate as figures are not readily available from hospital emergency departments and Primary Care.

Up to 300,000 Irish people aged 50 years and over may have osteoporosis. Prevalence is rising as the population ages. It is the most common form of metabolic bone disease in Ireland. It is characterised by bone fragility due to low bone mass and the propensity for 'fragility fractures' – fractures that occur as a result of mechanical forces that would not usually cause a fracture e.g. from a fall in the standing position. National statistics on osteoporosis are incomplete. In 2004 there were 6,113 hospital episodes where a diagnosis of osteoporosis was recorded but this represents the 'tip of the iceberg'.

Ireland's demographic trends will have profound effect on morbidity and mortality due to fall related injuries. If current rates of fall related injuries continue, by 2031 the number of deaths and hospital admissions in older people will double with huge impact on all health services. As fall related injuries are the biggest cause of injury death in older people, if these can be successfully managed on a population basis there will be a dramatic improvement in the health of older people.

The Irish Centre for Social Gerontology was commissioned to undertake an Economic Burden of Illness Study (BOI) of falls and fractures among people aged 65 years and over in Ireland. It was asked to project these costs to the next 20 years in the absence of the implementation of a National Fall and Fracture Prevention Strategy, Chapter 4. A comprehensive Burden of Illness Study has not been previously undertaken in Ireland. International research has shown the cost impact of falls and fractures can be immense. Studies in the United States estimate that the annual economic costs of fall injuries are 0.3% (\$20.2 Billion) of GNP (\$7,071 Billion). In the UK, the costs of falls were estimated at 0.11% of GNP but this did not include costs of informal

caring or mortality. The result of the Irish Burden of Illness Study shows that in financial terms fall related injuries in older people cost €402 million to the economy. If current trends continue it is estimated that costs will escalate. By 2010 the cost will be €520-€551million. By 2020 the cost will be €922-€1077 million and by 2030 the cost will be €1587 - €2043 million.

## 2. The Risk Factors for Falls and Osteoporosis; A Picture of Current Services and Best-Practice Interventions

### Risks

Fall related injuries are predictable and they can be prevented. Falls are multifactorial events with a wide range of risk factors. The risks can be loosely classified as intrinsic (e.g. muscle weakness), extrinsic (e.g. medication) and environmental (e.g. home hazards). Not all risk factors are strongly associated with falls-some are more predictive of a fall than others. Chapter 5a describes and weights the most predictive risk factors using recent guidelines that reviewed the available literature on fall risk factors. The most predictive intrinsic risk factors are muscle weakness, history of falls and gait/balance deficits. The most predictive extrinsic risk factors are medications and polypharmacy.

Chapter 5b describes the risks of fracture and osteoporosis in the Irish population. It is estimated that 55% of people aged over 50 years have low bone mass. This puts them at risk of fracture and/or osteoporosis. Approximately 193,000 women and 107,000 men over 50 years of age may have osteoporosis in Ireland. Osteoporosis is defined as *"a systematic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture"*. Early osteoporosis is not usually diagnosed and remains asymptomatic. In most cases, osteoporosis does not become evident until a fracture occurs. The presence of osteoporosis before or after a fracture can be confirmed using a DXA scan. When bone mineral density is measured at 2.5 or more standard deviations below normal peak bone mass for a young woman osteoporosis is said to be present. Some clinical risk factors for osteoporosis can be modified. These include smoking, sedentary lifestyle, low Calcium intake and Vitamin D exposure, low body weight and glucocorticoid

therapy. Non-modifiable risks include advanced age, female gender, white / Asian race, family history of osteoporosis and certain cancers (e.g. multiple myeloma). Nursing home residents are at highest risk of falls, fractures and osteoporosis. Their rate of hip fracture is 3-11 times greater than age-matched community dwelling older people.

The assessment of predictors for falls, fractures and poor bone health in Chapter 5 provides the evidence of the modifiable nature of many of these risks. It is possible to intervene and postpone the physical and cognitive manifestations of poor bone health and ageing and thereby improve health and reduce fall risks.

### Current Services

Chapter 6a gives a picture of current Fall Prevention Services. Fall prevention, assessment and intervention services have been set up, to some extent, around the country in recent years. For example, Health Promotion interventions, and services in the community, rehabilitation centres, acute hospitals and long stay residential units are being developed. However, these services are not provided on a comprehensive population basis. They are not standardised or integrated as part of national/regional cohesive service. These services vary in their approach. In addition their impact is difficult to determine as monitoring of outputs/outcomes is undertaken to varying degrees. In fact most patients who fall do not receive a falls assessment or intervention service. Where a service is in place, in most cases, this is due to efforts and enthusiasm of individual health professionals. The need for a comprehensive service is clear. It is estimated that 30,000 older people attend Emergency Departments (ED) or Primary Care each year for treatment of fall related injuries. Research undertaken in two EDs also highlights the seriousness of the problem. That research showed that the mean age of the 282 patients who attended after a fall was 78.5 years, 67% were female and two-thirds suffered a 'simple trip or slip'; over 70% of the injuries occurred at home and 60% had a previous fall. Only four (1.4%) had a multidisciplinary falls risk assessment.

Chapter 6b examines current fracture prevention services. These services are provided to a varying extent in all parts of the health service and include Health Promotion, Primary and



Community Care and general and specialist hospital services. Like the falls service, osteoporosis services have developed in an ad hoc manner and are difficult to quantify. As the clinical significance of osteoporosis lies in the fractures that occur, measurements of bone mineral density (BMD) by dual energy x-ray absorptiometry (DXA) are the gold standard and they are central to the diagnosis and assessment of osteoporosis. Research undertaken in 2006 showed that in Ireland there are 61 DXA scanners (59 locations). Based on the population of each hospital network, the DXA coverage ranged from 1/46,000 to 1/122,000 population. The annual number of scans per 100,000 population ranged from 1,025 to 3,105; 60% of the locations have protocols in place but there was wide variation in health personnel training and continuous professional development. International guidelines indicate that, using a selective case finding approach (which is recommended by the WHO) a minimum of 1,000 DXA scans per 100,000 population would be required. The current availability of DXA scans in Ireland is therefore sufficient to meet needs. However there is inequitable access to the service. Over 50% of these DXA scanners operate in the private health sector where scans can be provided upon request. The waiting times for DXA scans in the public health sector is up to 20 weeks. Osteoporosis prescribing during 2005 was researched. This showed that the number of prescriptions for the treatment and prophylaxis for osteoporosis has increased from 143,261 to 415,656 on the GMS scheme and from 52,452 to 136,547 on the Drugs Payments Scheme between 2002 and 2005, an indication of the increasing awareness and treatment provision to those at risk. The decision to treat should be based on fracture probability.

### Best Practice for Primary and Secondary Intervention

Fall related injuries in older people can be reduced by known cost effective interventions. Best practice in prevention, treatment and management of falls in older people are described in Chapter 7a. These are based on information from the AGS/BGS guidelines, NICE guidelines and work carried out by Larsen et al. This shows the patient pathways and the appropriate evidence based interventions that are required at different stages including 'screening',

risk assessment and management. The 'screening' assessment is simple and involves asking a set of questions that identifies at-risk people who may require further assessment. The components of the multifactorial assessment and intervention are provided in a self-explanatory algorithm. The strength of evidence is presented for each intervention. The overall goal of this approach is to optimise and standardise assessment and intervention so as to reduce falls in older people. The target populations for intervention are older people living in the community and those in long-term residential care.

Chapter 7b focuses on priorities for the maintenance of good bone health. These include:

- Health promotion should start in childhood and continue throughout life in different settings e.g. schools, community settings. It should be tailored to address the needs of both low risk and high risk people. The priorities include education and awareness regarding adequate diet, in particular, Calcium and Vitamin D intake, weight bearing exercise and smoking avoidance.
- Early detection of osteoporosis is recommended on a selective case finding basis based on recognised clinical risk factors i.e. previous low trauma fracture, x-ray evidence of osteopenia, long-term glucocorticoid treatment, family history of osteoporosis. Diagnosis is made using BMD at a cut off point of 2.5 standard deviations for most people.
- The aim of osteoporosis treatment is to prevent fracture, stabilise or increase bone mass, relieve symptoms and maximise physical function. Treatment involves pharmaceutical and non-pharmaceutical interventions. Criteria for these interventions are described in the report.
- Long term management and rehabilitation after a fracture should begin immediately after the acute phase. This should be undertaken by a multidisciplinary team that ensures integration of all services and addresses patient risk factors.
- Service developments in bone health and osteoporosis should be part of a population chronic illness management approach. In relation to specifics of fractures and osteoporosis an orthogeriatric care model is recommended. This should be fully



integrated with chronic illness approaches to care and be supported by a fracture liaison service. Components of the proposed model of care are described in the report.

### 3. Strategy and Implementation

This section gives a summary of the strategic and implementation approach. Figure S1 shows the Vision, Mission, high level Principles, Goals and Objectives. These are described in greater detail in Chapter 8.

leadership in fall and fracture prevention including training, research and health information materials.

3. Regional Planning/Development teams will need to be established at HSE Area level: (*Target – September 2008*). These teams will provide leadership and direction in each Area on the development, implementation, monitoring and evaluation of Area Plans. They will comprise of personnel with responsibility for Health Promotion, Primary



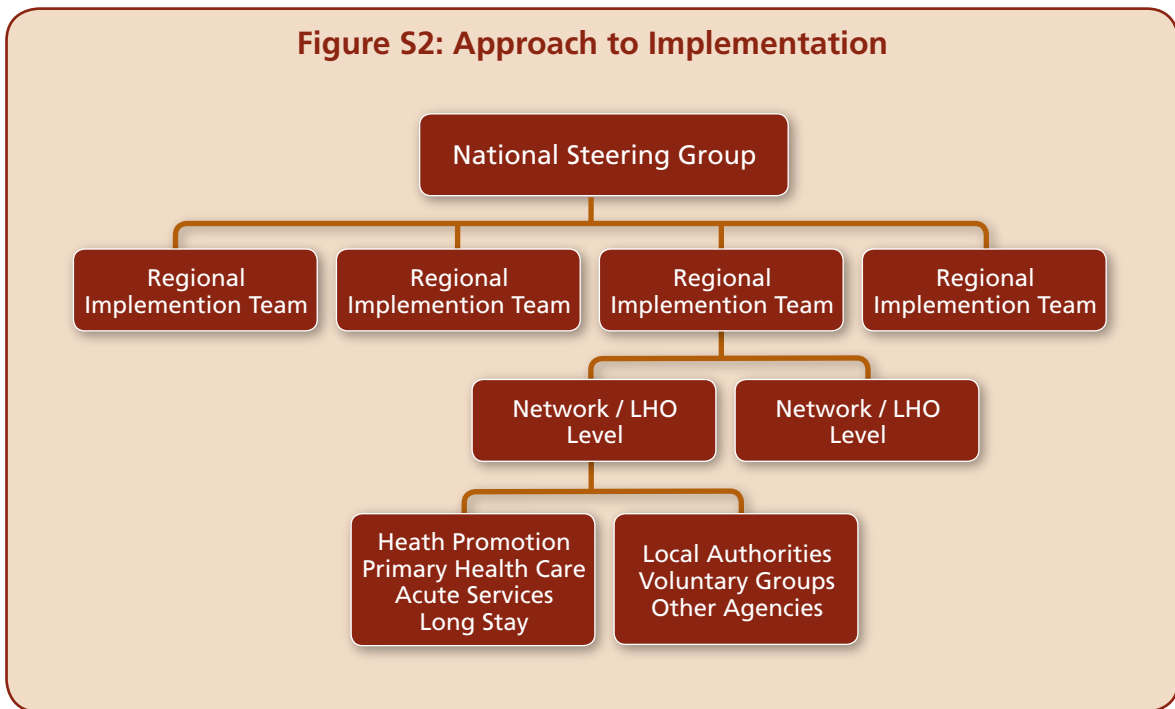
#### Implementation Approach

1. A National Falls and Fracture Prevention Steering Group will need to be established: (*target- September 2008*). This will involve key stakeholders from relevant disciplines and agencies. It will provide direction and guidance on priorities for national planning, implementation, audit, research and training.
2. The National Falls and Fracture Prevention Steering Group will support a newly established National Centre for Falls and Fracture Prevention: (*Target- June 2009*). This will be the nerve centre for national

Health Care, Acute Services, environmental health, long-stay residential services and others in the Area. They will also liaise with other relevant non-health services e.g. local authorities.

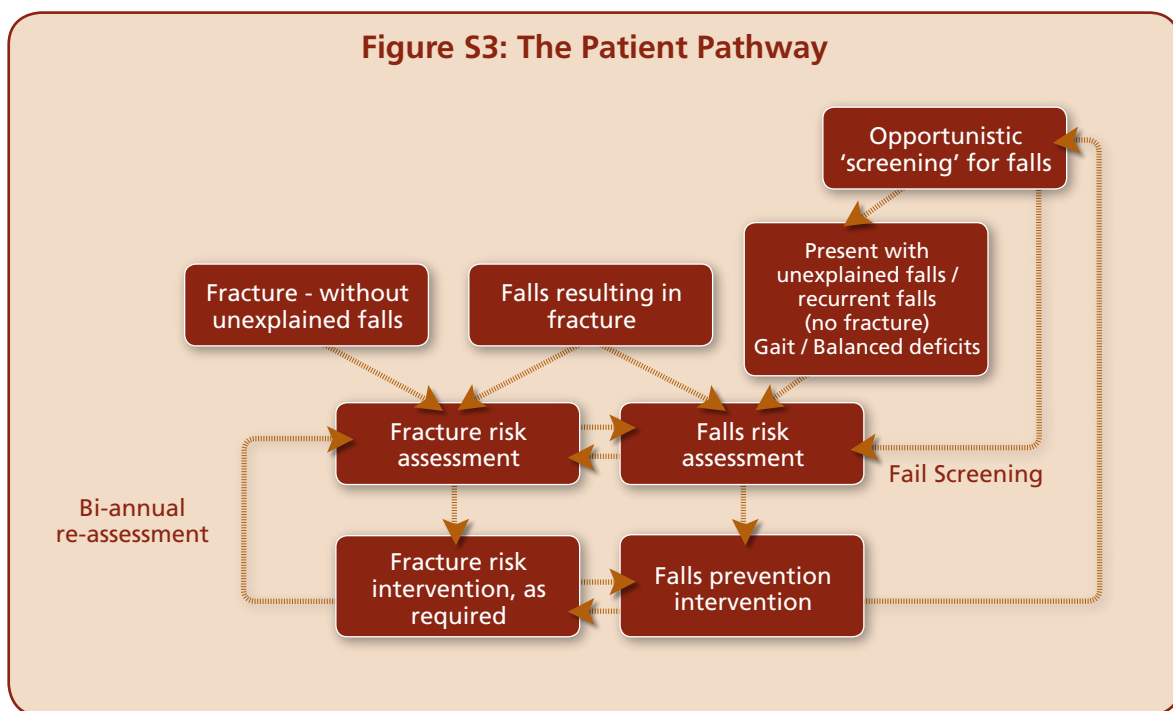
4. Local Implementation Teams at Network / Local Health Office Area will also need to be established (*September 2008*). This is to facilitate a partnership approach between all disciplines and to promote integration between the various parts of the health service and other relevant agencies in relation to local plans.

Figure S2: Approach to Implementation



5. Each acute hospital should have a multidisciplinary Integrated Fall and Fracture Prevention Programme (IFFP) to undertake falls and fracture assessment and intervention in accordance with evidence based practice: (*Target-September 2008*). This service must ensure the primary role of the GP and primary care team in the overall management of the patient. There should be free and timely access to a DXA scan for people shown to be at risk, following assessment.
6. Each IFFP will be consultant led and will have dedicated nursing personnel in falls and fractures to co-ordinate the service. Assessments will be carried out by a multidisciplinary team involving a :
  - Consultant
  - Clinical Nurse Specialist
  - Physiotherapist
  - Occupational Therapist
  - Dietician
  - Radiographer

Following assessment, an individual multifactorial intervention programme will be developed.
7. Multifactorial interventions will require access to a range of disciplines, based on the assessment. Disciplines commonly involved in interventions include; Geriatrician, GPs, Allied Health Professionals and other clinical specialties.
8. The multidisciplinary team approach will enable the majority of interventions to take place in the community. The hospital, community and primary health care services will need to work together to develop this integrated, seamless approach.
9. A small number of tertiary specialist Falls Services should be provided on a population basis of approximately one centre per Network Area. These centres will carry out a range of assessments including blood pressure assessments using beat to beat blood pressure equipment and haemodynamic response to carotid sinus stimulation, prolonged tilt testing. Referral criteria need to be agreed.
10. Patients who attend the service will have a patient held record, containing details of their individual multifactorial intervention programme. Interventions received will be recorded and signed off as appropriate. This will facilitate effective communication and the delivery of an integrated service.



The service is patient focused and outcome based. It is described as a pathway of care, not constrained by location. Patients enter the IFFP in one of four ways, Figure S3. The referring event determines the assessment required, as outlined in chapter 7.

1. A patient presenting with an unexplained fall and/or recurrent falls without fracture receives a multifactorial **falls** risk assessment.
2. A patient who fails the opportunistic 'screening' and/or has gait and balance deficits receives a multifactorial **falls** risk assessment.
3. A patient presenting with a fall resulting in a fracture receives both a falls risk assessment and a **fracture** risk assessment.
4. A patient presenting with a fracture, without an unexplained fall (including asymptomatic vertebral fractures identified on radiology reports) receives a **fracture** risk assessment.

People referred for a falls risk assessment who have clinical risk factors for osteoporosis (as indicated in Chapter 5b) should be referred for Fracture Risk Assessment. People referred for a fracture risk assessment who fail the opportunistic 'screening' criteria for falls and/or have balance and gait deficits, should be referred for Falls Risk Assessment.

Following falls assessment, a multifactorial individualised fall prevention programme is developed. Similarly, following fracture risk assessment, intervention based on clinical need is provided. Where a person has received both falls and fracture assessment, an integrated intervention will be provided as appropriate.



# Chapter 1

Introduction

# 1. Introduction

Today Irish people are healthier and are living longer than previous generations. This is, in part, due to improved lifestyles and better health care. The number of older people in Ireland is increasing and will double over the next 15 years. Fall related injuries are a big problem for older people. We understand the factors that lead to poor bone health and risk of falling. Furthermore we know the strategies that can be implemented to reduce these risks. The prevention of falls in older people and the maintenance of bone health in the whole population is a priority of the Health Service Executive.

*A fall is a sudden, unintentional change in position causing an individual to land at a lower level, on an object, the floor, or the ground, other than as a consequence of sudden onset of paralysis, epileptic seizure, or overwhelming external force.*

Fall related injuries can have devastating outcomes for older people. The incidence of falls and severity of fall related complications rise with age. Each year 30% of people aged 65 years and over fall. The problem is much worse for people over 80 years of age as 50% of them fall each year. One-fifth of those who fall sustain serious injury and many face a reduction in their quality of life after a fall. In addition older people suffer profound psychological effects due to fall related injuries including fear of further falls and social isolation. Fractures are one of the serious injuries that can occur following a fall. Older people find it difficult to recover from a fracture. For example, of those who survive a hip fracture, less than half regain their pre-fracture level of function, less than 50% of people return directly home upon hospital discharge and over 20% need long

term care. The inability to regain function or to be physically active leads to more bone loss and higher fracture risk. One fracture, regardless of where in the body, doubles the risk of subsequent fractures.

## 1.1 Understanding Bone Health and Osteoporosis

Although bones may seem hard and unchanging, they are in a constant state of flux. Bone is continually growing and being reabsorbed, but the rate at which people form or lose bone changes over their lifetime. As people age, their bones go through three important stages: bone growth, bone consolidation and bone loss.

- From birth to the mid to late 20s, most people form bone mass faster than they lose it. The most important time for healthy bone growth is childhood and adolescence. Skeletal mass doubles between puberty and young adulthood. By age 17 to 20, between 90% and 95% of adult bone mass is deposited. People with a high peak bone mass in early life have a lower risk of bone thinning in later life. Good health in childhood and adolescence is critical for healthy bones. While genetics determine up to half of each person's peak bone mass, lifestyle factors such as dietary intake and weight-bearing physical activity are also critical. Healthy eating and regular physical activity promote bone growth and also help to prevent a number of other chronic diseases (e.g. obesity, diabetes and cardiovascular disease).
- The key time for bone consolidation is between the mid to late 20s and age 35. During this time poor nutrition, a sedentary lifestyle, medications or conditions that

contribute to bone loss and/or dieting and the pursuit of thinness can interfere with bone formation and contribute to bone loss - even in young adults.

- Around age 35, men and women begin to lose bone mass faster than they can build it; at a rate of about 0.5% - 1% per year. The steady decline in bone mass continues until women reach menopause (typically, between ages 45 to 55) and men reach age 65. After that, bone mass loss accelerates dramatically.
- After menopause (and for the following ten years), bone loss in women escalates to 3% - 5% per year. Over her lifetime, a woman may lose 45% of her bone mass, and a man about two-thirds of the bone mass that a woman loses. Older people who do not develop or maintain sufficient bone mass early in life are at higher risk of developing osteoporosis<sup>1</sup>.

Over 200 million people world-wide have osteoporosis. Prevalence increases as populations age. The major complication of osteoporosis is a *fragility fracture* which can lead to decreased quality of life, morbidity and, in some cases, mortality<sup>2</sup>. In the EU approximately four million osteoporotic fractures occur each year costing €32 billion. These costs will double over the next 30 years if current trends continue.

In 2004 the US Surgeon General produced a report on Bone Health and Osteoporosis which concluded that the state of America's bone health is in jeopardy. It stated that while there is the scientific and clinical knowledge to correct this situation there is a major gap between what we know and what we put into clinical practice. These conclusions also reflect the state of bone health in Ireland.

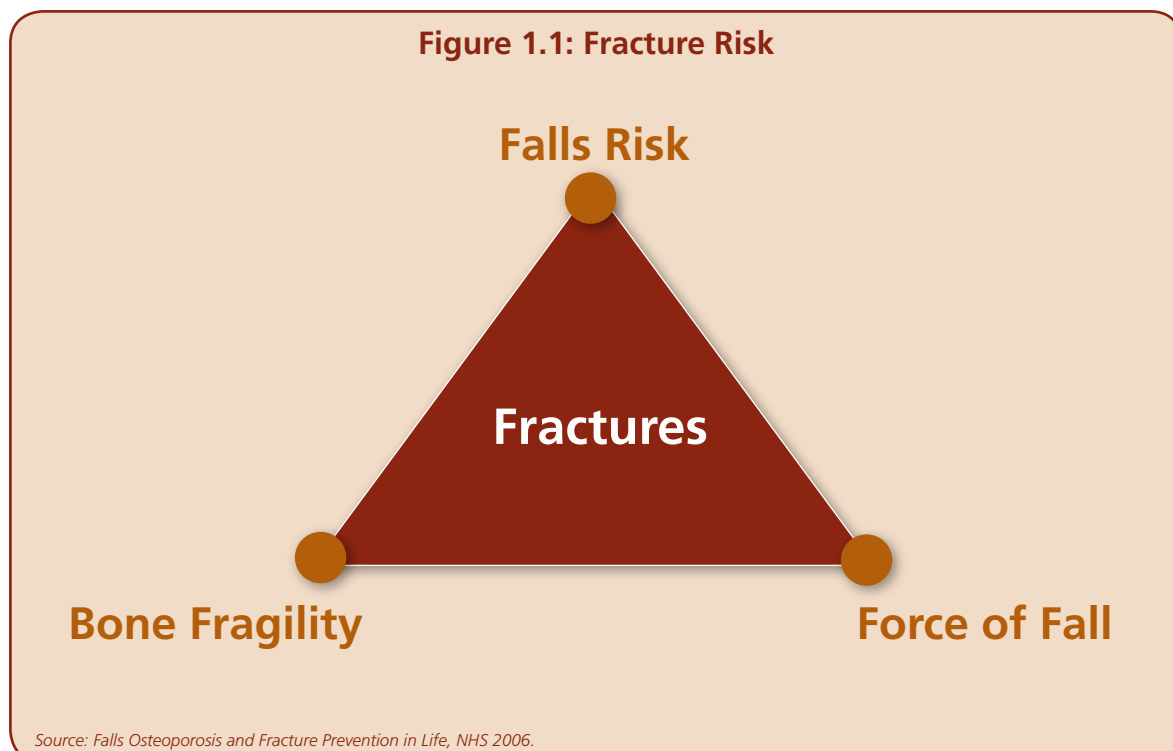
## 1.2 Falls, Osteoporosis, Fractures

Falls, bone health and fracture risk are linked, Figure 1.1. The force of the fall and the degree of bone fragility increases fracture risk.

### Falls

Older people are at an increased risk of falling compared to the population as a whole. Circumstances that lead to falls include physical and cognitive function, the effect of medical conditions, medication and the physical environment. The increased risk of falling combined with the likelihood of fracture ensures that older people sustain more severe injuries than younger age groups.

**Figure 1.1: Fracture Risk**



Source: Falls Osteoporosis and Fracture Prevention in Life, NHS 2006.

## Force of the Fall

The major clinical outcome of concern in people with osteoporosis is minimal trauma fracture, also referred to as low impact fracture, fragility fracture or osteoporotic fracture. The World Health Organisation defines minimal trauma fracture as **'a fracture caused by injury that would be insufficient to fracture normal bone: the result of reduced compressive and/or torsional strength of bone'**<sup>3</sup>.

## Bone Fragility

Most fractures in people over 50 years of age are the result of osteoporosis<sup>4</sup>. There is a quantifiable relationship between bone mineral density and fracture risk. Fracture risk increases as bone mineral density decreases and consequently, peak bone mass (or maximum bone mass achieved in adulthood) and the rate of subsequent bone loss are considered key determinants of fracture risk<sup>5</sup>.

## 1.3 Why does Ireland need a Strategy for the Prevention of Falls and Fractures?

An integrated strategy to prevent falls and fractures in our ageing population is needed as:

- Falls are preventable. Successful multi-factorial interventions have been implemented internationally. These approaches need to be implemented in Ireland.
- The proportion of the population at risk from falls and fractures is increasing. Disability and healthcare costs associated with osteoporosis are also increasing. Evidence based approaches to prevent and manage osteoporosis are needed.
- Current fall prevention services and bone health services appear to have developed in an ad hoc manner in Ireland. They are often championed by an individual health professional. While these efforts are to be applauded this approach is not sustainable. The challenge is to develop a structured, multidisciplinary, integrated strategy that addresses the needs of the population in a responsive, meaningful manner.

## 1.4 Strategy Development

In 2006, a National Steering Group to *Prevent Falls and Fractures in Ireland's Ageing Population* was established. This was a joint initiative between the Health Service Executive, The National Council for Ageing and Older People and the Department of Health and Children. The aim of the group was to develop an integrated national strategy to prevent falls in older people and improve bone health in the whole population. Members of the steering group included a wide range of health professionals (clinicians, allied health professionals, clinical nurse specialists, representatives from health promotion), patient advocacy groups, environmental consultants and representatives of older people, (Appendix 1).

Multi-disciplinary, multi-agency sub-groups of the Steering Group were established to:

- Address the issue of falls among older people
- Examine specific environmental issues including the built environment.
- Focus on the promotion of bone health and the prevention of osteoporosis in the population as a whole.

The terms of reference were to:

1. Identify the components of an effective Fall Prevention/Fracture Prevention strategy in an ageing population based on best practice.
2. Document the extent of the problem of falls and osteoporosis in Ireland and the impact on the health service including costs to the health service.
3. Document the services currently in place to prevent falls and promote bone health in Ireland.
4. Consult with multidisciplinary stakeholders regarding the development of the integrated strategy.
5. Develop a system based, integrated model of care for those at risk of falls and poor bone health including an evaluation framework.

To achieve its aim, English Language Falls and Osteoporosis strategies published in the international literature (including systematic



reviews) in recent years were identified by a combination of electronic searches, hand searches and personal contacts. To reflect the Irish context, stakeholders from a range of settings, organisations and disciplines were consulted. Specific research was conducted to estimate the health impact of falls in the health service. Research was commissioned to estimate the economic burden of falls and to examine the environmental issues associated with falls and the built environment.

## 1.5 Conclusion

The purpose of this strategy is to address the serious problem of fall related injuries in older people and to improve bone health in the whole population. Our approach is based on best evidence. It adapts internationally accepted guidelines and models of care from the WHO and the American Geriatric Society/ British Geriatric Society (AGS / BGS) for the Irish population. It encourages multi-disciplinary and intersectoral working. All health and financial indicators show that the problem of bone health and fall related injuries will escalate in the coming years and the impact to the health service will be severe. This strategy should minimise the health, social and financial impact of fall related injuries and osteoporosis in Ireland.

## References

1. Osteoporosis Action Plan Committee, Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario – 2003 Toronto, Osteoporosis Society of Canada [www.health.gov.on.ca/](http://www.health.gov.on.ca/)
2. Reginster, JY, Burlet, N, Osteoporosis: A Still Increasing Prevalence, *Bone* 38 2006 (Feb) No 2 Suppl 1 pp S4-S9.
3. World Health Organisation, 2003, Assessment of fracture risk and its application to screening for post menopausal osteoporosis, WHO Technical Report Series 843, Geneva, WHO.
4. Woolf A, Pfleger B 2003, Burden of major musculoskeletal conditions. Bulletin of the World Health Organisation, 81: 646-656.
5. Prentice A, Diet nutrition and the prevention of osteoporosis. Public Health and Nutrition, 7 1(A) 227-243.



# Chapter 2

Demography in Ireland

# Demography in Ireland

## Key Points

- **The serious problem of fall related injuries in older people is set to escalate because our population is getting older and we are living longer.**
- **By 2031 there will be five million people living in Ireland:**
  - One million of them will be 65 years and over – more than twice the current number.
  - The biggest population increase will be in those who are 80 years or more.
  - The incidence and prevalence of osteoporosis increases as the population ages.
  - 50% of people who are 80 years or more fall every year
  - Older women make up 65% of those who are over 80 years. Therefore they are at greatest risk.

## 2.1 Introduction

The population of Ireland is growing and ageing. These demographic changes have important medical, social and personal implications for the prevention, treatment and management of falls and fractures. Each year 30% of people aged over 65 years of age and 50% of those aged over 80 years fall<sup>1</sup>. The incidence and prevalence of osteoporosis increase with age. It is estimated that one in three women and one in five men over the age of 50 years of age have osteoporosis of the hip, spine or wrist<sup>2</sup>. In addition to the huge impact which fall related injuries have on people's quality of life and life expectancy they also have major implications for health services and resources.

## 2.2 Population Growth

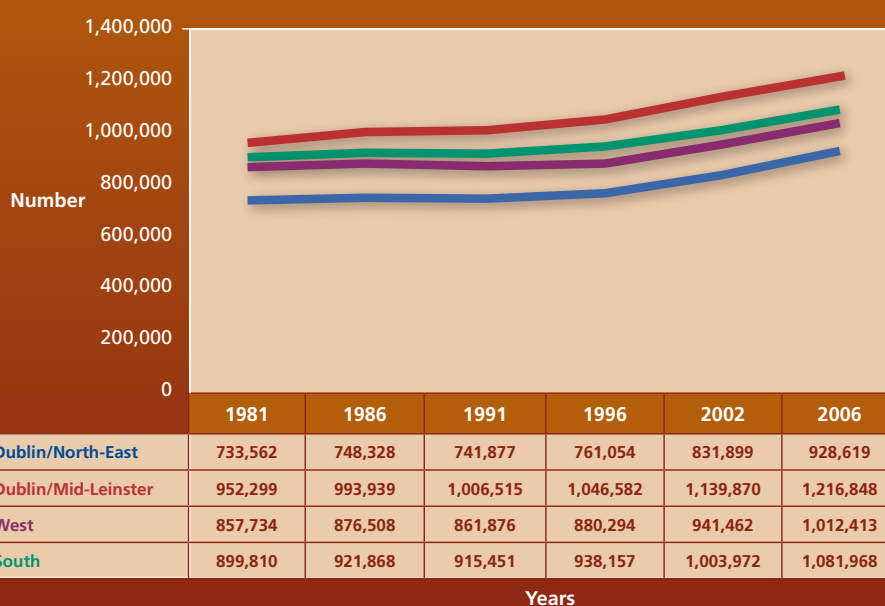
Ireland's population is currently 4,239,848<sup>3</sup>. It increased by 23% since 1981. Over the past 25 years the greatest growth rate occurred between 2002 and 2006 when the population increased by 8.2% (Table 2.1).

Population growth has not been homogenous throughout the country. This is evident when examined by the four administrative areas of the Health Services Executive (HSE). Figure 2.1 shows the population change over the 25 years between 1981 and 2006 and the high rate of increase since 2002.

**Table 2.1: Population Growth, 1981- 2006**

Year	1981	1986	1991	1996	2002	2006
<b>Population</b>	3,443,405	3,540,643	3,525,719	3,626,087	3,917,203	4,239,848

Data Source: CSO 2006

**Figure 2.1  
Population Growth by HSE Area, 1981-2006**

Date Source: HSE 2007

Since 2002 the percentage increase (and percent of national population) in each of these Areas is:

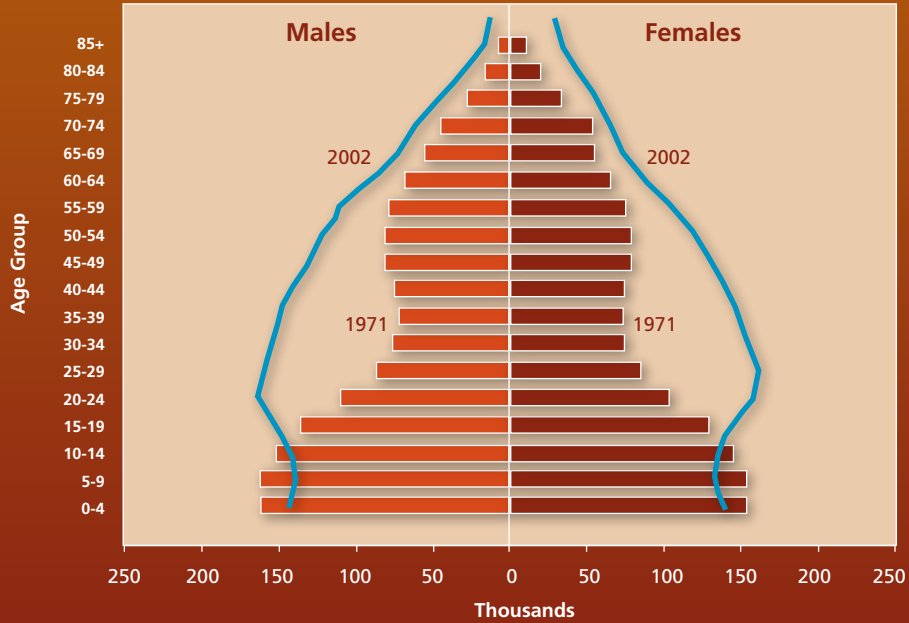
- Dublin Mid-Leinster: 7% increase; (29% of the national population)
- South: 8% increase; (25% of the national population)
- West: 8% increase; (24% of the national population)
- Dublin North-East: 12% increase; (22% of the national population).

## 2.3 Population Structure

Ireland's population is ageing as well as growing. The population pyramids (Figures 2.2 and 2.3) show the changes that have taken place since 1971 and the projected changes to 2031. These population pyramids show that the childhood

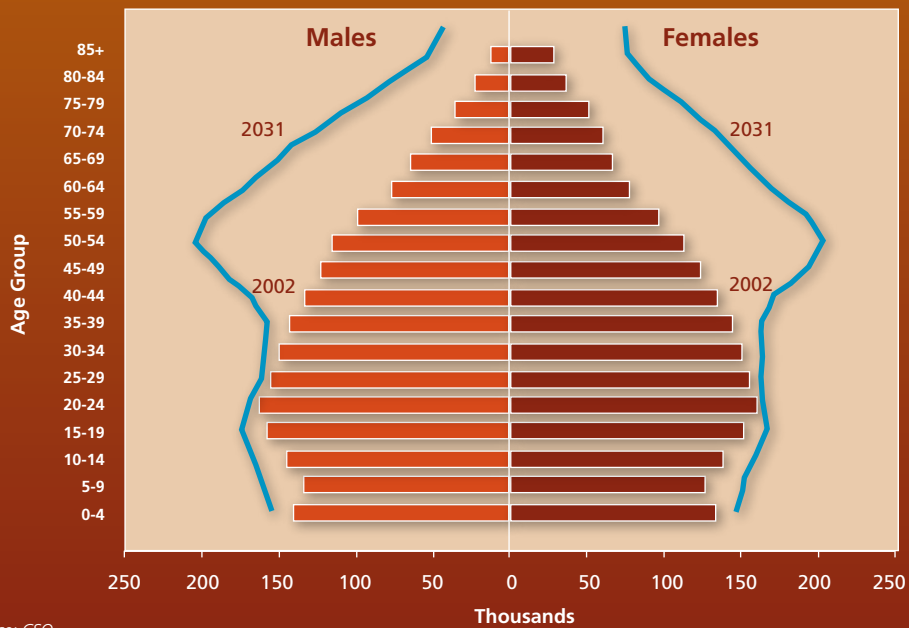
population 'bulge' of the 1970s will shift upwards to the older age groups within the next 20 years. By 2031 there will be over five million people living in Ireland and the most notable change will be to the 45-64 year age group<sup>4</sup>.

**Figure 2.2**  
**Population Pyramid for Ireland, 1971 and 2002. Numbers (in thousands) by age group and gender**



Data Source: CSO

**Figure 2.3**  
**Population Pyramid for Ireland, 2002 and 2031. Actual & projected numbers (in thousands) by age group and gender**

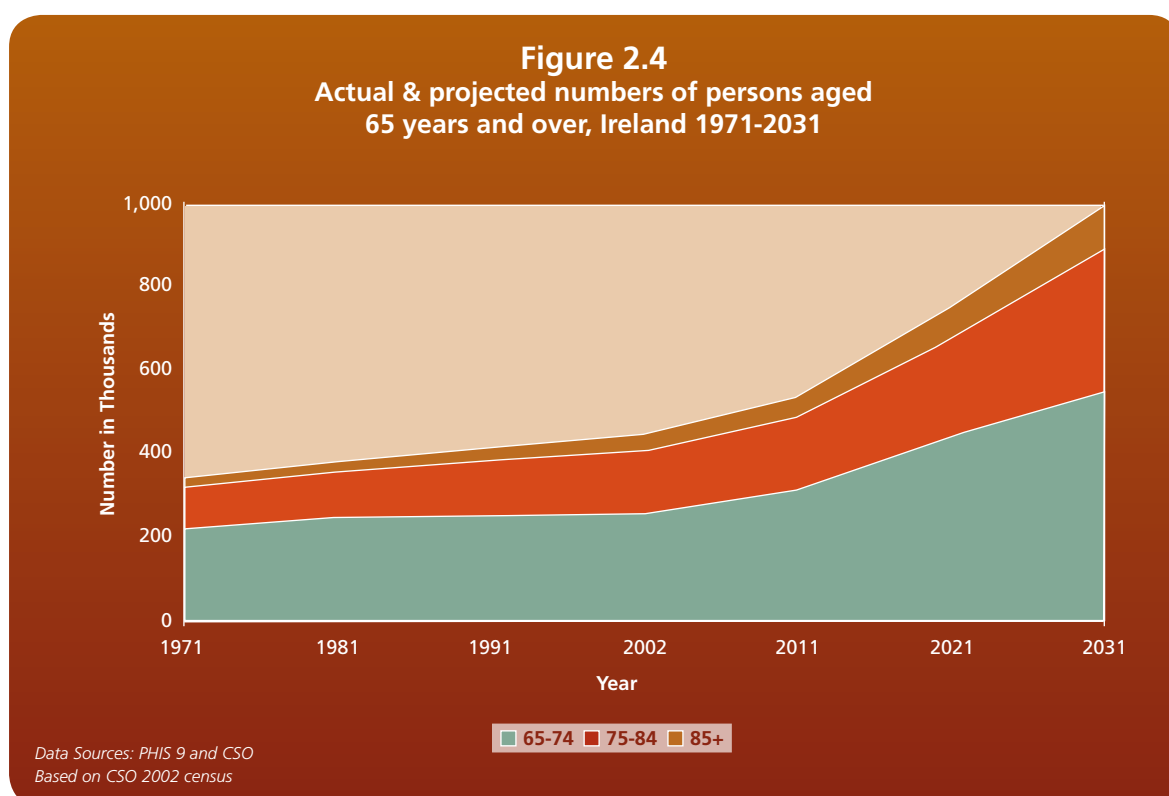


Data Source: CSO

It is also projected that the population of people over 65 years in Ireland will more than double from 436,001 in 2002 to 1,002,280 in 2031 or from 11% to 18% of the population. The number of people in each of the age sub-groups over 65 years (65-74 years, 75-84 years, 85+ years) will increase but the greatest change will occur in the oldest sub-group (85+ years), Figure 2.4.

as many women as men. The implications of falls, while relevant to all as they grow older, are greatest for the growing population of older women especially as they move into their 80s.

Internationally population ageing is a feature. The WHO estimates that over the next 25 years the population aged 65 years and over will



The current population of older people by age and gender is shown in Table 2.2. Overall women outnumber men by 26%<sup>3</sup>. The gap between genders widens with increasing age. By age 85 years and over, there are over twice

increase by 88% but the working population will grow by only 45%. The increase in people over the age of 80 years is the most striking change. By 2020 this age group will comprise 20% of the population in many European countries.

**Table 2.2: Numbers of older persons by age and gender, Ireland, 2006**

Age Group	Male	Female	Total
65-69	70895	72501	<b>143396</b>
70-74	56540	62612	<b>119152</b>
75-79	40121	52345	<b>92466</b>
80-84	24694	40190	<b>64884</b>
85+	14845	33183	<b>48028</b>
Total 65+	207095	260831	<b>467926</b>

Data Source: CSO, Census of Population, 2006.

**Table 2.3: Life expectancy in Ireland (1926 and 2002)**

Age in years	0	10	20	35	55	65	75	80	85
<b>Males</b>									
1926	57.4	55.2	46.4	34.4	19.1	12.8	7.7	5.8	4.4
2002	75.1	65.7	56.0	41.8	23.4	15.4	8.9	6.5	4.6
<b>Females</b>									
1926	57.9	54.9	46.4	34.4	19.6	13.4	8.4	6.5	4.9
2002	80.3	70.8	60.9	46.2	27.4	18.7	11.2	8.2	5.8

Data Source: CSO 2004 Irish Life Tables No.14 2001-2003 & Census of Population 1926

## 2.4 Life Expectancy

Life expectancy for both males and females has increased over the last century, Table 2.3<sup>5</sup>. In 2002 the average life expectancy at birth for males was 75.1 years and 80.3 years for females. In 2002 men aged 65 years could expect to live for another fifteen years and at 75 years another nine years. Women aged 65 years could expect to live for another nineteen years and at 75 years for another eleven years.

In addition to life expectancy in terms of quantity is the question of the quality of that life expectancy. A number of measures can reflect this, one such being Disability Free Life Expectancy (DFLE). In 2003 in Ireland, 66% of male and 54% of female life expectancy at age 65 years were estimated to be disability free<sup>6</sup>.

## 2.5 Conclusion

Increasing life expectancy is an indicator of better health and social conditions. This, together with the increasing number and percentage of those aged 65 years and over are important considerations in the priority which is needed to deal with fall related injuries in the growing older age population. Falls are the dominant cause of injury in older people where they account for 75% of all injuries<sup>7</sup>. Fall related injuries exert a major impact on older people's health and well-being and on health services. Such impacts will increase unless action is taken in line with this growing and ageing population.

## References

1. Skelton D, Todd C. What are the main risk factors for falls amongst older people and what are the most effective interventions to prevent these falls? How should interventions to prevent falls be implemented? Copenhagen: World Health Organisation, Europe; 2004. [http://euro.who.dk/HEN/Syntheses/Fallrisk/20041318\\_1](http://euro.who.dk/HEN/Syntheses/Fallrisk/20041318_1)
2. Kanis JA, Johnell O, Oden A, et al. (2000) Long-term risk of osteoporotic fracture in Malmo. *Osteoporos Int* 11:669.
3. Central Statistics Office: Census of Population, 2006.
4. Central Statistics Office, Population and Labour Force Projections 2006 to 2036; December 2004.
5. Central Statistics Office, Irish Life Tables No.14 2001-2003; 2004 & Census of Population 1926.
6. EHEMU Technical Report 2005\_2 July 2005. Are we living longer, healthier lives in the EU? Disability Free Life Expectancy in EU countries from 1991 to 2003 based on the European Community Household Panel (ECHP).
7. Lund J. Priorities for Elderly Safety in Europe; Agenda for Action; EUNESE: An Initiative of the European Network for Safety among Elderly, June 2006.
8. World Health Organisation, Population Ageing – a public health challenge. Fact Sheet no 135, September 1998.





# Chapter 3

Scale of the Problem of Fall  
Related Injuries in Ireland

# Scale of the Problem of Fall Related Injuries in Ireland

## Key Points

- **It is estimated that every year in Ireland:**
  - 10% of all older people need treatment for injuries. Falls cause 75% of these injuries.
  - Falls kill more older people than all other age groups. These death rates have been increasing in recent years.
  - Over 7,000 older people are admitted to hospital for treatment of fall related injuries each year. 5.2% of the 1.8 million hospital bed days are used in treating fall related injuries in older people
  - The full picture of the impact of falls is greater than the above data indicate as figures are not readily available from hospital emergency departments and primary care.
  - Hip fractures are one of the most serious injuries due to a fall: 80% are over 75 years of age; their length of hospital stay is 18 days; less than one-third go directly home after their hospital treatment. The inpatient cost of treating a hip fracture is €12,600.
  - It is estimated that up to 300,000 people aged 50 years and over may have osteoporosis in Ireland. Statistics on osteoporosis are incomplete. In 2004 the 6,113 hospital episodes where a diagnosis of osteoporosis was recorded, represents the 'tip of the iceberg'.
  - If current trends continue deaths and injuries due to falls in older people could double over the next 20 years.

### 3.1 Introduction

The impact of falls in older people injuries can best be described in terms of a pyramid, (see Figure 3.1). The larger, lower sections of the pyramid represent people who are uninjured or have minor injuries after a fall. The middle sections indicate moderate/serious injuries following a fall while the tip of the pyramid represents deaths. Ireland's currently available health statistics on injuries due to a fall do not capture the full extent of the problem in terms of their number, impact and severity. The CSO provides information on deaths due to a fall and the Hospital Inpatient Enquiry System (HIPE) provides information on falls that require admission to hospital. As risk factor data, and data on falls that do not require hospitalisation, are poorly recorded and captured, information is not routinely available in relation to most falls.

Internationally it is estimated that each year:

- 10% of older people are treated by a medical doctor after an injury each year<sup>1</sup>
- Falls are the dominant cause of injuries in older people. Falls consist of 75% of all inpatient and outpatient attendances due to an injury in this age group<sup>1</sup>

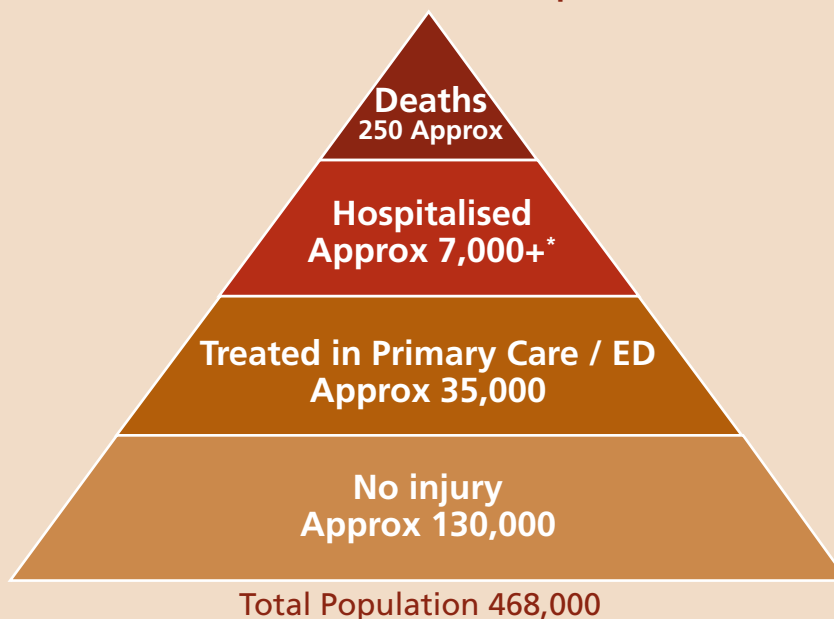
- 30% of people over 65 years of age and 50% over 80 years of age fall<sup>2</sup>
- 2-3% of people over 65 years of age are hospitalised due to an injury<sup>1</sup>
- 20-30% of older people who fall suffer moderate to severe injuries such as bruising, hip fractures or head injuries<sup>3</sup>.

By applying these rates to the Irish population (approximately 468,000 people) together with Irish data on deaths and hospitalisation, the size of the problem of "falls" in older people emerges. While the majority who fall have minor injuries, more than 7,000 require hospitalisation and approximately 250 die. These are shown in the pyramid. These estimates of deaths, hospitalisation and Primary Care / Emergency Department injury treatments are consistent with both CDC<sup>3</sup> and the WHO/EUNESE reports<sup>1</sup>.

### 3.2 Estimating Future Trends

By 2031, there could be a doubling in the number of fall related injuries, hospitalisations and deaths in older Irish people if current injury rates remain unchanged, Table 3.1. This has obvious implications both for acute hospital facilities, other health services as well as personal and social resources.

**Figure 3.1 Injury Pyramid: Annual Health Burden of Falls for Older Irish People**



\* The external cause of injury was recorded in approximately 95% of hospital episodes due to injuries in older people.

**Table 3.1: Estimated number and severity of injuries from falls among older people in Ireland; 2006 and 2031**

	2006	2031
Population aged 65 years and over (% of population)	467,920 (11%)	1,002,280 (18%)
Number who fall: (30% over 65 years, 50% over 80years <sup>2</sup> )	148,000	320,000
Number injured: 1 in 10 of whole population are injured <sup>1</sup> and 75% of these injuries are due to a fall <sup>1</sup> (20% approximately have serious injuries <sup>3</sup> );	30,000 – 35,000	64,000 – 75,000
Number who need hospitalisation due to their fall injury (2-3% of the older population of which 75% due to a fall <sup>1</sup> )	7,000 – 10,000	15,000 – 22,000
Deaths due to falls (61.7 per 100,000 population <sup>1</sup> ) (CSO rates are 48.7 per 100,000 population <sup>4</sup> )	250 – 280	600+

### 3.3 Fall Related Deaths in Ireland 1990-2004

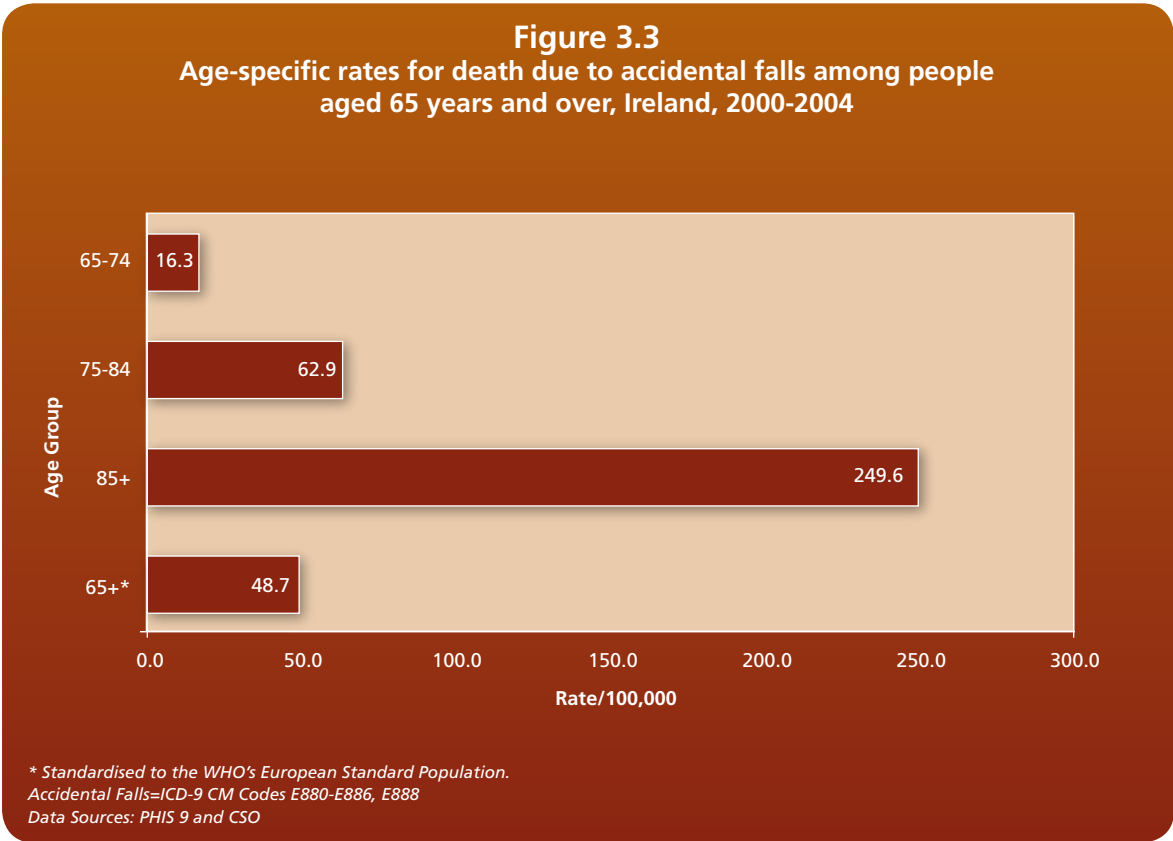
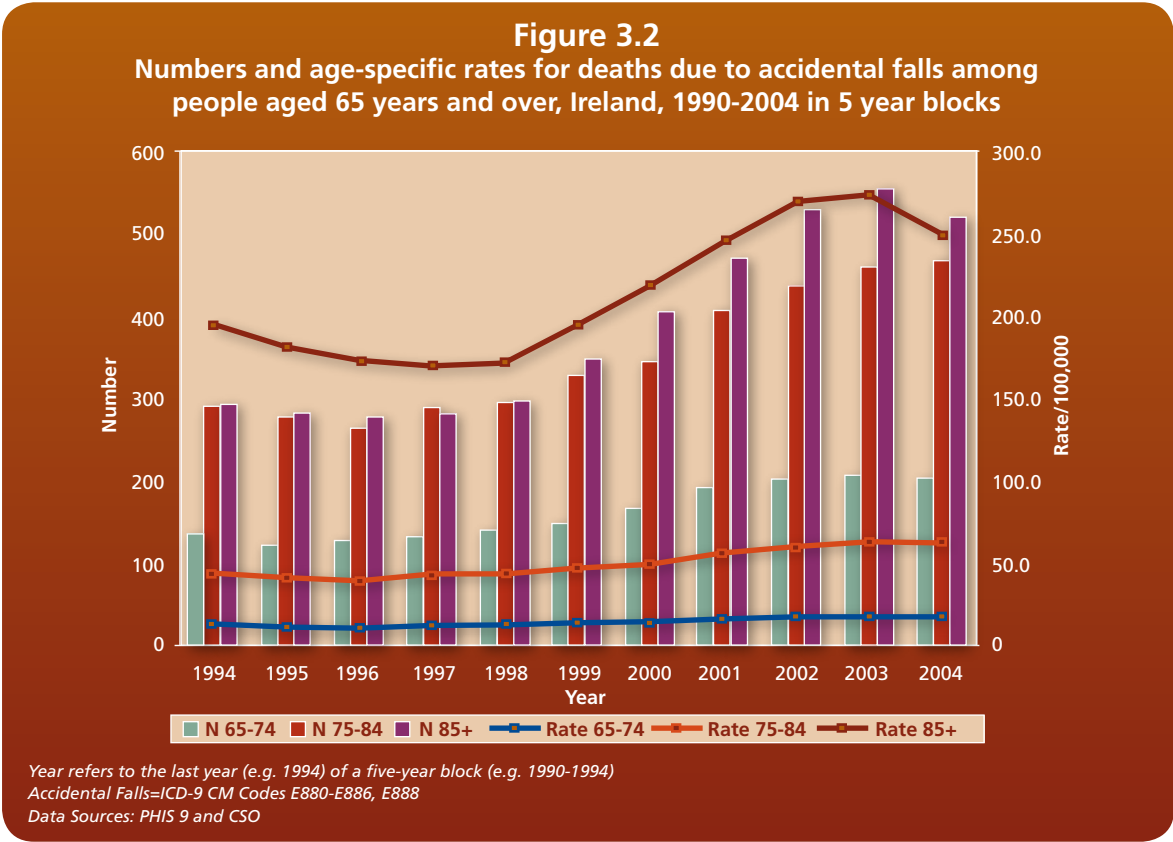
Three-quarters of fall related deaths in Ireland occur to people who are aged 65 years and over. Since 1990, death rates from accidental falls in this age group have increased significantly in both males and females. Similar trends are reported in the United States<sup>3</sup>. Analysis of five-year aggregated Irish mortality data show an increase from an average annual number of 144 for the years 1990-1994 to 238 for the years 2000-2004. Increases in mortality over this time period occurred in each of the age sub-groups and the gaps between the age sub-groups widened over the time period both in terms of rates and numbers. Each set of rates has been significantly increasing ( $p < 0.01$ ) over the entire time period, Figure 3.2.

CSO data show that for the five year period, 2000-2004, the age-standardised mortality rate was 48.7 per 100,000 population (compared with 36.1 between 1990-1994). There were fourfold rate increases between the 65-74 and the 75-84 age-groups and between the 75-84 and the 85+ age groups. The rate for the 85 years+ group is five times higher than the rate for all older people, Figure 3.3.

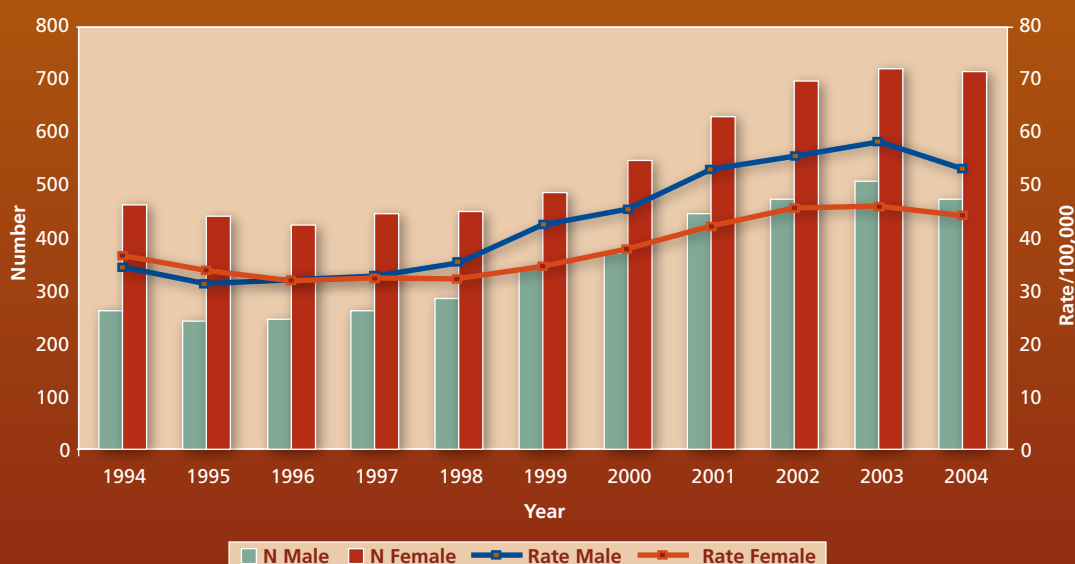
The number of deaths due to falls among females outnumbered male deaths during this period although male age-standardised rates have been higher than females since 1998, Figure 3.4 on page 30. The rates for both males and females have significantly increased ( $p < 0.01$ ) over the period 1990-2004 with average percentage changes of 6.9% and 3.6% respectively recorded.

### 3.4 European Comparisons Fall Related Deaths

Falls are the leading cause of fatal injuries in older people in most of the 25 member states of the European Union (EU) and in those of the European Economic Area (EEA) ([www.eunese.org](http://www.eunese.org)). The exceptions are Estonia and Lithuania (where suicide is the leading cause) and Greece (where transport injuries are the leading cause). For the majority of countries where falls are the leading causes of fatal injuries they account for approximately 40%-50% of injury deaths in older people. Figure 3.5 on page 31, from the EUNESE report, shows that Ireland's death rate is approximately average in the EU<sup>1</sup>.



**Figure 3.4**  
Numbers and age-standardised rates for deaths due to accidental falls among people aged 65 years and over by gender, Ireland, 1990-2004 in 5 year blocks



Year refers to the last year (e.g. 1994) of a five-year block (e.g. 1990-1994)  
Rates standardised to the WHO's European Standard Population.  
Accidental Falls=ICD-9 CM Codes E880-E886, E888  
Data Sources: PHIS 9 and CSO

### 3.5 Hospitalisation Due to Falls 1997-2005

One-third of fall related injury hospitalisations in Ireland are among persons aged 65 years and over (HIPE)<sup>4</sup>. Between 1997 and 2005 hospitalisation rates for fall related injuries decreased significantly for all older people and for each of the age-groups, 65-74 years, 75-84 years and 85 years+. This decline may be due to a move to ambulatory care. Over the period 1997 to 2005, there was an average of 7,394 inpatient episodes annually recorded by HIPE reporting hospitals on older persons where the principal diagnosis was injury due to accidental fall, Figure 3.6 on page 32. Of those 7,394, 32% affected the 65-74 age group, 44% the 75-84 age group and 24% the 85+ age-group.

The length of hospital stay due to a fall, with the exception of the 65-74 year age group, has lengthened significantly ( $p < 0.01$ ) between 1997-2005, Figure 3.7. This is most marked for those aged 85 years and over.

In 2005 the average length of hospital stay for all older persons with a fall related injury was 12.7 days. This compares with 11.5 days for all causes of hospitalisation. Lengths of stay for those who had fallen were longer than for all causes of hospitalisation in the 75-84 year old age group (13.5 vs 12.2 days) and in the 85+ age group (15.7 days vs 14.4 days). People admitted with a Colles' fracture after a fall stayed on average 3.2 days, those with a hip fracture stayed on average 18.1 days while for other injuries due to falls the average length of stay was 10 days.

Over the period 1997-2005, although there was significant upward trend in terms of average lengths of stay for older people both for all causes ( $p = 0.04$ ) and for falls ( $p < 0.01$ ), the rate of increase for all causes was slower than that for falls.

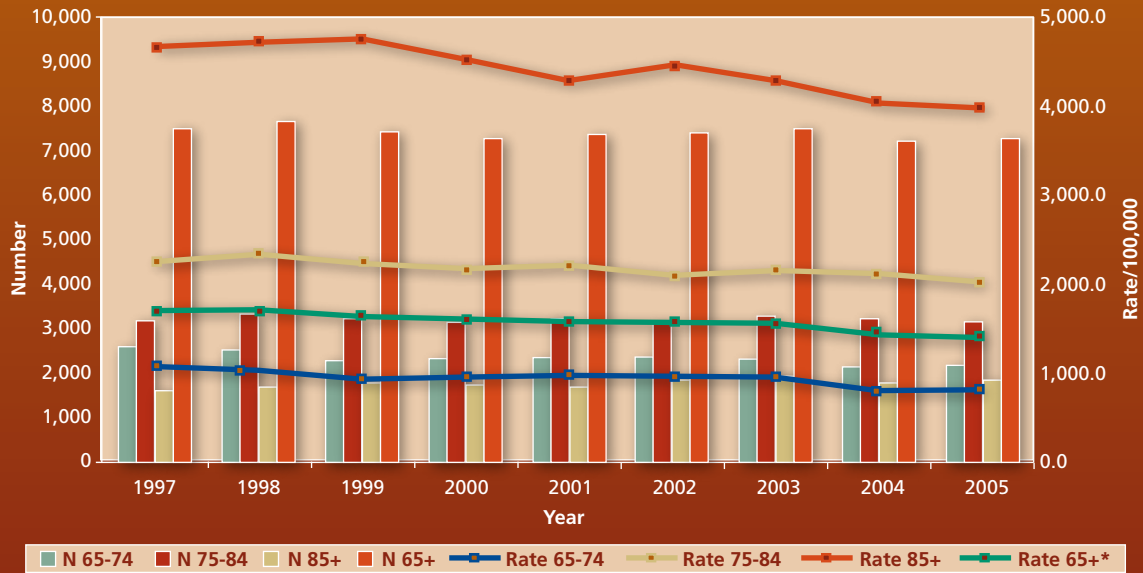
In 2005 falls among older people accounted for 5.2% of the 1.8 million bed days utilised by older people. The proportion increased from 3.1% for those aged 65-74 years, to 5.4% for those aged 75-84 group and to 8.9% for the oldest group.

**Figure 3.5**  
**Deaths due to falls per 100,000 of the elderly (65+) in the EU25 + Norway**  
Countries with less than 1,000,000 are deleted  
Source: WHO ca. 2000-2002 national average.



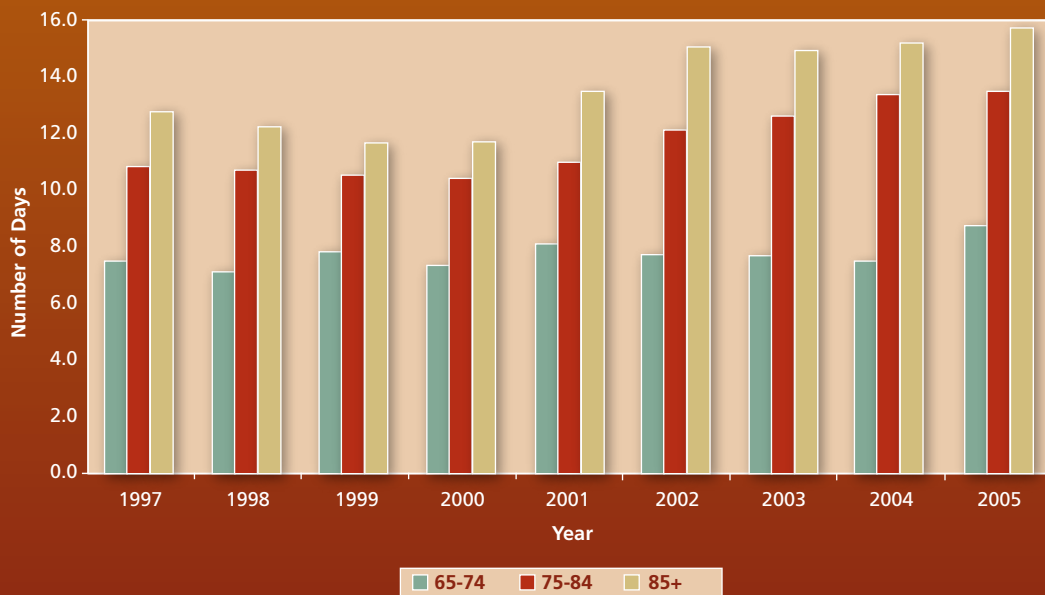


**Figure 3.6**  
**Numbers and age-specific rates for inpatient hospitalisations due to fall-related injuries among people aged 65 years and over, Ireland, 1997-2005**



\* Standardised to the WHO's European Standard Population.  
 ICD-9 CM Codes 800-959 or ICD-10 AM Codes S00-T35 as principal diagnosis with ICD-9 CM Codes E800-886, E888 or ICD-10 AM Codes W00-W19 as secondary diagnosis respectively. ICD-9 CM Codes relate to 1997-2004 and ICD-10 AM Codes to 2005.  
 Data Source: HIPE & NPRS Unit, ESRI

**Figure 3.7**  
**Average lengths of stay for hospitalisations due to fall related injuries among people aged 65 years and over, Ireland, 1997-2005**



ICD-9 CM Codes 800-959 or ICD-10 AM Codes S00-T35 as principal diagnosis with ICD-9 CM Codes E800-886, E888 or ICD-10 AM Codes W00-W19 as secondary diagnosis respectively. ICD-9 CM Codes relate to 1997-2004 and ICD-10 AM Codes to 2005.  
 Data Source: HIPE & NPRS Unit, ESRI

**Table 3.2: Numbers and percentages of selected fall related hospitalisations among persons aged 65 years and over, Ireland, 2005**

Specific Injury	Male		Female		Both Genders	
	N	%	N	%	N	%
Hip Fracture	665	32.9	2109	40.2	2774	38.2
Other Lower Limb Injuries	281	13.9	697	13.3	978	13.4
Upper Limb Injuries	281	13.9	1413	26.9	1694	23.3
Intracranial Injuries	191	9.4	172	3.3	363	5.0
Other head injuries	332	16.4	365	7.0	697	9.6

*Accidental Falls=ICD-10 AM Codes W00-W19 as secondary diagnosis.*

*Specific Injuries relate to principal diagnoses of S72.0-S72.2 for hip fractures, S70-S99 minus S72.0-S72.2 for other lower limb injuries, S40-S69 for upper limb injuries, S06 for intracranial injuries and S00-S05,S07-S09 for other head injuries.*

*Data Source: HIPE & NPRS Unit, ESRI.*

In 2005, of the 153,140 hospitalisations of older persons (all causes) 4.7% were due to fall related injuries. This proportion increased with age, from 3.4% for the 65-74 age group, to 4.9% for the 75-84 age group and to 8.1% for the 85+ age group.

### 3.5.1 Hospitalisation Due to Falls in 2005

The previous section dealt with the period 1997-2005. In 2005 alone over 70% (N=5,246) of the 7,269 fall related injury hospitalisations among older persons related to women. Hip fractures were the most common injury requiring hospitalisation. As shown in Table 3.2 there were significant gender differences in terms of hip fractures, upper limb injuries and head injuries.

Residents of nursing/convalescent homes or long-stay accommodation accounted for 472 (6%) of fall related injury hospitalisations and for 11% of those who sustained hip fracture cases in 2005 (Table 3.3) on page 34. Inpatient costs for all fall related hospitalisations among older persons were estimated at €59 million.

### 3.6 HIPE Data on Osteoporosis

Although HIPE data provide information on the types of fractures sustained by patients who have been discharged from public hospitals, it gives little information regarding osteoporosis. In 2004, there were 6,113 hospital patient

episodes in public HIPE reporting hospitals with a principal or secondary diagnosis of osteoporosis (901 males and 5,212 females, Table 3.4). These data reflect patient episodes of hospital care – they are not patient specific. The number of cases recorded in HIPE depends on a number of factors, including whether osteoporosis has been diagnosed and whether the diagnosis has been recorded in the patient's chart. The data relating to osteoporosis are likely to be the "tip of the iceberg" as they exclude patients who attend as outpatients and those who attend private hospitals, GP surgeries, specialist clinics and those who do not seek medical attention for osteoporosis and those who are undiagnosed.

Although the incidence and prevalence of osteoporosis cannot be extrapolated from HIPE data, its recording of osteoporosis is increasing, Table 3.4 on page 35. There was a 91% increase in the recording of principal or secondary diagnosis of osteoporosis for men between 2000 and 2004 and a 72% increase for women over the same period.

### 3.7 Scale of the Problem of Osteoporosis

Osteoporosis is a serious health problem. World-wide over 200 million people have osteoporosis. It is most common in white women<sup>5</sup>. As populations age its prevalence and economic burden increases<sup>6</sup>. It is estimated that osteoporosis affects one in three women and

**Table 3.3: Selected statistics for fall related hospitalisations for hip fractures and intracranial injuries among persons aged 65 years and over, Ireland, 2005**

	Hip Fracture N=2774	Intracranial Injury N=363
<b>Age:</b>		
75 years and over	2274 (82.0%)	212 (58.4%)
Mean	81.4	76.7
<b>Source of Admission:</b>		
Admitted from home	2063 (74.4%)	310 (85.4%)
Transferred from another hospital	386 (13.9%)	30 (8.3%)
Transferred from nursing/convalescent home or long-stay accommodation	292 (10.5%)	17 (4.7%)
<b>Principal Procedure:</b>		
Invasive	2457 (88.6%)	77 (21.2%)
Non-invasive	108 (3.9%)	184 (50.7%)
None	209 (7.5%)	102 (28.1%)
<b>Discharge Destination:</b>		
Discharged home	805 (29.0%)	206 (56.8%)
Emergency transfer to another hospital	135 (4.9%)	26 (7.2%)
Non-emergency transfer to another hospital	746 (26.9%)	32 (8.8%)
Transferred to nursing/convalescent home or long-stay accommodation	928 (33.4%)	47 (12.9%)
Died while in hospital	142 (5.1%)	46 (12.7%)
<b>Length of Stay:</b>		
Mean/median (in days)	18.1 / 13	10.5 / 4
<b>Estimated Cost:</b>		
Case average (mean)	€12610	€7390

one in five men aged over fifty years of age<sup>7</sup>. The prevalence of fracture, defined as the number of individuals suffering disability, was estimated at 56 million worldwide, with a female-to-male ratio of 1.6<sup>8</sup>.

World-wide in the year 2000 there were an estimated nine million osteoporotic fractures of which 1.6 million were at the hip, 1.7 million at the forearm and 1.4 million were clinical vertebral fractures. The greatest proportion of these fractures, one-third, occurred in Europe<sup>9</sup>. The direct costs of osteoporotic fractures to the health services in the EU that year was €32 billion. This is predicted to double by 2050<sup>6</sup>. The majority (over 90%) of hip fractures in later life are associated with osteoporosis<sup>10</sup>.

In the United States, an estimated 30% of women 65 years of age and older suffer from osteoporosis. Each year there are 300,000 hip fractures in the United States<sup>11</sup>. Overall the excess mortality within 6 to 12 months after hip fracture is 20 – 25%; in addition 25% of patients need long-term care and 50% need assistance to walk<sup>12</sup>. Hip fracture is associated with significant morbidity, loss of independence, and diminished quality of life. It is also the main source of osteoporosis-related health care costs. Total estimated direct expenditure in hospitals and nursing homes for all osteoporosis associated fractures amounted to \$17 billion in 2001 and continues to rise<sup>6</sup>.

**Table 3.4: Hospital discharges with a principal or secondary diagnosis of osteoporosis, 2000 - 2004**

Age	2000		2001		2002		2003		2004	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Under 50	90	152	81	165	124	174	127	201	179	237
50-54	28	111	39	112	32	125	52	116	47	137
55-59	26	103	37	112	42	132	36	156	39	192
60-64	39	199	49	207	67	265	82	271	70	347
65-69	58	332	56	339	98	430	81	483	78	574
70-74	54	456	85	489	80	591	101	694	125	708
75-79	75	695	107	695	115	982	105	1,000	114	1,052
80-84	63	529	81	649	92	867	99	921	142	1,130
85+	38	453	43	512	60	686	75	719	107	835
All Ages	471	3,030	578	3,280	710	4,252	758	4,561	901	5,212

Data Source: HIPE & NPRS Unit, ESRI.

The epidemiology of osteoporosis varies internationally. Even within Europe it is estimated that:

- Hip fracture rates vary between 2 and 3 fold between countries. This variation may be related to differences in lifestyle and environment.
- The highest risk of hip fractures are seen in Norway, Sweden, Iceland and Denmark.
- In Denmark, the estimated prevalence of osteoporosis in people aged 50 years and over is 40% in women and 18% in men<sup>13</sup>.
- In the United Kingdom, an estimated 3 million people suffer from osteoporosis and more than 310,000 osteoporotic fractures are sustained each year.
- The combined social care and acute costs for treating the current level of osteoporotic fractures are estimated at more than £1.8 billion annually in the UK<sup>14</sup>.

### 3.7.1 Estimated Prevalence of Osteoporosis in Ireland

While precise information on the number of people in Ireland with osteoporosis is not readily available, as many people are undiagnosed, if WHO estimates are applied to the Irish

population the scale of the problem emerges. There are 1.1 million people aged 50 years and over in Ireland. Application of the International Osteoporosis Foundation rate suggests as many as 300,000 people aged over 50 in Ireland may have osteoporosis, Table 3.5. This figure represents more than a quarter of those aged over 50 and approximately seven per cent of the total population of Ireland. Almost twice as many women as men are estimated to suffer from osteoporosis in later life.

## 3.6 Conclusion

Fall related injuries kill more older people in Ireland than any other age group. Death rates from falls in this age group are increasing. Approximately 250 older people die each year in Ireland as a result of a fall.

Over 7,000 older people are admitted to hospital each year for treatment of fall related injuries. Falls related injuries have the longest lengths of hospital stay for older people. The inpatient cost for these injuries is €59 million while for hip fractures it is €35 million. People with a hip fracture spend on average 18 days in hospital; 33% are discharged to long stay accommodation and 5% die in hospital. There are at least another 30,000 older people who are less severely injured after a fall.

**Table 3.5: Estimated number of Irish people over 50 years with osteoporosis by gender**

Age Group	Total Pop.	50-64 Age Group	65+ Age Group	50+ Age group	50+ Age Group as a % of total Pop.	*Potential number aged 50+ with osteoporosis	* % of total Pop
Male	2,121,171	330,054	207,095	537,149	12.7	*107,430	*5.0
Female	2,118,677	324,069	260,831	584,900	13.8	*193,017	*9.1
Total	4,239,848	654,123	467,927	1,122,049	26.5	*300,447	*7.0

Population statistics - CSO 2006

\* Estimate based on IOF assessment of potential cases of Osteoporosis in people aged 50 years and over by gender.

If current rates continue it is estimated that by 2031 there will be a doubling in fall related injuries deaths and hospitalisations in older people in Ireland. While comprehensive Irish information is not available on all injuries that result from falls, the size of the problem is readily apparent from current statistics.

## References

- Lund J. Priorities for Elderly Safety in Europe; Agenda for Action; EUNESE: An Initiative of the European Network for Safety among Elderly, June 2006.
- Skelton D, Todd C. What are the main risk factors for falls amongst older people and what are the most effective interventions to prevent these falls? How should interventions to prevent falls be implemented? Copenhagen: World Health Organisation, Europe; 2004. [http://euro.who.dk/HEN/Syntheses/Fallrisk/20041318\\_1](http://euro.who.dk/HEN/Syntheses/Fallrisk/20041318_1)
- Centres of Disease Control and Prevention. Atlanta, GA 30333, USA. [www.cdc.gov](http://www.cdc.gov)
- Hospital Enquiry System, (HIPE). Economic and Social Research Institute, Dublin, Ireland.
- Cooper, C Epidemiology of osteoporosis, *Osteoporos. Int*, 9 1999, (Suppl 2) pp s2-s8
- Reginster, JY, Burlet, N, Osteoporosis: A Still Increasing Prevalence, *Bone* 38 2006 (Feb) No 2 Suppl 1 pp S4-S9
- Kanis JA, Johnell O, Oden A, et al. (2000) Long-term risk of osteoporotic fracture in Malmo. *Osteoporos Int* 11:669.
- Johnell O, Kanis, JA, An estimate of worldwide prevalence and disability associated with osteoporotic fractures, *Osteoporosis Int.* 2006(Dec); 17 (12): pp 1726-33.
- ibid
- Fisher A et al. Broader strategies for hip fracture prevention, *The American Journal of Medicine* Volume 2004 (July) 117 (2) pp 137-138
- Hoovan F et al, Follow-up treatment for osteoporosis after fracture, *Osteoporosis Int.* 2005; 16 pp 296-301
- Vidal, E.I. O. et al. Mortality within one year after hip fracture surgical repair in the elderly according to postoperative period; a probabilistic record linkage study in Brazil, *Osteoporosis, Int*, 2006, 17; 10: 1569-1576.
- Vestergaard, P. Rejnmark L, Mosekilde L, Osteoporosis is markedly under diagnosed: a nationwide study from Denmark, *Osteoporosis Int.* 2005; 16 pp 134-141
- Poole KE, Compston J, Osteoporosis and its management, *BMJ*, 2006 333, pp1251-1256.



# Chapter 4

## Economic Burden

## 4. Economic Burden

### Key Points

- **In financial terms fall related injuries in older people are very costly to the economy.**
- **Current costs are estimated at €402 million.**
- **If current trends continue it is estimated that costs will be:**
  - €520 - €551 million by 2010
  - €922 - €1077 million by 2020
  - €1587 - €2043 million by 2030.

### 4.1 Introduction

The Irish Centre for Social Gerontology was commissioned to undertake an Economic Burden of Illness Study (BOI) of falls and fractures among people aged 65 years and over in Ireland and to project these costs to the next 20 years in the absence of implementation of a National Fall and Fracture Prevention Strategy. While the inpatient cost of fall related injury hospitalisations among older persons is currently estimated at €59 million and inpatient hip fractures cost are estimated at €35 million a comprehensive Burden of Illness Study has not been previously undertaken in Ireland. The full technical report is available in Technical Report 1.

International research has shown the immense cost of falls and fractures in different populations. In the UK, Scuffham found that the costs of falls were 0.11% of GNP but this did not include costs of informal caring or mortality<sup>1</sup>. In the UK in 2000 the estimated annual cost of hip fractures in older people was estimated at €726 million<sup>2</sup>. Another study published in 2006 estimated the costs of falls in people over the age of 60 years at €981million in 2005<sup>1</sup>. In the United States it is estimated that musculoskeletal conditions

accounted for 6% of all medical expenditures in 1988<sup>3</sup>. It is also estimated that in the US the annual economic costs of fall injuries is 0.3% (\$20.2 Billion) of GNP (\$7,071 Billion)<sup>4</sup>.

### 4.2 Economic Burden of Illness Studies

The economic burden of a disease on society is the value of all resources used to prevent, diagnose, treat and generally cope with the disease<sup>5</sup>. The role of BOI studies is to increase understanding of the clinical and economic implications of a disease as opposed to resource allocation. BOI studies can be used to estimate the extent of the problem and its consequences. They can provide an indication as to the contribution of each individual health-care resource used in the management of a particular health condition. BOI studies, when used in conjunction with demographic projections, can be useful in predicting future disease trends<sup>6</sup>.

BOI studies of falls and fractures need to examine direct, indirect and human costs. Direct costs are costs directly related to the illness and include both medical and non-medical costs, which are



related to treatment but do not result directly from it, e.g. hospital 'hotel' costs. Indirect costs represent the losses resulting from premature death, morbidity or disability as a result of the illness and items such as lost leisure time, as well as the unpaid activities of the patient and the carer. The intangible or human costs such as pain, suffering and reduced quality of life for patients who experience the illness are more difficult to estimate.

In general, BOI studies are subject to data limitations. When estimating overall disease costs, it is necessary to quantify the number of people affected and then to assign a unit cost to the identified resources. This can pose difficulties as the interpretation of cost of illness relies on a range of assumptions and extrapolations from international studies. Therefore, it is critical in a BOI study that each assumption is stated explicitly and that a sensitivity analysis is conducted.

#### 4.2.1 Methods

This BOI study examined direct, indirect and intangible costs of falls and fractures. The main direct costs were inpatient acute care, outpatient and ED care, GP care, long stay care and prescription costs. Indirect costs include deaths (mortality and life years lost) and opportunity costs (i.e. time given by carers). The main intangible cost is the cost of reduced quality of life.

A model of economic costing of falls and fractures in Ireland was built by calculating the overall direct and indirect annual costs, using available data sources and extrapolated costs from other published research where Irish data were not readily available. Secondary datasets were used such as HIPE and data from the CSO<sup>7</sup>. Costs on falls and fractures were obtained from the Department of Health and Children Casemix Model. As there were some data constraints a number of assumptions and extrapolations were made, for example, the number of GP visits and OPD attendees following discharge from hospital was extrapolated from a study in the UK<sup>8</sup>.

The indirect costs were more difficult to quantify. For informal care, estimates of hours of care were based on international literature<sup>9</sup> and the opportunity cost of caring was up-rated from work undertaken by O'Shea and O'Reilly<sup>5</sup>. To cost

mortality due to falls and fractures information provided by the CSO was used. The estimated value of life was taken from Krupnick<sup>10</sup> and Jackson<sup>11</sup>. The Quality of Life Estimates were based on work by Borgstrom<sup>12</sup>. A sensitivity analysis was carried out on the parameters with the greatest uncertainty, such as the value of a life and the cost of an informal care hour. Some of the main assumptions were projected in different ways to give a range of estimates of the various factors in the cost of falls and fractures.

#### 4.2.2 Results

Table 4.1 on page 40 shows that annual cost to the economy of falls and fractures in older people is approximately €402 million (including the current costs of osteoporosis medication). About two-thirds of these costs are due to fractures.

#### 4.2.3 Sensitivity Analysis

A number of variables were tested in a sensitivity analysis to ascertain how susceptible the results were to changes in these variables. The variable with the most uncertainty was 'the value of life'. In testing this variable it was found that halving and doubling the current value of life (€455,000) resulted in total mortality costs of €67 million and €270 million respectively. Other variables that were analysed were informal caring and length of long stay care after an injury. Both of these variables had a less impact on overall costs than the value of life.

#### 4.2.4 Projected Costs in 20 Years

In projecting the costs to the next 20 years (in the absence of a Strategy), the estimated current costs of €402 million, population projections and the impact of technological advances were assessed. Three key factors will likely affect projections of future costs over the next 20 years. These are shown in Table 4.2 on page 40.

1. The structure of the population is changing which will lead to an increase in future costs. The exact changes in this projected population are known.
2. Inflation will contribute towards higher costs – an average annual rate of inflation of 3.5% was assumed.



**Table 4.1: 2006 costs of falls and fractures (aged 65 years and over)**

	Cost €m
<b>Fractures: Direct</b>	
Hospital Costs	
<i>Inpatients</i>	58.26
<i>Ambulance</i>	0.3
<i>ED</i>	0.4
<i>Outpatients</i>	5.93
Long-stay care	88.4
Community costs: GP	1.37
<b>Fractures: Indirect</b>	
Carers	15.84
Quality of Life	53.65
<b>Other injuries due to Falls: Direct</b>	7.02
<b>Other injuries due to Falls: Indirect</b>	11.1
<b>Mortality</b>	135
<b>Prescription costs</b>	24.73
<b>Total Costs</b>	<b>402</b>

Data Source: Authors' Own Calculations

**Table 4.2: Impact of factors on future numbers of falls and fractures**

	Impact on Future Costs	% change by 2020
Demographics	+	+ 54.5%
Inflation	+	+ 3.5% p.a.
Technology/disability prevalence	-	- 1% p.a.

Data Source: Authors' Own Calculations

**Table 4.3: Projected costs scenario 1**

	Population aged 65+	Population (% increase on 2005)	Cost €m
2010	508,750	11.5	551
2020	705,058	54.5	1077
2030	948,419	107.8	2043

Data Source: Authors' Own Calculations

3. Disability prevalence among the elderly in general has decreased by 1% or more per year over the last few decades in the US as a result of improvements medical technology and behavioural changes<sup>13</sup>.

The assessment of cost over the next 20 years considers two different scenarios:

1. There is a constant increase in number of people with falls and fractures; rates remain the same.
2. The rate of falls and fractures actually declines by 1% per annum due to technological improvements.

### Scenario 1: A Constant Increase in Fractures

This is the simplest scenario whereby it is assumed that there are no improvements in technology and no National Strategy. Table 4.3 shows the percentage increase in population aged 65 and over from 2005. For example, in 2010 this population will increase by 11.5%. If the growing population is applied to current estimated 2004 costs (€402 million) and an assumption of an average rate of inflation of 3.5%, in 2010 the cost to the economy of falls and fractures will be approximately €551 million, rising to €2,043 million in 2030.

### Scenario 2: Disability Prevalence Reduction/Technological Improvements

In this scenario, it is estimated that there is a relative reduction in fracture rates among older people, as a result of technological

improvements, Table 4.4. It is still assumed that there is no National Strategy, so any reductions would purely result from the fact that there was some advance in technology. While the exact potential reduction in fractures is difficult to ascertain it is assumed that the number of people with falls and fractures will decrease by 1% per year. Compared to the final column of Table 4.3, this could lead to a reduction of about 15% in overall costs by 2020.

The limitations of the projected cost exercise are similar to those found in economic cost of illness studies more generally. For example, it is difficult to predict how disability prevalence will change over the next 20 years as a result of lifestyle changes and technological advancements. However it provides the best estimate feasible with current knowledge.

## 4.3 Prescribing Data for Medications Associated with Osteoporosis

The National Centre for Pharmacoeconomics (NCPE) receives prescription data relating to the Long Term Illness Scheme (LTI), the Drug Payments Scheme (DPS) and the General Medical Services Scheme (GMS) from the Primary Care Reimbursement Scheme. In early 2007 the NCPE reported that the number of prescriptions for the treatment and prophylaxis of osteoporosis has increased from 143,261 to 415,656 on the GMS scheme and from 52,452 to 136,547 on the DP scheme over the time period 2002 to 2005, Technical Report 2.

In addition, in 2005 over 60,000 patients received medications for the prophylaxis and

**Table 4.4: Projected costs scenario 2**

	Cost after technology improvements. €m (Assume 3.5% inflation)
2010	520
2020	922
2030	1587

*Data Source: Authors' Own Calculations*

treatment of osteoporosis on the GMS scheme with an associated expenditure of €16,093,676. Approximately 80% of all patients who were dispensed drugs for the management of osteoporosis were prescribed either Alendronate (Fosamax once weekly) or Risedronate (Actonel once weekly) respectively.

On the DPS scheme, over 27,000 patients received medications for the prophylaxis and treatment of osteoporosis in 2005 with an associated expenditure of €6,028,925. The majority of patients treated with drugs affecting bone structure were over 70 years i.e. 12,224 were between 70 and 74 years and 25,518 were 75 years of age and over. (NCPE, 2007)

#### 4.4 Conclusion

From a cost perspective falls and resultant injuries have a major impact on services and resources. In view of the predicted changes in population in the years ahead the cost burden of falls in older people will increase substantially unless a determined approach to prevention

is implemented. New Irish information on the Burden of Illness due to falls shows that:

- The current estimated cost of falls and fractures in Ireland is €402 million (0.32% of GNP which compares favourably with US estimates).
- By 2010 the costs will be approximately €520 - €551 million
- By 2020 the costs will be approximately €922 - €1077 million
- By 2030 the costs will be approximately €1587 - €2043 million.

## References

1. Schuffham P., Chaplin S., and Legood R., 2006. Incidence and costs of unintentional falls in older people in the United Kingdom. *Journal of Epidemiology and Community Health*. 2003; 57;740-744.
2. Parrot S, 2000. *The Economic Cost of Hip Fracture in the UK*. Centre of Health Economics, University of York; 2000.
3. Praemer A. Furner, S. Rice D. 1992. Section 5: "Costs of Musculoskeletal Conditions." Musculoskeletal Conditions in the United States. American Academy of Orthopaedic Surgeons, 1992.
4. Englander F. Hodson T.J, Terregrossa RA. 1996. "Economic dimensions of slip and fall injuries," *Journal of Forensic Science*, Vol. 41, No. 5, pp. 733-46.
5. O'Shea E, O'Reilly S. 2000. "The Economic and Social Cost of Dementia in Ireland," *International Journal of Geriatric Psychiatry*, 15:208-218.
6. Sedrine W. Radican B. Reginster J. 2001. On Conduction Burden-of-Osteoporosis Studies: A Review of the Core Concepts and Practical Issues. A study carried out under the auspices of a WHO Collaborating Center. *Rheumatology*, 40 (1): 7-14.
7. CSO, 2003. *Vital Statistics Annual Report 2003*, CSO: Ireland.
8. Dolan P. Torgerson, DJ. 1998. "The Cost of Treating Osteoporotic Fractures in the United Kingdom Female Population," *Osteoporosis International*, Vol. 8, pp.611-617.
9. Charatan F. 2002. "US: Medicaid pays for half of nursing home bills, but better off do not qualify," *British Medical Journal*, Vol. 324, p.1543.
10. Krupnick A., Alberini, A., Cropper, M., Simon, N., O'Brien, B., Goeree, R. Heintzelman, M., 2002, "Age, Health, and the Willingness to Pay for Mortality Risk Reductions: A Contingent Valuation Survey of Ontario Residents," *Journal of Risk and Uncertainty*, 24, 161-186.
11. Jackson D., Stone, D., Butler, G., G. Mc Glynn, G., 2005. "A risk related value of spend for saving a statistical life," *Radioprotection*, Suppl. 1, Vol. 40, S973-S979.
12. Borgstrom F., Zethraeus N., Johnell O., Lidren L., Ponzer S., Svensson O., Abdon P., Ornstein E., Lunsjo K., Thorngren K., Sernbo I., 2005. "Costs and quality of life associated with osteoporosis-related fractures in Sweden" *Osteoporosis International*, Vol. 17: 637-650.
13. Cutler D. 2001. Declining disability among the elderly. *Health Affairs* 11-27.



# Chapter 5

Risk Factors for Falls and Fractures

# 5. Risk Factors for Falls and Fractures

## Introduction

The risk of falling and fracture is related to overall bone health particularly in older people. The propensity to fall is a risk factor for minimal trauma fracture, for post fall anxiety and for social isolation in older people.

Circumstances leading to falls in older people are multifactorial. They include the level of physical and cognitive function, walking ability, the effect of medical conditions and medication, the physical environment and accessibility of the built environment – the home, public buildings and the connecting public places.

Circumstances leading to poor bone health among older people are also multifactorial. Although often viewed as an inevitable part of the ageing process, a number of factors (modifiable and non-modifiable) can affect bone health in older age. There are a number of

preventive measures which can be adopted throughout life to postpone the deterioration in bone health and reduce the risk of fractures in later life.

Identifying people at risk of falls and fractures is central to the preventive process. Assessing an individual's risk factors can assist health professionals to target those most vulnerable to injury and to implement effective intervention measures to reduce the likelihood of future falls and fractures.

As the risk factors for falls differ from the risk factors associated with poor bone health and osteoporosis, this chapter is presented in two sections. Chapter 5(a) describes and weights risk factors for falls. Chapter 5(b) describes and evaluates risk factors for poor bone health fracture and osteoporosis.

## 5(a) The Risks of Falling

### Key Points

- Falls are predictable and preventable.
- There are a number of predictive risk factors which can be modified.
- Risk factors can be grouped under three main headings:
  - Intrinsic (e.g. muscle weakness)
  - Extrinsic (e.g. polypharmacy)
  - Environmental (e.g. poor lighting).

### 5(a).1 Introduction

A fall has been defined as: *“a sudden, unintentional change in position causing an individual to land at a lower level, on an object, the floor, or the ground, other than as a consequence of sudden onset of paralysis, epileptic seizure, or overwhelming external force”*<sup>1</sup>.

The myriad of negative consequences following a fall, for both the individual and health care providers, has been explored in previous chapters. The challenge facing the health services today is how to prevent falls and injuries occurring.

Every fall prevention programme is designed to reduce a person's risk of falling. Therefore, it is necessary to first identify those factors most strongly associated with a fall. However, falls are multifactorial events, with a range of risk factors which could contribute to a fall event occurring. This has led to a very large body of literature being published on this topic. While different classifications are often used in studies, risk factors can loosely be classified under three main headings:

- intrinsic – e.g. muscle weakness
- extrinsic – e.g. medication
- environmental – e.g. home hazards.

Not all risk factors are as strongly associated with a fall, i.e. some are more predictive of future falls than others. In order to ensure that fall prevention programmes are both effective and efficient, it is necessary to identify those risk factors most predictive of future falls. The authors of three recent guidelines reviewed the available literature on fall risk factors and published lists of the risk factors most strongly associated with falls. This chapter summarises and weights predictive risk factors.

### 5(a).2 Risk Factors

The AGS/BGS guidelines<sup>2</sup>, which were published in 2001 compiled a list of most common risk factors based on univariate analysis of 16 studies that examined risk factors.

The review group also found significantly increased risk from psychotropic medications (OR = 1.7), class 1a antiarrhythmic medications (OR = 1.6), digoxin (OR = 1.2) and diuretics (OR = 1.1).

Moreland et al collated a comprehensive list of modifiable risk factors in their 2003 evidence based guidelines, based on two meta-analyses and 40 risk factors studies<sup>3</sup>. Their list of 29 risk factors are listed in Appendix 2 with strength of evidence (1 being strongest, 6 weakest) for both

<b>Risk Factor</b>	<b>Significant/Total*</b>	<b>Mean RR/OR**</b>	<b>Range</b>
Muscle weakness	10/11	4.4	1.5-10.3
History of falls	12/13	3.0	1.7-7.0
Gait deficit	10/12	2.9	1.3-5.6
Balance deficit	8/11	2.9	1.6-5.4
Use assistive device	8/8	2.6	1.2-4.6
Visual deficit	6/12	2.5	1.6-3.5
Arthritis	3/7	2.4	1.9-2.9
Impaired ADL	8/9	2.3	1.5-3.1
Depression	3/6	2.2	1.7-2.5
Cognitive impairment	4/11	1.8	1.0-2.3
Age>80 years	5/8	1.7	1.1-2.5

\*Number of studies with significant odds ratio or relative risk ratio in univariate analysis/total number of studies that included each factor.

\*\*Relative risk ratios (RR) calculated for prospective studies. Odds ratios (OR) calculated for retrospective studies.

institutional and community settings. Additional risk factors identified in this study (with evidence rating of 1-3) are:

- Urinary incontinence
- Orthostatic or postprandial hypotension
- Dizziness
- Psychotropic drugs
- Multiple drugs
- Environmental hazards
- Hearing – risk factor particularly in institutional settings
- Limited activity – risk factor particularly in institutional settings
- High level of activity – risk factor in community setting

In 2005, the National Institute for Clinical Excellence (NICE) published fall prevention guidelines<sup>4</sup>. Using the AGS/BGS 2001 guidelines as their foundation, they reviewed evidence from prospective cohort studies on risk factors for

falling published between 1998 and 2002. Their fall prevention guidelines added four additional risk factors found to be strongly predictive of falling:

- Mobility impairment
- Fear of falling
- Urinary incontinence
- Home hazards.

Classifying these risk factors under the three main headings outlined above, the risk factors can be grouped as shown in the following table.

### 5(a).3 Intrinsic Risk Factors

Normal ageing brings physical, cognitive and psychosocial changes which may contribute to the risks of falls. Intrinsic risk factors lie along the continuum from healthy ageing to the development of ill health. While some intrinsic risk factors cannot be modified to reduce risk, e.g. being greater than 80 years of age, others respond well to tailored intervention.



**Intrinsic:**

Muscle weakness  
 History of falls  
 Gait and balance deficits  
 Visual deficit  
 Arthritis  
 Depression  
 Cognitive impairment  
 Age >80 years  
 Urinary incontinence  
 Orthostatic or postprandial hypotension  
 Dizziness  
 Fear of Falling  
 Limited activity (Institutional setting)  
 Hearing (Institutional setting)

**Environmental:**

Environmental hazards  
 Home hazards

**Extrinsic:**

Use of assistive devices  
 Impaired ADL (activities of daily living)  
 High level of activity (Community setting)  
 Medication:
 

- Polypharmacy
- Psychotropic drugs
- Class 1a antiarrhythmic medications
- Digoxin
- Diuretics

**5(a).3.1 Muscle Weakness**

Muscle weakness and reduced physical fitness, particularly in the lower body, are common predictors of a fall. People with reduced physical fitness and lower body muscle weakness are four to five times more likely to have a fall<sup>2</sup>.

**5(a).3.2 History of Falls**

A history of previous falls is one of the best predictors of a future fall. A previous fall increases the risk for another fall threefold<sup>2</sup>. A previous fall may reduce mobility, resulting in loss of strength, balance and reflexes. However, older people can often be reluctant to report a fall due to factors such as fear of loss of independence, reluctance to admit to ageing or fear of being moved into long term care. One qualitative study found that older people often fail to report previous falls as they dismiss fall events as unimportant or believe that falling is an inevitable part of growing old<sup>5</sup>.

**5(a).3.3 Gait and Balance Deficits**

Impaired control of balance and gait is a factor leading to instability and falls<sup>6</sup>. Age-related changes in the neural, sensory and

musculoskeletal systems can lead to impaired ability to maintain upright position or to react to a sudden loss of balance (e.g. a slip, trip or push)<sup>7</sup>. People with gait and balance disorders are three times more likely to have a fall<sup>8</sup>. Balancing reactions that involve taking a step or reaching to grasp an object play a crucial role in the prevention of falls and fall related injuries. The ability to execute these reactions effectively can be impaired even in healthy older people<sup>9</sup>. These reactions can be severely delayed in people with neurological disorders such as Parkinson's disease or stroke<sup>10</sup>.

**5(a).3.4 Vision**

Impaired vision can contribute to falls. People with visual deficits such as reduced acuity or contrast sensitivity, reduced accommodation to light and darkness, or altered depth perception are more likely to fall<sup>2</sup>. Visual deficits such as myopia, ulcerative scars, corneal pathology, cataracts or complications from cataract surgery and glare intolerance may also increase the risk of falling.

### 5(a).3.5 Chronic Illness

Arthritis increases the risk of falling by 2.4 times<sup>2</sup>. Other common chronic conditions associated with falls include Parkinson's disease and stroke. Cardiovascular disorders such as intermittent or persistent hypotension and cardiac arrhythmias cause or contribute to one third of falls and these figures rise to 60% of falls presenting to acute facilities or necessitating hospitalisation<sup>11,12</sup>.

### 5(a).3.6 Depression

Depression has been reported to have a relationship to falls. As such studies are often retrospective, it is unknown if the depression is cause or effect<sup>13</sup>.

### 5(a).3.7 Cognitive Impairment

Cognitive impairment increases the risk of falls. AGS reported that cognitive impairment increases the risk of falling by 1.8<sup>2</sup>.

### 5(a).3.8 Urinary Incontinence

A number of studies have found that urinary urge incontinence (as opposed to stress incontinence) is associated independently with risk of falling. Authors advise that early intervention for urinary urge incontinence may reduce a persons risk of falling<sup>14,15</sup>.

### 5(a).3.9 Orthostatic or Postprandial Hypotension/ Dizziness

Orthostatic hypotension, which may or may not be associated with symptoms of dizziness, is a predictor of falls in older adults. Conventional methods of measuring blood pressure often fail to detect orthostatic hypotension as they are too imprecise and not optimally timed. Tilt table testing is one of the most reliable ways of measuring fluctuations on blood pressure brought on by a sudden change in body position<sup>16</sup>.

### 5(a).3.10 Fear of Falling

Fear of falling is reported as one of the most common fears of older adults<sup>17</sup>. This is important particularly for those who develop fear after having fallen<sup>18</sup>. Specific fears vary but often

include fear of falling again, being hurt or hospitalised, not being able to get up after a fall, social embarrassment, loss of independence, and having to move from home<sup>19</sup>. Fear can positively motivate some older people to take precautions against falls which can lead to gait adaptations which increase their stability<sup>20</sup>. However for others fear can lead to a decline in overall quality of life and increase the risk of falls through a reduction in the activities needed to maintain self-esteem, confidence, muscle strength and balance<sup>21</sup>. In addition, fear can lead to maladaptive changes in balance control which may further increase the risk of falling<sup>22</sup>.

### 5(a).3.11 Activity Levels

Limited activity was found to be a risk factor particularly for people in residential care settings<sup>3</sup>. Limited activity leads to a loss in muscle mass and in turn muscle weakness, which is one of the strongest risks for falls. However, it was found that high levels of activity also posed a risk for community dwelling older adults. While moderate levels of activity are protective, people who engage in high levels of activity tend to also engage in more risk taking behaviour, and thus increase their risk of a fall.

### 5(a).3.12 Hearing

Hearing often declines in older age. While a reduction in hearing poses a small risk for community dwelling older adults, it is in the residential care setting that it acts as a significant risk factor for falls<sup>3</sup>.

## 5(a).4 Extrinsic Risk Factors

Extrinsic risk factors are those which are directly related to the older person, without being integral to the individual.

### 5(a).4.1 Use of Assistive Devices

Assistive devices can promote independence and mobility and may prevent falls if properly used and safely maintained. However, they can also become hazards, for example, where walkers and wheelchairs lack a functioning locking mechanism or where the speed of motorised wheelchairs is set too high. Also the use of walkers can interfere with a person's ability

to maintain balance in certain situations. The demands of using these devices can be excessive for some people<sup>23</sup>. Having an assistive device does not guarantee its use. Many people see such aids as symbols of their old age and advanced frailty, and may be reluctant to use them<sup>24</sup>. Occupational Therapy input is essential to ensure that all assistive devices are protective rather than risks.

### 5(a).4.2 Impaired Activities of Daily Living

Older adults with impaired Activities of Daily Living (ADLs) are 2.3 times more likely to fall than those without impairment. This relationship works both ways, as a fall incident has significant negative impacts on ADL as measured by the Barthel Index (BI) and Lawton's Instrumental Activities of Daily Living (IADL) scale<sup>25</sup>.

### 5(a).4.3 Medication

With age, people develop altered mechanisms for metabolising drugs. Both the half-life and the active levels of a given dose increase with age. Medications can affect alertness, judgment, and co-ordination. Some drugs increase the risk of hypotension. Others affect the balance mechanism and the ability to recognise and adapt to obstacles. Drugs may also impair mobility by causing increased stiffness or weakness<sup>26</sup>. Medications found to increase a person's risk of falling are psychotropic medications, Class 1a Antiarrhythmic medications, Digoxin and Diuretics<sup>2,4</sup>.

Polypharmacy is a significant factor in many falls<sup>26</sup>. The variety of prescription medications and their combinations is increasing. For example, 70% of over 70 year olds have hypertension and antihypertensive medications are one of the commonest cause of drug related falls and blackouts. Falls may also result from the interactions of supplements and vitamins, both with each other or, with prescribed medications<sup>27</sup>.

### 5(a).5 Environmental Risk Factors

Between 25% and 75% of falls in older people involve an environmental component<sup>28</sup>. Environment includes buildings, places and spaces: it is the personal place we call home

(house/residential/nursing home etc); the places we visit (shops/post offices/health care facilities/parks etc), and the connecting spaces between these places (bus-stops, footpaths and road crossings etc)<sup>29</sup>.

#### 5(a).5.1 Floor and Stairs

Stair surfaces and floors that are slippery, excessively patterned, glare-producing or uneven have been implicated in falls<sup>30</sup>. Hazardous characteristics of stairs include uneven or excessively high or narrow steps, slippery surfaces, unmarked edges, discontinuous or poorly-fitted handrails, and inadequate or excessive lighting. A Canadian study which examined stairs which older people found difficult to use, identified the following unsafe features: no contrast markings for stair edges, non-uniform risers, stair dimensions that differed from the recommended seven-inch maximum height or rise and eleven-inch minimum run (toe to heel allowance), open risers and lack of handrails<sup>31</sup>.

#### 5(a).5.2 The Hazards around the Home

Other risk factors in the home environment include loose or uneven rugs, absence of night lights, absence of accessible light switches at room entrances, hazardous shower cubicles, baths or toilets including slippery floors, loose seats, lack of or poorly fitted grab bars or handrail (alongside the bath/shower, toilet and bedside), obstacles in walking routes, items stored in high cupboards, and low furniture such as beds or chairs. Outside the home, hazards include garden paths and walks that are cracked or slippery from rain, snow or moss. Entrance stairs and poor night lighting also pose risks. Pets can be a tripping hazard<sup>32</sup>.

#### 5(a).5.3 Public Areas

Public areas share many of the hazardous characteristics found in the home environment. In addition poor building design and inadequate maintenance of buildings contribute to falls as do cracked or uneven paths, unmarked obstacles, slippery surfaces, poor lighting and lengthy distances to sitting areas and public toilets. In Canada 65% of falls among older people occur outdoors while walking on a familiar route<sup>33</sup>.

Inadequate footpaths have been found to be a universal problem. Many older people have difficulty getting outdoors due to barriers in the environment and lack of supportive facilities.

#### **5(a).5.4 Institutional Environments**

Fall hazards in long-term care settings and hospitals include chair and bed heights, floor surfaces, lighting and lack of rest areas. Many falls occur as people rise from bed. The physical structure of the bed itself can be a factor, for example, when there is lack of space at the bed for proper footing and balance.

#### **5(a).5.5 Footwear, Clothing & Bags**

Footwear which fits poorly, has worn soles, is not fastened or is of an unsuitable heel height for the individual, can contribute to falls. As people age, their height and posture change so clothes such as dressing gowns or trousers, which may have fitted well in the past, can cause tripping hazards<sup>28</sup>. In addition older people may fall as a

result of carrying an object such as a bag. This may relate to altered balance, altered recovery mechanisms following a trip or stumble, and altered means of protection as the older person lands on the ground<sup>28</sup>.

#### **5(a).6 Conclusion**

The factors outlined above are not an exhaustive list of possible risk factors. Rather they represent those risk factors found to be most strongly predictive of future falls in the current research literature. Perhaps more important than identifying single risk factors is recognising the interaction and probable synergy that exists between two or more risk factors. This interaction greatly increases a person's risk of falling, and makes the task of reducing risk more challenging. However, there is sufficient evidence available on which to base an effective falls prevention programme for Ireland, incorporating full assessment which in turn will lead to individual and general interventions being undertaken by relevant health care professionals.

## 5(b). The Risks of Fracture

### Key Points

- **An increased risk of fracture is linked to deterioration in bone health and conditions such as osteoporosis.**
- **Osteoporosis is difficult to detect and often becomes evident only after a fracture has occurred.**
- **More than half of all fragility fractures occur in patients who would not be considered to have osteoporosis.**
- **There are a number of predictive risk factors for fracture associated with osteoporosis and poor bone health.**
- **Risk factors for osteoporosis can be grouped under two main headings:**
  - **Modifiable.**
  - **Non-Modifiable.**

### 5(b).1 Fractures and Osteoporosis

Deterioration in bone health is an inevitable part of the ageing process. Significant loss of bone mass, leading to conditions such as osteoporosis, increases a person's susceptibility to fracture even after minor trauma<sup>34</sup>. A person who sustains a fracture will likely suffer considerable pain and discomfort and, in most cases, require acute medical intervention.

Osteoporosis is the most common form of metabolic bone disease. It is characterised by bone fragility due to low bone mass and modifications of the internal bone structure with alterations of its microarchitecture<sup>34</sup>. Genetic factors have a strong influence on peak bone mass, which is attained during the third decade of life and is an important determinant of bone mass later in life. Nutrition, particularly Calcium and Vitamin D intake, hormonal status, and physical activity also influence peak bone mass<sup>36</sup>.

During adulthood, bone tissue undergoes continuous remodelling, with a balance between bone formation and resorption. After the age

of 30, resorption starts to outstrip formation and bone mineral density (BMD) begins to decline gradually. Among those suffering from osteoporosis, 80% are women and most of them are postmenopausal<sup>34</sup>. Because of the accelerated bone loss associated with oestrogen deficiency, women can lose up to 20% of their bone mass during the 5-7 years that follow the menopause, making them more susceptible to fractures.

With the general ageing of the world's population, trends in osteoporosis are increasing. The burden of its associated morbidity and mortality are a major health concern. The WHO estimates that over the next 25 years the population aged 65 years and over will increase by 88%, while the working population will grow by only 45%. The most striking changes will be observed in the oldest age group (80 years and above), which is the one most affected by osteoporotic fractures. By 2020, the very elderly will make up 20% of the population in many European countries<sup>34, 37</sup>.

### 5(b).2 Clinical definition of Osteoporosis

The internationally agreed definition of osteoporosis is *"a systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture"*<sup>38</sup>.

The WHO definition of osteoporosis is based on bone mineral density in the spine and proximal femur measured with dual energy x-ray absorptiometry (DXA). Osteoporosis is classified as a bone mineral density 2.5 or more standard deviations below normal peak bone mass i.e. a T score  $\leq -2.5$ <sup>39</sup>. However, where a fracture has already occurred a person may require treatment to reduce further fracture risk or manage osteoporosis at a higher T score value.

- The clinical significance of osteoporosis is in the fractures that occur. Without a fracture, a person at risk from osteoporosis will not suffer morbidity. The most common fractures associated with osteoporosis are to the vertebrae, distal radius and hip<sup>38</sup>. Though these are characteristic of osteoporosis, this is a systemic condition and all fractures are increased in patients with low bone density.
- Adults who sustain any fracture have a two fold increased risk of a further fracture<sup>40</sup>.

### 5(b).3 Fragility Fractures

People with osteoporosis are at risk of fragility fractures. These are fractures that occur as a result of mechanical forces that would not ordinarily cause fracture. The WHO has quantified this as *"forces equivalent to a fall from standing height or less"*<sup>38</sup>.

55% of people aged 50 years and over have low bone mass which puts them at high risk of osteoporosis and related fracture. Furthermore, over half of all 'fragility fractures' occur in patients who would not be considered to have osteoporosis<sup>35</sup>.

A study published in 2002 examined the outcome of hip fracture in a sample of Irish females aged over 50 years. At two year follow up, the mortality rate was 24% while a further 27% were in long term care. On the basis of quality

of life and economic grounds it is important to improve interventions to reduce the risk of hip fracture in older people by preventing osteoporosis and reducing the risk of falls<sup>41</sup>. Early identification of risk factors associated with poor bone health can reduce the incidence of fractures among the at-risk population and decrease the burden of fracture on individuals and the health services.

### 5(b).4 Clinical Risk Factors

Multiple factors contribute to low bone mass and osteoporotic fractures. Lower peak bone mass, increased bone loss at menopause, and greater longevity all put women at greater risk than men<sup>36</sup>. However, advanced age is the most important factor as it is associated with reduced bone mass and reduced quality of the bone. Some factors contributing to reduced bone mass are modifiable and some are non-modifiable<sup>45</sup>:

#### (i) Non-modifiable

- Advanced age
- Female gender
- White / Asian race
- Family history of osteoporosis
- Family history of hip fracture
- Metabolic disorders affecting the skeleton
- Certain malignancies (myeloma, lymphoma)

#### (ii) Modifiable

- Smoking
- Low Calcium intake
- Low Vitamin D / sunlight exposure
- Sedentary lifestyle
- Low body weight
- Stress / depression
- Surgical or drug induced hypogonadism
- Glucocorticoid therapy

The incidence of vertebral fractures begins to increase in late middle age, mirroring the age-related decrease in bone mass. In contrast, the incidence of hip fractures increases exponentially after age 70, so that 90% of hip fractures occur after this age. Risk factors for hip fracture are more strongly related to falls risk factors and factors that may modify the impact of a force of a fall than to low bone mass per se<sup>42</sup>.

One particularly high-risk group for hip fractures is nursing home residents. The rate of hip fracture among residents of nursing homes is between 3 and 11 times that of age-matched community-dwellers<sup>43</sup>. A study conducted in the U.S which assessed the bone mineral density of white female nursing home residents found that the prevalence of osteoporosis increased from 63.5% for women aged 65–74 years to 85.8% for women over 85 years of age. Only 3% had composite forearm BMD within one standard deviation of the young adult mean<sup>44</sup>.

### 5(b).5 Children and Adolescents

Although osteoporosis is most likely to affect people who are older, the disease process begins years, if not decades, earlier. Bone mass is primarily laid down during childhood and adolescence. The child or adolescent who does not develop healthy bones is at risk of becoming an adult with osteoporosis.

The factors that put children at risk of problems with bone health include:

- inadequate intake of Calcium and Vitamin D
- engaging in prolonged, strenuous athletic training and / or low body weight
- delayed onset of menstruation or irregular menstruation in young women
- undernourishment due to an eating disorder (e.g., anorexia) or a malabsorption syndrome (e.g., coeliac disease, cystic fibrosis)
- a history of chronic glucocortico-steroid use (to treat diseases such as asthma, arthritis, and some forms of cancer)<sup>46</sup>.

### 5(b).6 Secondary Causes of Osteoporosis

Common causes of secondary osteoporosis include<sup>45</sup>:

#### Endocrine

- Hypogonadism
- Hyperthyroidism
- Anorexia nervosa
- Type 1 diabetes mellitus
- Hyperadrenocorticism

#### Nutritional

- Malabsorption syndromes
- Vitamin D deficiency / resistance
- Calcium deficiency
- Alcoholism

#### Chronic Medication Therapy

- Glucocorticoids
- Thyroxine
- Anticonvulsants
- Loop diuretics
- GnRH agonists
- Aromatase inhibitors
- SSRI antidepressive drugs

#### Other

- Hypercalciuria
- Chronic Obstructive Pulmonary Disease
- Rheumatoid arthritis
- Organ transplantation



### 5(b).7 Assessment of Fracture Risk

The risk of fractures increases steeply with age and most of those affected are over 75. Hip fractures, the most serious outcome of osteoporosis, are becoming more frequent as the world's population is ageing. The incidence of hip fracture is increasing by 1- 3% per year in most areas of the world<sup>40</sup>.

In women over the age of 50 years, the lifetime risk of hip fracture is approximately one in six. This risk of a subsequent fracture is much higher in postmenopausal women who have already had a fracture<sup>47</sup>. Although men are at somewhat lesser risk than women, 50-year-old men have approximately a 13% lifetime risk of fracture and experience about 20% of symptomatic vertebral fractures and 30% of hip fractures<sup>46</sup>.

Hip fractures place the greatest demand on health resources and have the greatest impact on patients because of increased mortality, long term disability, and loss of independence. Although less common, vertebral fractures are also associated with long term morbidity and increased mortality<sup>47</sup>. A number of studies of the management of osteoporosis in older women who have had hip or wrist fractures have found under diagnosis and under treatment of the disease<sup>48</sup>.

Bone mineral density measurements are the standard method of assessing the risk of fracture. However, this approach captures only a small proportion of those who will suffer a fracture<sup>49</sup>. Fracture risk should also be assessed by considering clinical risk factors that contribute to a fracture risk independently of bone mineral density<sup>36</sup>.

The WHO approach to fracture risk assessment is based on the following risk factors:

- Age
- Previous fracture
- Family history of hip fracture
- Glucocorticoid use
- Current smoking
- Alcohol use > 2 units / day
- Rheumatoid arthritis

According to Kanis et al, the assessment of fracture risk needs to be distinguished from the diagnosis of osteoporosis to take account of the independent value of the clinical risk factors. The independent contribution of these risk factors can be determined by the calculation of fracture probability with or without the use of BMD. Treatment can then be offered to those identified to have a fracture probability greater than an intervention threshold<sup>49</sup>.

### References

1. Feder, G. Cryer, C. Donovan S. & Carter Y. Guidelines for the Prevention of Falls in People over 65. *BMJ* 2000; 321:1007-1011.
2. American Geriatrics Society, British Geriatrics Society and American Academy of Orthopaedic Surgeons Panel on Falls Prevention. *JAGS* 2001; **49**:664-672.
3. Moreland J; Richardson J; Chan DH; O'Neill J; Bellissimo A; Grum RM; Shanks L. Evidence-Based Guidelines for the Secondary Prevention of Falls in Older Adults. *Gerontology*. 2003; **49**:93-116.
4. Clinical Practice Guidelines for the Assessment and Prevention of Falls in Older People. Commissioned by the National Institute for Clinical Excellence, November 2004. <http://guidance.nice.org.uk/CG21>
5. de Siún A. Falls in the Older Adult Population of the Midland Health Board: An Exploration of Circumstances and Beliefs. 2004 (unpublished).
6. Maki, B. E. and W. E. Mcllroy. Postural control in the older adult. *Clinical Geriatric Medicine*. 1996; **12**:635-58.
7. Maki, B. E. and W. E. Mcllroy. Effects of aging on control of stability. In L. Luxon et al. (eds.), *A textbook of audiological medicine: Clinical aspects of hearing and balance*. London: Martin Dunitz Publishers, 2003, pp. 671-90.
8. Speechley, M. Risk factors for falling among Canadian veterans and their caregivers. *Canadian Journal on Aging*, 2005. (Publication pending).
9. Maki, B. E. and W. E. Mcllroy. Control of compensatory stepping reactions: Age-related impairment and the potential for remedial intervention. *Physiotherapy Theory and Practice*. 1999; **15**:69-90.
10. Maki, B. E. and W. E. Mcllroy. Change-in-support balance reactions in older persons: An emerging research area of clinical importance. *Neurologic clinics of North America*. 2005; **23**: Issue 3, 751-783



11. Shaw F, Bond J *et al.* Multifactorial intervention after a fall in older people with cognitive impairment and dementia presenting to the accident and emergency department: randomised controlled trial. *BMJ*. 2003. 326:73.
12. Davison J, Bond J, Dawson P, *et al.* Patients with recurrent falls attending Accident & Emergency benefit from multifactorial intervention—a randomised controlled trial. *Age Ageing* 2005;**34**:162–8.
13. Gallagher, E. M.; M. Hunter and V. J. Scott. Nature of falling among community dwelling seniors. *Canadian Journal on Aging*. 1999; **18**(3):348-62.
14. Brown *et al.* Urinary incontinence: does it increase risk for falls and fractures? Study of Osteoporotic Fractures Research Group. *Journal of the American Geriatrics Society*. 2000; **48**(7):721-5.
15. Teo *et al.* Do sleep problems or urinary incontinence predict falls in elderly women? *Aust J Physiotherapy*. 2006; **52**(1):19-24.
16. Heitterachi E *et al.* Blood pressure changes on upright tilting predict falls in older people. *Age and Ageing*. 2002; **31**:181-186.
17. Howland, J. and E. Peterson. Fear of falling among the community-dwelling elderly. *Journal of Aging and Health*. 1993; **5**(2):229-43.
18. Gagnon, N. and A. Flint. Fear of falling in the elderly. *Geriatrics and Aging*. 2003; **6**(7):15-17.
19. Kong, K. *et al.* Psychosocial consequences of falling: The perspective of the older Hong Kong Chinese who had experienced recent falls. *Journal of Advanced Nursing*. 2002; **37**(3): 234-42.
20. Maki, B. E. Gait changes in older adults: Predictors of falls or indicators of fear. *Journal of the American Geriatrics Society*. 1997; 45:313-20.
21. Adkin, A. *et al.* Fear of falling modifies anticipatory postural control. *Experimental Brain Research*. 2002; **143**:160-70.
22. Maki, B. E.; P. J. Holliday and A. K. Topper. Fear of falling and postural performance in the elderly. *Journal of Gerontology*. 1991; **46**:M123-M131.
23. Bateni, H. *et al.* Can use of walking frames or canes impede lateral compensatory stepping movements? *Gait Posture*. 2004; **20**:74-83.
24. Gallagher, E. *et al.* Final report: Laying the groundwork for improved knowledge and use of assistive devices among Canadian veterans and seniors. Report to Health Canada, 2002.
25. Leung-Wing Chu *et al.* Impact of Falls on the Balance, Gait, and Activities of Daily Living Functioning in Community-Dwelling Chinese Older Adults. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2006; **61**:399-404.
26. Castles, S. Factors influencing falls among nursing home residents. Paper presented at the Canadian Association on Gerontology's pre-conference workshop. Victoria, B.C.: 2004
27. Miller, L. G. Selected clinical considerations focusing on known or potential drug-herb interactions. *ARCH Intern Med*. 1998; **58**:
28. Gallagher, E. and H. Brunt. Head over heels: A clinical trial to reduce falls among the elderly. *Canadian Journal on Aging*, 1996; 15:84-96.
29. Bond R. Submission of the Environmental Subgroup: Strategy for the Prevention of Falls and Fractures in an Ageing Population, 2007 (In Press).
30. Pauls, J. "Stair safety and accessibility: Standards development in the building and housing industry." In G. Gutman (ed.), *Technology and innovation for an aging society: Blending research, public and private sectors*. Vancouver: Gerontology Research Centre, Simon Fraser University, 1998, pp. 111-29.
31. Edwards, N., Maki, B. E. and W. E. Mclroy. "Stair study: Stair use and stair safety among community living seniors." (In press)
32. Public Health Agency of Canada. The safe living guide: A guide to home safety for seniors. 2005. Online: [www.phac-aspc.gc.ca/seniors-aines/pubs/safelive/](http://www.phac-aspc.gc.ca/seniors-aines/pubs/safelive/)
33. Gallagher, E. and V. Scott. The STEPS project: A collaborative study to reduce falls in public places among seniors and persons with disabilities. *Canadian Journal of Public Health*. 1997; **88**(2):129-33.
34. Reginster, JY., Sarlet, N., Lecart, MP., Fractures in Osteoporosis: The challenge for the new millennium. *Osteoporosis Int* 2005, **16** S1-S3
35. Sanders *et al.* Half the burden of Fragility Fractures in the community occur in women without osteoporosis. When is fracture prevention cost effective. *Bone* 2006 **38** Iss. 2 pp S1-S3
36. Poole KE, Compston J, Osteoporosis and its management, *BMJ*, 2006 333, pp1251-1256
37. Connel and Pringle, *Population Ageing in Ireland: 2002-2021*, Dublin NCAOP 2002

38. National Institute for Health and Clinical Excellence (NICE) Bisphosphonates (alendronate, etidronate, risedronate) Selective Estrogen Receptor Modulators (raloxifene) and parathyroid hormone(teriparatide) for the secondary prevention of osteoporotic fragility fractures in postmenopausal women. *Technology appraisal No 87*, 2005 [www.nice.org.uk](http://www.nice.org.uk)
39. Kanis, JA, Diagnosis of osteoporosis and assessment of fracture risk. *Lancet* 2002(June), 359 pp1929-1936
40. Cummings, SR., Melton III, LJ, Epidemiology and outcomes of osteoporotic fracture *Lancet* 2002(June), 359 pp1761-67
41. Kirke, P.N., et al. Outcome of hip fracture in older Irish women: a 2-year follow-up of subjects in a case-control study. *Injury* 2002 33:5 pp 387-391
42. Wilkins, C., Birge, S., Prevention of osteoporotic fractures in the elderly. *The American Journal of Medicine*, 2005 118 : 11, pp 1190-1195
43. Lee, V.K., Management of osteoporosis in the nursing home setting. *Annals of Long-Term Care* - Volume 9 - Issue 09 - September 2001
44. Zimmerman et al. The prevalence of osteoporosis in nursing home residents. *Osteoporosis Int* 1999, 9 pp 151-157
45. Osteoporosis Action Plan Committee, Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario – 2003 Toronto, *Osteoporosis Society of Canada* [www.health.gov.on.ca/](http://www.health.gov.on.ca/)
46. McLellan A.R. et al. The fracture liaison Service: Success of a programme for the evaluation and management of patients with osteoporotic fracture. *Osteoporosis Int.* 2003, 14 pp 1028-1034
47. Woolf, A.D., Akesson, K., Preventing Fractures in Elderly People, *BMJ* 2003, 327 pp89-95
48. Hoovan F et al, Follow-up treatment for osteoporosis after fracture, *Osteoporosis Int.* 2005; 16 pp 296-301
49. Kanis, JA., et al Assessment of fracture risk *Osteoporosis Int* 2005 16 581-589.



# Chapter 6

Current Services for Falls  
and Fracture Prevention

## 6. Current Services for Falls and Fracture Prevention

### Introduction

Prior to the establishment of the HSE in 2005, health services in Ireland were delivered through a complex structure of ten regional Health Boards, the Eastern Regional Health Authority and a number of different agencies and organisations. The HSE replaced all of these organisations, and it is now the single body responsible for ensuring that everyone can access cost-effective and consistently high quality health and personal social services. This single system has enabled a national assessment of current fall and fracture services to take place.

This chapter describes and assesses falls and fracture prevention services in primary and community care, in acute hospitals and in long stay settings (where relevant). It provides the summary results of a consultation exercise that was undertaken with key stakeholders. The aim of the consultation was to ascertain the views of service providers, particularly in relation to unmet need and to gather information on the best way to develop the strategy.

There appears to be considerable regional variation in the way services to prevent and manage falls and fractures among older people have been developed in Ireland. Although it is difficult to quantify the extent of these services, it is clear that some services have been developed in many different settings. These services were often set up by and may still depend on the interest and determination of dedicated health champions. Therefore, delivery of the services remains geographically patchy and, to date, no dedicated integrated falls and fracture prevention programme has been developed to meet the needs of an increasingly at-risk population.

This chapter looks separately at falls and fracture related services. The chapter is divided into two sections. Chapter 6(a) describes falls prevention services. Chapter 6(b) describes fracture prevention services (including the management of osteoporosis).

## 6(a). Current Services - Falls

### Key Points

- **Fall prevention and assessment services are not well structured or developed in Ireland.**
- **Where a service is in place, in most cases, this is due to efforts and enthusiasm of individual health professionals.**
- **Most patients who fall do not receive a falls assessment service.**
- **Services have been developed in the community, rehabilitation centres, acute hospitals and long stay residential units.**
- **These services need to be standardised, planned and implemented on a national basis as part of a National Strategy.**

### 6(a).1 Introduction

While there is no national integrated falls prevention programme/strategy, a number of falls prevention initiatives are in place in various settings around the country. In order to build a national strategy that could integrate and support services that are already in place, it was necessary to assess these existing services and to measure the gaps that exist between current service provision and the needs of the population.

There are barriers to identifying current services in Ireland. Due to the absence of a national strategy, fall prevention services generally work in isolation, with no central point of information or database on services available. A scoping exercise was carried out in order to identify as many services as possible. Services have developed in various parts of the country but they are generally as a result of the enthusiasm and interest of one or more health care providers in the area. Although much excellent work is being undertaken, the distribution of these services is patchy. The majority of services identified are based in the acute hospital setting, though others were identified in health promotion, the community, rehabilitation and residential care settings. During the scoping exercise, services were identified for the most part through word of mouth. Therefore,

while a number of very good services are reported in Appendix 3, it is likely that there are others operational that were not identified during the scoping exercise. In addition, information on a large number of allied health professional programmes were submitted (physiotherapy, occupational therapy, dietetics), details of which can be found in Appendix 4. Finally, a number of pilot programmes were identified which have since been discontinued due to lack of resources.

In order to identify the gap between service provision and unmet need, a consultation exercise was conducted with relevant stakeholders. Due to the multifactorial nature of falls, a very large body of people, both in the general public and within the health care setting, have an interest in falls. The health professionals involved in the falls service include clinicians (geriatricians, orthopaedic surgeons, emergency department consultants, general practitioners), nurses, physiotherapists, occupational therapists, dieticians, pharmacists, social workers, home helps, chiropodists, opticians and health promotion personnel. It was decided to consult with relevant stakeholder groups through their representative organisations (Appendix 5). The report of the findings can be found in Technical Report 5.

Finally, as part of the Emergency Department (ED) Research which was conducted to provide a rough estimate as to how many older people are presenting to the ED as the result of a fall, data were collected on the circumstances of each persons fall, and whether they had previous falls. This research highlighted further areas of need in our falls prevention services today. The report of the research is available in Technical Report 6.

Fall prevention services are provided in four main areas:

- Health promotion
- Primary and community care services
- Residential care
- Acute hospitals.

### 6(a).2 Health Promotion and Prevention

The goal of falls prevention is to promote bone health in all age groups, to raise awareness of fall risks in vulnerable people and implement evidence based-interventions. Older people are encouraged and supported in achieving their full potential by:

- Increasing control over their own lives
- Improving their own health
- Maximising their functional capacity
- Postponing or preventing the onset of diseases
- Lessening the effects of debilitating conditions.

Health promotion interventions have been set up in many areas to:

- Promote healthy lifestyles and strengthen primary prevention
- Promote awareness of falls and encourage safe behaviour in older people
- Create safer physical environments by working with other health services and other agencies, for example, local authorities

- Deliver fall prevention programmes in health and community settings
- Encourage the development of fall prevention policies in organisations.

However, during the consultation process, education on falls for the general public, older people, and health care providers was identified as an area of unmet need. It was highlighted that education needs differ depending on the older person group being targeted. Few healthy older adults living in the community perceive themselves as being at risk of falling. Therefore, education should focus on healthy ageing and the importance of good diet and continued exercise, rather than on falls prevention per se. The challenge of reaching older people who may be living in isolation was also highlighted.

Education is also needed to ensure that older people understand the importance of reporting all falls, even when they have not injured themselves. Older people's reluctance to report minor falls was reported as one of the barriers to identifying those at risk.

### 6(a).3 Primary and Community Care Services

The strategy document '*Primary Care: A New Direction*' (2001) provides a template for placing Primary Care as the central focus in the delivery of health services in Ireland. The 2,500 general practitioners (GPs) are private contractors and provide healthcare services to both public and private patients. The HSE is implementing the Primary Care Strategy with the development of primary care teams (PCTs) and social care networks staffed by multidisciplinary health personnel. This approach will enable the provision of comprehensive multi-disciplinary services to people living in defined geographical areas. These teams include general practitioners, nursing and allied health professionals.

People who are 70 years of age and over are entitled to General Medical Services i.e. free GP services and a variety of community services. All these services contribute to the prevention and management of falls. The development of PCTs and social care networks creates a new opportunity for these health professions to work together to provide high quality, integrated fall

prevention services for older people in their area. A key priority is that personnel receive evidence based training and support so that they have the knowledge to identify and manage people at high risk for falls.

The need for co-ordinated community based services, such as the PCTs was identified during the consultation process. The majority of respondents identified community care settings as the most appropriate for identifying and assessing people at risk of falling. However, poor service integration and resourcing and the absence of standardised identification and assessment procedures were highlighted as barriers to the provision of effective falls prevention services. The establishment of PCTs and social care networks would provide a base from which fall prevention services could be co-ordinated in the community.

Currently there are falls prevention programmes in operation in the community setting, as outlined in Appendix 3. However, services are patchy, and current resources are not adequate to provide intervention and rehabilitation in the community. The consultation process identified a lack of community physiotherapy services in particular, while research undertaken over the period of Winter 2006-Spring 2007 highlights further gaps in current services:

- Few facilities have multi-disciplinary falls prevention services: Of the 14 Local Health Offices that provided details of physiotherapy services in their area only three had a specialised multi-disciplinary falls service (one was a pilot). Of 10 non-acute hospitals that responded only two had a specialised multi-disciplinary falls service
- Although the majority (66%, 732) of the 947 WTE occupational therapists employed in the Public Service work with geriatric teams, many of the remainder work with community services and are involved in falls services as part of their work.
- There are Co-ordinators of Services for the Elderly in various parts of the country but the population covered by this service varies from Local Health Office level (approximately 100,000) to former Health Board population size (approximately 400,000-500,000). Their remit varies from co-ordinating and developing all services provided by HSE and voluntary organisations to co-ordinating HSE community services only.

#### 6(a).4 Residential Care

At present there is no obligation at national level for residential care providers to record and audit the number of falls among their residents. While accident policies should be available in private nursing homes and most record falls, these are not audited externally. Public facilities currently are not included in this inspection process.

The need for all public and private residential care centres to develop falls prevention policies was identified in the consultation process. It was reported that the lack of a standardised screening tool for residential care setting was a barrier to the implementation of effective services. Likewise, the lack of resources, specifically Physiotherapy, Occupational Therapy and Dietetic Services for all care centres was a barrier to assessment and appropriate intervention for those at risk of falling. It was suggested that residential care centres should be linked with community services to ensure continuity of care. Finally, the need for more rehabilitation services was suggested.

#### 6(a).5 Acute Hospital Setting

There are 53 acute hospitals in Ireland. They vary greatly in size, type, number of specialties and activity levels. Of the acute hospitals, 37 have an Emergency Department (ED). At a national level there is no structured programme in place to ensure that frontline ED staff are aware of the importance of falls among older people, ask about risk factors or know about fall risk assessment tools, and interventions. This was highlighted by the ED research finding that of the 282 people attending ED with a fall, 60% had a previous fall, but only four people (1.4%) had ever been assessed for falls risk. (Technical Report 6).

Knowing that a history of falls is one of the strongest predictors of future falls it is essential that people attending the ED with a fall are identified as being at risk, assessed and given appropriate intervention where required. However, patients with injuries after a fall may be under the care of many different medical specialties and subspecialties in the acute hospital. Their clinical pathway is varied:

- Many older people who sustain an injury after a fall will attend an ED where they may or may not be admitted.



- They may be referred to a number of specialist services within the hospital or at another hospital setting.
- When admitted with a fall related injury, the older person may be treated by a number of specialties where the same problem as in ED arises i.e. the injury will be dealt with but not necessarily the cause of the fall.
- The number of Geriatricians employed in public hospitals can be taken as a crude proxy for multi-disciplinary geriatric teams which potentially could form the core of fall teams.
- Of the 37 acute hospitals who responded only 6 have a specialised multidisciplinary falls service.
- A small number of older people who fall, as part of their investigation and management, will need referral from general secondary care facilities to more specialised services e.g. investigation of carotid sinus syndrome of which there are two centres in country.
- Most not linked directly with continuity of assessment and intervention and monitoring compliance in the community.
- Unfortunately it is difficult to measure the impact of many services as there is seldom an evaluation carried out and data on numbers seen are not routinely collected.

### 6(a).6 Conclusions

There are few examples of multi-disciplinary fall prevention services in Ireland given the scope of the problem and impact on health care services and quality of life.

While services are available in many parts of the country they do not appear to have developed in a structured or co-ordinated cohesive manner. Few of the services are alike and many are not well integrated with other services. However, their success often depends on the enthusiasm and interest of one or more people in a specific area/facility. It is not uncommon for a pilot programme to be established, but then discontinued after the pilot phase due to lack of funding or support rather than unsatisfactory evaluation. A wide range of assessment and referral procedures are used, and the level and intensity of intervention differs depending on the staffing and support available. Many of these programmes have not been evaluated.

In their current format they face an uncertain future and many challenges including competing service and funding priorities, sustainability and continuity, lack of comprehensive planning and coverage to date, overcoming their lack of priority to date and integration with other relevant services. Despite these many challenges, the services that exist often provide a high quality of care and offer support and intervention based on international best practice guidelines.

It is obvious that while there is a need for co-ordination of services and referral of people identified as high risk, resources must be available to provide the appropriate interventions. This was an issue repeatedly highlighted during the consultation. Despite the challenges of scarce resources and varied care pathways, there are a number of falls prevention services based in acute hospitals. Among the services which are in place:

- They have developed in an ad hoc manner. Few services are alike. Most are led by different disciplines. The level and intensity of intervention differs depending on the staffing and support available. Many services are not linked with other disciplines in their area e.g. a hospital based service with no formal referral procedures from an ED, and none are linked with services in other geographical areas.



## 6(b). Current Services – Fracture Prevention

### Key Points

- **The prevention and management of fractures and osteoporosis involves many health specialties.**
- **Health Promotion priorities include nutrition (particularly Calcium and Vitamin D intake), physical activity, smoking cessation and alcohol awareness.**
- **A multidisciplinary approach which integrates care between Primary Health and specialist services provides opportunities to identify those at risk of fracture and to prevent fractures.**
- **A small number of specialist services including fracture liaison services have been piloted. These services improve outcomes for prevention and management.**
- **The gold standard for the diagnosis of osteoporosis is Bone Mineral Density using DXA scanning. On a population needs basis there are sufficient DXA machines in Ireland. However the service is not provided on an equitable basis.**

### 6(b).1 Osteoporosis Services

Poor bone health and osteoporosis are preventable and treatable. Osteoporosis is diagnosed and managed in a variety of settings in primary and secondary care. Health professionals who are involved in the clinical care of patients with osteoporosis in the community include general practitioners, community-based nurses, physiotherapists, occupational therapists, dieticians, public health nurses and others. In the acute care setting, patients with osteoporosis may receive care under a number of medical specialties such as rheumatology, medicine for the elderly, gynaecology, gastroenterology, endocrinology, orthopaedics, and others. The range of specialties often depends on specific secondary conditions requiring treatment.

The consultation process with key stakeholders identified a number of service gaps including health promotion, criteria for identifying people at risk, access to diagnostics, management and rehabilitation, post fracture liaison services and community services.

### 6(b).2 Prevention and Management of Osteoporosis and Low Trauma Fracture

Services to prevent, treat and manage osteoporosis and fragility fractures are provided in a variety of settings. The key sectors responsible for delivering services include:

- Health Promotion
- Primary Care
- Secondary and Tertiary Care including Specialist Services and Fracture Liaison

Opportunities to intervene to improve outcomes in patients with osteoporosis include reducing the prevalence of modifiable risk factors and implementing measures to reduce the risk of low trauma fractures. These opportunities are summarised in Table 6(b).1.

**Table 6(b).1: Opportunities to improve the prevention and management of osteoporosis and low trauma fracture**

Who?	Well Population	At Risk population	Established Osteoporosis	Chronic Disease Management
Level of Prevention	<i>Primary Prevention</i>	<i>Secondary Prevention / Early Detection</i>	<i>Tertiary Prevention and Management</i>	
Goal	<i>Prevent Incident Disease</i>	<i>Prevent Progression to Established Disease</i>	<i>Prevent Repeated Acute Episodes, Readmissions, and Prevent or Delay Complications</i>	<i>Optimise Health Related Quality of Life</i>
Nature of Intervention	<ul style="list-style-type: none"> <li>Promote behaviours to improve bone health (e.g. physical activity, adequate Calcium and Vitamin D, avoid smoking, avoid excessive alcohol intake)</li> <li>Prevent corticosteroid, induced osteoporosis.</li> </ul>	<ul style="list-style-type: none"> <li>Knowledgeable health professionals</li> <li>Intervene to prevent first fracture in people at high risk (e.g. Osteoporosis prophylaxis, Calcium and Vitamin D, physical activity, prevent falls and injuries)</li> <li>Support attendance at an Educational programme</li> </ul>	<ul style="list-style-type: none"> <li>Identify people with low trauma fracture</li> <li>Intervene to prevent further fractures (e.g. osteoporosis treatment, Calcium and Vitamin D, physical activity, prevent falls and injuries)</li> <li>Monitor treatment response and optimise therapy</li> <li>Manage secondary conditions (e.g. Coeliac disease).</li> </ul>	<ul style="list-style-type: none"> <li>Monitor treatment response and optimise therapy</li> <li>Preserve function and independence</li> <li>Provide psychosocial support</li> <li>Support ongoing self management</li> <li>Intervene to prevent further fractures (e.g. osteoporosis treatment, Calcium and Vitamin D, physical activity, prevent falls and injuries).</li> </ul>
Responsible Services	Primary and Community Health Care	Primary and Community Health Care	Specialist Services Hospital Care Primary Health Care	Primary and Community Care Hospital Services
Promotion of Quality of Life	Health Promotion	Health Promotion	Health Promotion	Health Promotion

**NB. Each stage requires critical assessment of: staffing requirements, resource allocation, data requirements, evidence base, cost-effectiveness, quality measures, guidelines and standards, monitoring and evaluation, roles and responsibilities (national, local, public/private), equity impact, consumer involvement etc.**

Source: (Centre for National Research on Disability and Rehabilitation Medicine, Queensland, Australia, 2004)

### 6(b).3 The Population Health Approach

The traditional health and social care model is primarily episode-based and demand led. The Population Health model, adopted by the HSE, takes a more proactive approach by focusing on maximising the health and social well being of the population and providing opportunities to plan for better health.

Its primary focus is the promotion and protection of the health of the whole population and/or its subgroups, with particular emphasis on reducing health inequalities. It takes account of all the factors that can influence the health and well being of the population, such as demographics, socio-economic factors, chronic disease, health technology and legislation. It also recognises that everyone has a responsibility to promote and protect their own health.

With a Population Health approach the opportunities to sustain a healthy population can be increased when resources are rebalanced towards reducing health and social inequalities and disease prevention. Experience elsewhere suggests that this approach is likely to be the least expensive model in the long run.

### 6(b).4 Health Promotion

During the consultation process, health promotion was identified as a key factor for bone health and fracture prevention. Health Promotion involves the promotion of good health for the whole population with a specific emphasis on sub-groups in the population. It contributes in many ways to the prevention of osteoporosis such as nutrition, physical activity, smoking cessation and alcohol awareness. Health promotion reaches a wide range of audiences from children to older people and across many settings from schools to work places, third level colleges, communities and health services.

Health promotion interventions are based on evidence based practice and are undertaken in the context of a broad socio-ecological approach with a strong focus on evaluation (process, impact and outcome evaluation). Strong emphasis is placed on developing the research base supported by academic colleges/institutions. Much of the work is undertaken in partnership

with others within the Health Services and with other sectors. Patient representative groups, such as the Irish Osteoporosis Society also provide information to the public and raise awareness of the condition.

Health promotion seeks to systematically address all pillars of the Ottawa Charter in its work through:

- supporting development of healthy public policies at all levels
- creating supportive environments for health in all settings
- developing personal skills of individuals and communities
- supporting reorientation of health services through provision of support and training to facilitate integration of health promotion into service delivery at all levels
- supporting communities to develop healthier communities using a community development approach.

### 6(b).5 Primary and Community Care

In the consultation process, stakeholders stressed that the development of Primary Care multidisciplinary teams was of key importance to improve the prevention and management of osteoporosis. Primary Care multidisciplinary teams including GPs, nurses and allied health professionals require access to diagnostics to enable comprehensive care to be delivered in the community. Primary Care is the appropriate setting to meet 90-95% of all health and personal social service needs. Osteoporosis is most appropriately managed in primary care. GP services to 'public' patients are provided under a variety of contracts including the General Medical Services (GMS) contract. Approximately 70% of the population access general practice services as private patients and pay the practice directly for these services.

Approved prescribed medicines are free of charge for medical card holders. People with certain long-term illnesses may get the approved prescribed medicines for those illnesses free of charge. Under the Drugs Payment Scheme,

no person or family unit should currently have to pay more than €90 per calendar month for approved prescribed medicines. Physiotherapy and occupational therapy services are provided in the community and are generally free. However, waiting lists operate in many areas.

### 6(b).6 Acute Health Care

Consultant led multidisciplinary teams were identified as being essential for the delivery of a multi-disciplinary service and to facilitate integration between health care settings. While the service can be led by different specialists (depending on patient characteristics), the geriatrician was most often suggested as being the ideal leader of the service.

Some of the services involved in the treatment and management of osteoporosis (and its consequences) in secondary care include:

#### Emergency Department

Ireland has 53 acute hospitals, which vary greatly in size, type, number of specialties and activity levels. Of the 53 acute hospitals, 37 have ED departments. Patients who suffer a fracture will commonly present at an ED department for treatment/assessment and may be referred to a number of specialist services within the hospital or at another hospital setting.

#### Geriatrics

Geriatrics is the branch of medicine that focuses on the prevention and treatment of disease and disability in later life. In Ireland, geriatricians are largely based in secondary care settings, while a small number focus on community geriatrics. Specialised geriatrics services include orthogeriatrics (close cooperation with orthopedic surgery and a focus on osteoporosis and rehabilitation), psychogeriatrics (focus on dementia, depression and other conditions common in the elderly), and rehabilitation. A number of geriatricians in Ireland specialise or express a particular interest in the area of falls and bone health. The majority of older people who require secondary care as a result of a fall will be treated by a hospital based geriatrician.

#### Rheumatology

Rheumatology is the medical speciality concerned with the study, diagnosis and treatment of conditions of the joints muscles and bones. Musculoskeletal conditions treated by rheumatologists range from back pain to auto immune diseases such as rheumatoid arthritis and degenerative diseases such as osteoarthritis and osteoporosis.

#### Orthopaedics

Orthopaedic surgeons address many musculoskeletal ailments, most notably arthritis, trauma (including low impact fractures caused by bone fragility/osteoporosis) and congenital deformities using both surgical and non-surgical means. Patients who present with a fracture in any of Ireland's acute ED services may require admission to orthopaedic services.

### 6(b).7 Specialist Services

#### Fracture Liaison Services

Fracture liaison services are a relatively new development in Ireland. Services have been developed in a number of hospitals including St James's Hospital, Dublin, Waterford Regional Hospital, Merlin Park, Galway, Sligo General Hospital, and St Vincent's University Hospital, Dublin.

A Fracture Liaison Services (FLS), led by a Clinical Nurse Specialist, is a well-established model that ensures a high level of communication and continuity of care, with cost-effective targeting of therapy. Stakeholders proposed that a dedicated Fracture Liaison Service should be available in any hospital to which a patient presents with a fracture. Where patients are transferred from an ED at one hospital to a centralised fracture clinic elsewhere, the FLS should be located at the centralised site. The FLS carries out a bone health assessment and offers treatment and lifestyle advice. Connecting services i.e. primary care teams, community services and hospital services are essential for providing continuity of care.

### Dual Energy X-ray Absorptiometry (DXA)

Bone Mineral Density (BMD) testing is the gold standard for diagnosing osteoporosis and low bone mass. BMD should normally be measured by DXA scanning performed on two sites, preferably anteroposterior spine and hip. DXA is recommended for individuals with key clinical risk factors to confirm whether treatment is required.

International guidelines promoting a selective case find strategy for identifying patients with osteoporosis suggest a minimum 1,000 DXA scans are needed per 100,000 population where targeted high risk assessments for osteoporosis is employed. This means that in the Irish population of 4.2 million people, 42,000 are needed per year. The capacity to promote this service already exists.

Research was commissioned to provide a baseline view of current DXA services in Ireland, Technical Report 3. This suggests that there is wide variation in the provision and use of DXA scanners throughout the country. 59 sites were identified as having a total of 61 DXA scanners

in full or partial operation. Two additional sites awaited service development. The total number of reported scans in 2006 exceeded 70,000. The total number of scans reflects a mix of public and private patients, repeat scans, those referred for a scan by a clinician and patient self referrals.

Funding and access to services also varied throughout the country. Of 59 scanners in operation 9 were publicly funded, 13 were funded by a mix of public and private investment and 36 were funded exclusively by private means (1 non respondent). Of 53 respondents providing details of waiting times, 34 providers predominantly operating in the private sector were able to perform DXA scans upon request. Waiting times for scans in the acute/specialist regional hospital settings ranged from one week to 52 weeks depending on urgency and other factors with an average national waiting time of approximately 20 weeks in hospital settings.

It is clear that referral and utilisation protocols are needed to reduce this inequity of access and to improve case finding and patient outcomes.



# Chapter 7

Best Practice Guidelines to Prevent  
and Manage Falls and Fractures  
in an Ageing Population

# 7. Best Practice Guidelines to Prevent and Manage Falls and Fractures in an Ageing Population

## Introduction

An evidence based approach to the prevention of fall related injury in our ageing population should result in a reduction in morbidity and mortality and increased quality of life.

Evidence-based approaches to the management of falls and osteoporosis have become more standardised in recent years, yet awareness and implementation vary. Many health personnel have limited access to the training and tools they need to effectively identify and manage people at risk.

The goal of evidence based guidelines is to optimise assessment and intervention and to develop a uniformly high quality, standardised approach to management. The WHO recommends that guidelines are adapted to meet the challenges of specific health care systems so as to increase the sense of ownership and relevance among stakeholders.

The National Steering Group assessed guidelines on falls and osteoporosis/fracture prevention. This chapter is divided into two sections:

- Section 7(a) outlines guidelines in relation to assessment and multifactorial intervention for people who have fallen or who are at risk of falls. This section includes reference to the environmental aspects of falls prevention and the impact of the built environment on people at risk of falling.
- Section 7(b) outlines guidelines on the prevention, treatment and management of poor bone health/osteoporosis and includes reference to proposed models of care in relation to fracture liaison services, self management and chronic care management.

## 7(a). Best Practice Guidelines to Prevent and Manage Falls in Older People

### Key Points

- **All older persons should be asked the following at least once a year:**
  - **Have you fallen during the past year? If yes, did you fall more than once?**
  - **Have you any problems with your balance?**
  - **Are you afraid of falling?**
- **Older persons who have had a single explained fall should be tested for gait and balance annually.**
- **Older persons who:**
  - **have recurrent falls (2 or more in the last year)**
  - **had an unexplained fall**
  - **have problems with gait and balance or**
  - **have a fear of falling****should undergo a multi-factorial assessment carried out by an experienced clinician.**
- **Following a multi-factorial assessment older people should receive a tailored multi-factorial intervention as clinically indicated.**
- **Communication with other public sector bodies is essential to ensure necessary changes are made in the environment to reduce risk and promote safety.**

### 7(a).1 Introduction

Intervention programmes based on evidence-based guidelines can prevent falls and fall related injuries in older people. In recent years the key guidelines, that have underpinned all others, were those produced jointly by the American Geriatric Society (AGS), British Geriatric Society (BGS) and The American Academy of Orthopaedic Surgeons in 2001<sup>1</sup>. These were used by NICE as a basis for their 2005 evidence based guidelines<sup>2</sup> and are currently under review

again by AGS/BGS taking account of more recent research including Cochrane<sup>3</sup>.

The overall goal of these guidelines is to optimise and standardise assessment and intervention so as to reduce the incidence of falls in older people. The vision is that the guidelines will result in effective, evidence-based, fall services whereby health care workers across diverse settings will screen individuals for falls risk using generic criteria at multiple points of access. All people identified at risk will be offered a multi-factorial



**Table 7(a).1: Key Elements Addressed by the Guideline for Prevention of Falls**

- All older persons who are under the care of a health professional (or their caregivers) should be asked at least once a year about falls.
- This 'screening' for falls should include questions about fall(s), fear of falling, frequency of falling, and difficulties in gait or balance
- A fall risk assessment should be performed for older persons living in the community who:
  - Report recurrent (2 or more) falls in the past year
  - Report difficulties with gait and balance; or
  - Report fear of falling; or
  - Present seeking medical attention because of a fall.
- Gait and balance deficits should be evaluated in an older person reporting a single fall.
- A falls risk assessment followed by intervention to modify the identified risk (deficit) is the most effective strategy to reduce both the risk of falling and incidence of falling in older persons.
- Strategies that combine interventions targeted at more than one risk factor reduce falls.
- Risk factors and interventions that have been shown to reduce falls and should be included in multifactorial assessment and intervention are:
  - Individualised exercise programme that includes a combination of resistance (strength) training, gait, balance, and co-ordination training
  - Medication review and withdrawal of psychotropic and other medications
  - Home environment assessment and modification, carried out by a health care professional.
  - Managing postural hypotension.
  - Vision assessment and referral for intervention
  - Assessment for Vitamin D deficiency and insufficiency and treated if identified
  - Identification of foot problems and appropriate treatment
  - Behavioural modification and educational programmes should be considered

The Guideline is shown in the falls algorithm across together with details in boxes 1-4, section 7(a).3.

assessment and tailored interventions. These in turn will reduce falls and maximise functional and quality of life outcomes.

The guidelines produced here are based on a number of key publications on falls prevention. Information from the AGS/BGS guidelines<sup>1</sup>, the NICE guidelines<sup>2</sup> and Larsen et al was used to form the basis of the following guidelines. Authors from the AGS/BGS guidelines and Larsen et al were consulted and permission was granted for use of their materials. Members of the steering committee were consulted to ensure that all professions were appropriately represented.

A review of the current literature and standards regarding environmental safety was also conducted (Technical Report 4). This included an exploration of safety measures recommended for public transport, housing, community design and public areas. The responsibility for many of these recommendations lies with bodies outside of health sector, but are pertinent to falls prevention.

For this Guideline the target populations are older persons living in the community or in long-term residential facilities. The principle outcome is elimination or reduction of falls. The key elements of the Guideline are shown in Table 7(a).1.

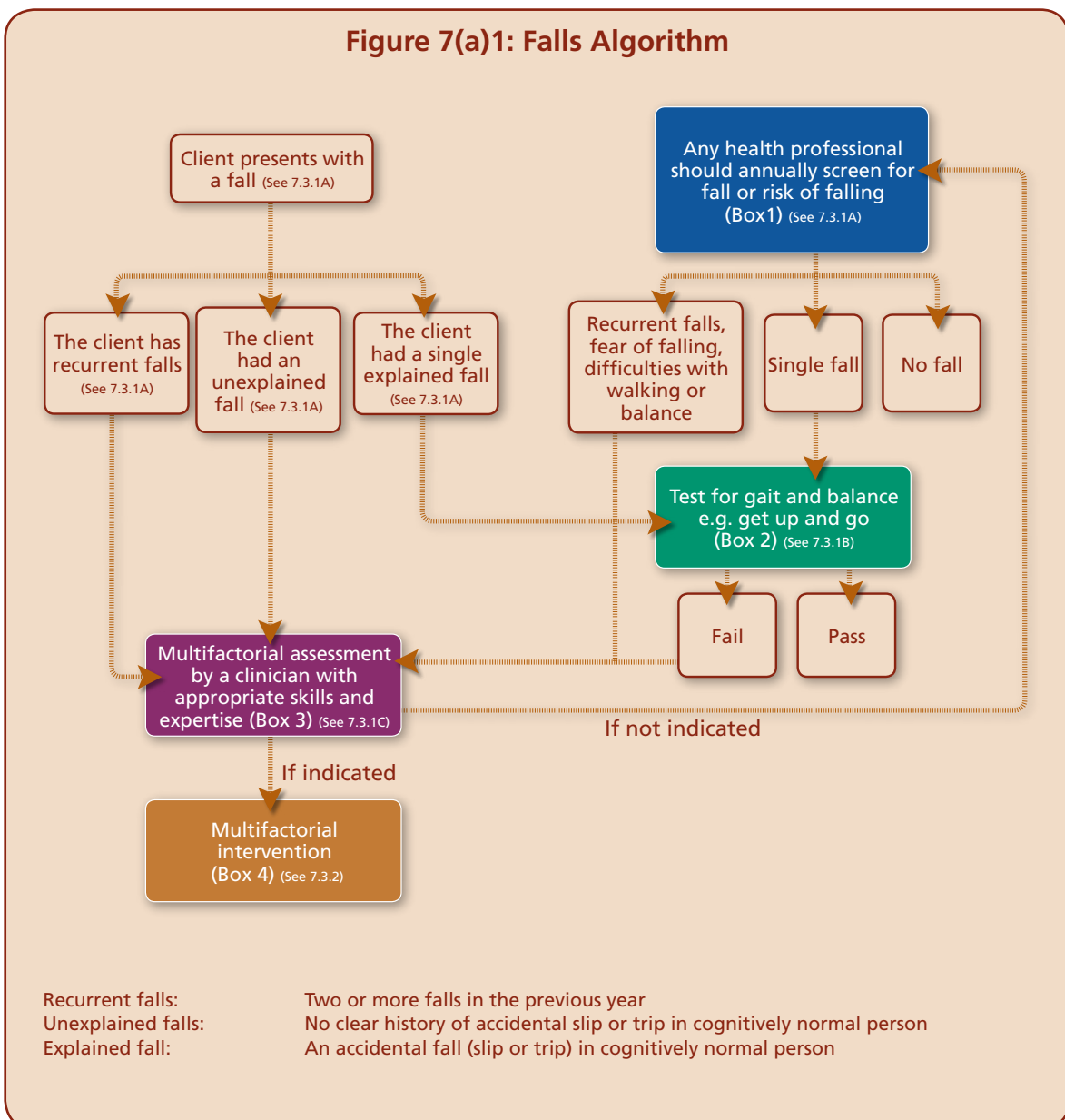
In preparing this guideline the following was undertaken:

- The intervention strategies evaluated were classified as either single or multifactor strategies and as generic or individually designed<sup>1</sup>.
- Management options were considered in relation to the setting of patient care e.g., community, long-term care facility, acute hospital.
- Other potential interventions such as bone strengthening measures, cardiovascular

interventions, visual interventions, footwear interventions and restraints were considered.

- As assessment of risk factors for falls and/or a history of falls is a prerequisite to intervention.
- Details of Evidence for interventions grades are in Appendix 6.

The Guideline is shown in the falls algorithm below together with details in boxes 1-4, section 7(a).3 on the following pages.



**Box 1****'Screen' for Fall or Risk of Falling**

- Client and / or carer is asked if the client has fallen in the past year
- If a client has fallen they and/or their carer are asked about the frequency and characteristics of their fall(s)
- Client is asked if they have a fear of falling
- Client is asked if they have experienced difficulties in walking or with their balance

**Box 2****Test for Gait and Balance*****Get up and go***

The client is asked to do the following:

- Sit in a chair
- Get up without using their arms or any other device.
- Take several steps
- Return to the chair
- Sit back down without using their arms or any device

The test should be completed within 14 seconds

Other tests with proven validity may be used.

**Box 3****Multifactorial Assessment**

- Identification of falls history
- Review of medication(s) and their dose(s)
- Assessment of gait, balance and mobility and lower extremity joint function
- Assessment of endurance
- Assessment of osteoporosis risk
- Assessment of vision
- Examination of neurological function, muscle strength, proprioception, reflexes and tests of cortical, extrapyramidal and cerebellar function
- Assessment of cognitive function
- Screening for depression
- Assessment of postural blood pressure
- Assessment of heart rate and rhythm and evidence of structural heart disease
- Assessment of heart rate and blood pressure responses to carotid sinus stimulation if appropriate
- Assessment of home hazards
- Assessment of the older person's perceived functional ability and fear relating to falling
- Assessment of urinary incontinence
- Assessment of Vitamin D deficiency
- Assessment of foot problems and footwear

### Box 4

The multifactorial intervention includes assessment of known fall risk factors and management of those risk factors identified in the multifactorial assessment (A)\*

#### Multifactorial Intervention

- Withdrawal or minimisation of psychoactive medications
- Withdrawal or minimisation of other culprit medications
- Gait, strength and balance training
- Prescription and teaching in the use of assistive devices and Occupational Therapy
- Treatment of osteoporosis
- Management of visual abnormalities
- Management of neurological disorders
- Management of cognitive impairment
- Management of depression
- Management of postural hypotension
- Management of other cardiovascular abnormalities
- Adaptation or modification of home environment
- Management of functional disability
- Management of fear of falling
- Management of urinary abnormalities
- Assessment of Vitamin D deficiency
- Management of foot problems and footwear
- Management of other relevant acute or chronic medical conditions.

\* Evidence see Appendix 6

### 7(a).3 Recommendations

The assessment of falls risk and the effectiveness of interventions (single and multifactorial) is affected by the person's cognitive status, as some interventions are less effective, particularly if adherence is limited. Assessment of falls risk should include use of a standardised tool to detect cognitive impairment, and the application of these recommendations tailored to the individual accordingly.

#### 7(a).3.1 Initial Assessment

7(a).3.1.(A) Screen for fall or risk of falling (Box 1)

- Older persons should be asked routinely whether they have fallen (in the past year). The majority of 'opportunistic screening' will take place in Primary Care.
- Older persons, who fell, should be asked about frequency, and characteristics of their fall(s).

- Older persons should be asked if they fear falling.
- Older persons should be asked if they experienced difficulties in walking or balance.

7(a).3.1.(B) Follow-up evaluation for a single fall (Box 2)

- Evaluation for gait and balance should be performed for older people presenting with a single fall. People demonstrating no difficulty or unsteadiness in the evaluation need no further assessment.

7(a).3.1.(C) Indications for falls risk assessment (Box 3)

- A fall risk assessment should be performed for older people who present for medical attention because of a fall, report recurrent falls in the past year, report difficulties in walking or balance or fear of falling.

- A fall risk assessment should be performed for older people who show unsteadiness or difficulty performing a gait and balance test.
- A fall risk assessment should be performed for all older people in long-term residential facilities.
- The falls risk evaluation should be performed by a clinician with appropriate skills and experience [C]\*.
- The falls risks assessment should be followed by direct intervention on the identified risk [A]\*.

\*Evidence see Appendix 6

### 7(a).3.2 Multifactorial Interventions (Box 4, Appendix 2)

#### 7(a).3.2.(A) Older person living in the community

A multifactorial intervention strategy includes assessment of known fall risk factors and management of the risk factors identified. The health professional or team conducting the falls risk assessment should either implement the interventions or assure that the interventions are carried out by the health professionals to whom the older person is referred. There is insufficient evidence to recommend for or against multifactorial interventions in older person with known dementia living in the community<sup>1</sup>.

#### 7(a).3.2.(B) Older person in long-term residential facilities

A multi-factorial intervention strategy for older person residing in long-term residential facilities should be essentially the same as for the older person living in the community with the inclusion of staff training and feedback [C]\*. There is insufficient evidence to support multifactorial interventions for the older person with known dementia in long term residential facilities<sup>1</sup>. Staff training and feed back to patients should be considered as part of multifactorial intervention in long-term care settings

### 7(a).4 The Environment

There are a number of plans being implemented in Ireland today to reduce risk and increase accessibility and safety for everyone. Work is

currently being undertaken in public transport, the built environment and residential care settings. Good design models that promote safety both in the home and the community at large are also outlined<sup>4</sup>. A report on Environmental Factors in Fall Prevention was undertaken, Technical Report 4.

#### 7(a).4.1 Public Transport

The Department of Transport Sectoral Plan (2006) is a 10 year transport investment strategy. As part of this strategy, accessible transport for people with mobility, sensory and cognitive impairments is to be achieved in two principle ways. Accessibility will be built into new transport infrastructural projects and the acquisition of accessible rolling stock and buses as a matter of course. In addition, funding will be provided to enable the phased adaptation or retrofit of existing transport infrastructure and facilities.

#### 7(a).4.2 The Built Environment

The primary aim of building regulations in Ireland is to provide for the health, safety and welfare of people in and around buildings. Part M requirements, entitled *Access for People with Disabilities* were introduced in 1992. This contains the requirements that must be adhered to so that people with disabilities can safely and independently access and use buildings. The *Review of the Effectiveness of Part M of the Building Regulations* found inspection levels varied greatly across local authorities (Rogerson et al., 2005). The review found low compliance with 'visitable' requirements and considered a range of factors (i.e. car parking, external access routes, ramps, entrance doors, steps and stairs, internal circulation, sanitary arrangements, communications and signage).

The Disability Act (2005) adopts a broader definition of disability than that assumed by Part M of the Building Regulations and includes those with mobility problems, those with intellectual disabilities or mental health problems and those with impaired sight, vision or hearing. Part 3 of the Disability Act (sections 25-28) requires Government Departments, public bodies and local authorities, to ensure the services and information for which they hold responsibility are accessible by people with disabilities, including accessible streets and footpaths, by 31<sup>st</sup>

December 2015. The Act places an obligation on six Government Departments (Health and Children/Social and Family Affairs/Transport/Communications, Marine and Natural Resources/Environment, Heritage and Local Government/Enterprise, Trade and Employment) to prepare sectoral plans detailing how they will deliver specific services for people with disabilities.

The Department of Environment, Heritage and Local Government (July 2006) contains a number of important targets in relation to housing and the legislative and regulatory framework. Specific targets set by the Department include:

- Review Part M of the Building Regulations and to prepare proposals to amend Part M and associated Technical Guidance Document (TGD) M by 2007;
- Enact the Building Control Bill, which will introduce the Disability Access Certificate, by 2006;
- Issue final Development Plan and Development Management Guidelines by 2006-2007, following public consultation;
- Publish the revised and updated Standards for Site Development Works for Housing Developments and Sustainable Urban Housing Guidelines for public consultation by 2007;
- Develop a National Housing Strategy for People with Disabilities by end 2009;
- Publish best practice advice on housing design approaches by mid 2007.

The Sectoral Plan also stresses the importance of lifetime adaptable housing stating (4.9.3, page 36) that 'the aim should be to ensure that dwellings can meet the changing needs of occupants over their lifetimes'. Additionally, all local authorities are required to draw up an implementation plan (within nine months of the statutory approval of the Sectoral Plan) on the basis of a detailed accessibility audit of all public buildings, amenities, open spaces, etc.

In order to support the development and provision of accessible buildings and external environments in Ireland, the National Disability Authority (NDA) published *Building for Everyone: Inclusion, Access and Use (NDA, 2002a)*. Findings in a recent report of the United Nations Special

Rapporteur on Disability (2006) showed that just over half of all the countries that participated in its survey have developed legislation dealing with the accessibility of the built environment. In order to improve this situation, the International Organization for Standardisation (ISO) is currently developing an International Standard on the Accessibility and Usability of the Built Environment. The ISO has set up a Committee of experts in this area to draft this International Standard. The National Standards Authority of Ireland (NSAI) has a participant status on this Committee and it has established its own Accessibility for All Consultative Committee.

### 7(a).4.3 Residential Care Settings

The importance of the environment in residential care settings is highlighted by research carried out in the UK that found significant positive associations between several aspects of the built environment and residents quality of life<sup>5</sup>.

In Ireland, the legislative framework for control of the environment in long term-care settings is contained in the Health (Nursing Homes) Act 1990, the Nursing Homes (Care and Welfare) Regulations 1993 and the Building Control Act 1990. Responsibility for control currently rests with local authorities and the HSE in the four administrative areas. The Department of Health and Children is currently in the process of creating a uniform set of criteria for standards of residential care for older people to be administered by the Health Information and Quality Authority (HIQA), incorporating a new inspectorate and registration authority for residential services. For the first time, there will be an inspectorate for all nursing homes both public and private. The overall aim is to ensure that the standards set are applied consistently and on a national basis.

### 7(a).4.4 Models of Good Design

#### *Lifetime Homes/Adaptable Homes Model*

The Lifetime Homes concept has sixteen design features to ensure a new house or flat will meet the needs of most households. The emphasis is on accessibility and design features that make the home flexible enough to meet whatever comes along in life.

### *Universal Design*

Universal design promotes a broad approach to design based on the principle that products, buildings and exterior spaces should be designed to be usable by all people to the greatest extent. So, for example, universal design recognises that lack of colour contrast can create problems for people with sensory impairments, disorientation problems, and dementia when trying to find their way.

### *Safe Communities*

The Safe Communities Model (promoted by the WHO Collaboration Centre for Community Safety Promotion) creates an infrastructure in local communities to address injury prevention and safety promotion through collaboration and partnerships. It recognises that unsafe neighbourhoods constrain the opportunities for older people to participate actively in the life of the community, making them feel isolated and impacting on their quality of life.

### References

1. American Geriatrics Society, British Geriatrics Society and American Academy of Orthopaedic Surgeons Panel on Falls Prevention. *JAGS* 2001; **49**:664-672.
2. Clinical Practice Guidelines for the Assessment and Prevention of Falls in Older People. Commissioned by the National Institute for Clinical Excellence, November 2004. <http://guidance.nice.org.uk/CG21>
3. Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH. Interventions for preventing falls in elderly people. *Cochrane Database of Systematic Reviews* 1997, Issue 4. Art. No.: CD000340. DOI: 10.1002/14651858.CD000340
4. Bond R. et al. Submission of the Environmental Working Group: Strategy for the Prevention of Falls and Fractures in an Ageing Population, 2007 (In Press).

## 7(b). Best Practice Guidelines to Prevent and Manage Osteoporosis and Fractures

### Key Points

- The WHO recommends that guidelines for the prevention and management of osteoporosis and fractures should be customised to different health care systems.
- This chapter presents Guidelines on the Prevention, Treatment and Management of Osteoporosis:
  - Prevention includes health promotion, primary and secondary prevention
  - Treatment includes pharmacologic and non-pharmacologic interventions
  - Management includes post fracture care, rehabilitation, chronic illness management and self management.
- Prevention should be life long and focus on improving awareness of bone health in particular Calcium and Vitamin D intake, the benefits of physical activity and the risks of smoking on bone health.
- Case finding initiatives are recommended to identify people at high risk of fracture.
- Some pharmacological interventions can be initiated in primary care. Non-pharmacological interventions can reduce the incidence and impact of future fracture.
- Fracture Liaison Services coordinate services in primary and secondary care to manage people who have had a fracture, to diagnose osteoporosis and reduce incidence of further fracture.
- Osteoporosis is a chronic illness. It should be managed in an integrated manner as part of HSE chronic illness services.

### 7(b).1 Review of International Guidelines

Bone health/fracture prevention services require a clear structure, adequate facilities, effective guidelines and mechanisms for monitoring and evaluation<sup>1</sup>. The WHO recommends that

international best practice guidelines should be adapted and used locally to<sup>1</sup>:

- Set standards of clinical care.
- Serve as a basis for audit.
- Improve quality of care and reduce morbidity in those suffering an osteoporotic fracture and those at risk of fracture.



- Provide a starting point in the education of individuals and health care professionals.
- Ensure that all stakeholders are aware of the common goals and methods for the prevention and management of osteoporosis<sup>1</sup>.

### 7(b)1.1 Review Method

International guidelines on the prevention, treatment and management of osteoporosis and low impact fractures, that were developed within the previous five years, were included in a structure review of the evidence.

#### The Guidelines that were reviewed were:

- World Health Organisation, *Prevention and Management of Osteoporosis*, 2003
- American Association of Clinical Endocrinologist, *Medical Guidelines for Clinical Practice for the Prevention and Treatment of Postmenopausal Osteoporosis 2003*
- Osteoporosis Society of Canada, *Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario*, 2003
- National Institute for Health and Clinical Excellence (NICE) *Bisphosphonates (alendronate, etidronate, risedronate), selective oestrogen receptor modulators (raloxifene) and parathyroid hormone (teriparatide) for the secondary prevention of osteoporotic fragility fractures in postmenopausal women*, 2005
- *National Osteoporosis Society, Primary Care Strategy for Osteoporosis and Falls 2002*
- Scottish Intercollegiate Guidelines Network (SIGN), No 71: *Management of Osteoporosis – A National Clinical Guideline Edinburgh*
- National Arthritis and Musculoskeletal Advisory Group (NAMSCAG), *Evidence to Support the National Action Plan for Osteoarthritis, Rheumatoid Arthritis and Osteoporosis*, 2005
- National Osteoporosis Foundation, *Physicians guide to prevention and treatment of Osteoporosis*, 2003

- International Society of Clinical Densitometry *Official Position Statement*, 2005

The review was divided into three sections:

1. 'Prevention' (including primary and secondary prevention)
2. 'Treatment' (including pharmacologic and non-pharmacologic interventions),
3. 'Management' (including rehabilitation, falls prevention, self management).

Three subgroups, drawn from the main osteoporosis group, reviewed the relevant guidelines and agreed on how best they should be adapted for the Irish Health Care system, (see figure 7(b).1

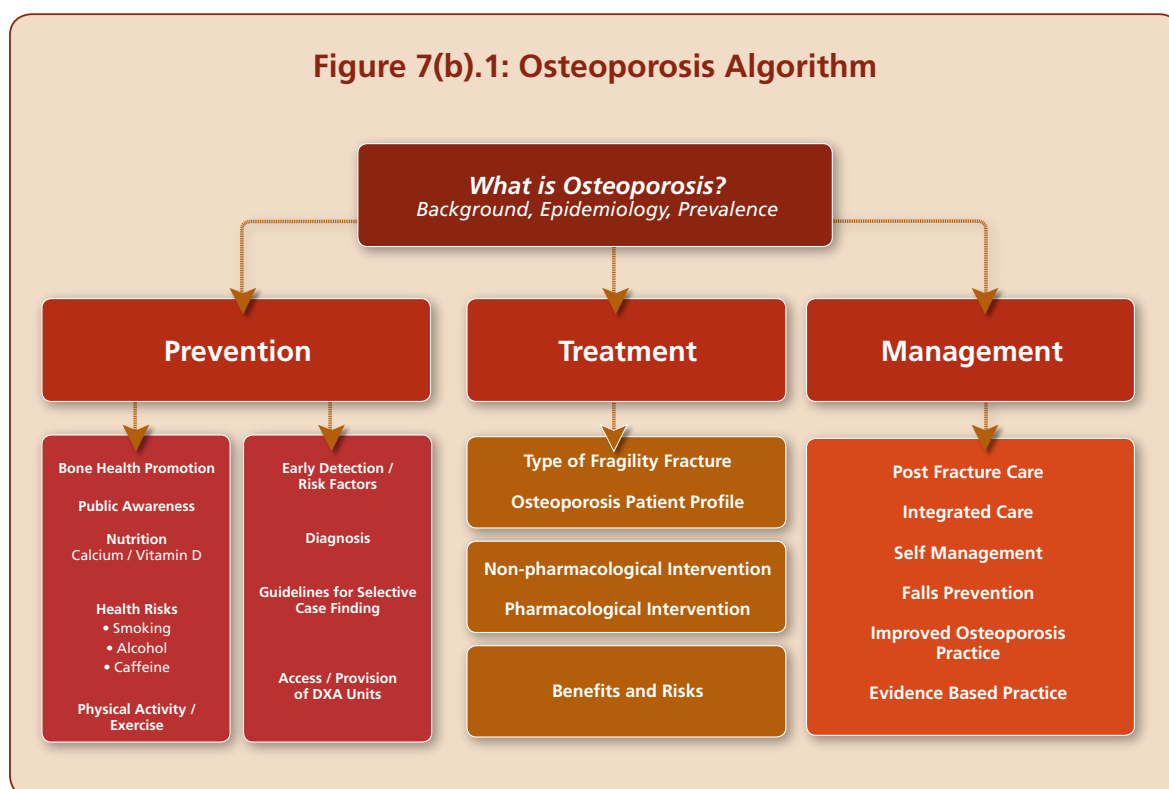
### 7(b).2 Section A - Prevention

#### 7(b).2.1 Health Promotion and Primary Prevention

Health promotion is a process that enables people to increase their control over and improve their health<sup>2</sup>. Prevention must start early and continue throughout life. Activities to prevent osteoporosis must include:

- Education on the importance of bone health and risk factors for osteoporosis / fractures.
- Promoting bone-healthy nutrition.
- Promoting regular physical activity.

As poor bone health can affect men and women of all ages and peak bone mass is a significant factor in the development of osteoporosis in later life, it is essential that health promotion and prevention initiatives are targeted at all age groups.



Childhood and Adolescence are critical years for bone growth. Primary osteoporosis prevention programmes during these years can have life-long benefits. Osteoporosis is a paediatric preventable disease<sup>2</sup>. Strategies to deliver primary prevention for children include:

- Development of nutrition/physical activities programmes.
- Development of school-based initiatives. As children and adolescents spend a significant amount of time in school, it is important that the school environment supports bone health.
- Development of bone health programmes<sup>2</sup>.

Young adulthood is the period of bone consolidation. The rate of bone growth declines from what it was during adolescence but bone loss has yet to begin. Healthy nutrition and regular osteogenic activity at this time of life can promote bone consolidation and prevent premature bone loss<sup>3</sup>.

In relation to older adults who are at low risk, lack of awareness means that many of these older adults are missing valuable low-cost opportunities to prevent osteoporosis. Most low-risk adults have at least two modifiable risk factors for poor

bone health e.g. inadequate intake of Calcium and low levels of physical activity<sup>2</sup>. Osteoporosis prevention programmes for low-risk adults should:

- raise awareness about the importance of bone health and the prevention and diagnosis of osteoporosis.
- collaborate with existing health promotion programmes for adults to improve nutrition, particularly adequate intake of Calcium and Vitamin D and promote higher levels of regular physical activity, particularly weight-bearing exercise that stimulates bone growth<sup>2</sup>.

In relation to older adults at high risk, prevention programmes to reduce the burden of osteoporosis should:

- be part of existing chronic disease prevention/health promotion programmes aimed at post-menopausal women/older people, including nutrition, physical activity and falls prevention strategies.
- develop osteoporosis-specific prevention programmes designed to prevent and detect osteoporosis and promote self-management as part of chronic illness programmes.

- develop public education programmes to promote early detection so that older adults with osteoporosis are diagnosed at a stage in the disease when they can be treated effectively. Comprehensive, multifaceted public education that targets high-risk populations has the potential to increase knowledge, change attitudes and promote behaviours that contribute to bone health (e.g., healthy eating, regular physical activity and self-management)<sup>2</sup>.

As many of the behaviours that promote bone health, such as healthy eating and regular physical activity, also prevent other chronic diseases, osteoporosis prevention efforts will also enhance general health promotion activities<sup>2</sup>.

## Nutrition

For most people, the essential elements for bone health (i.e. protein, Calcium, Vitamin D, phosphorus, magnesium and other minerals) can be obtained from a healthy, balanced diet. Two elements – Calcium and Vitamin D – are critical to good bone health. Calcium helps to build bones and Vitamin D helps the body to absorb Calcium. In fact, without Vitamin D, the body cannot use the Calcium in the foods we eat<sup>2</sup>.

## Calcium

Calcium comes mainly from food, particularly milk and other dairy products. The Food Pyramid recommends that children and adults consume three servings from the milk group of foods daily, while teenagers and pregnant women need five. One serving is equal to:

- A glass of milk (any type)
- A carton of yogurt
- One ounce of hard cheese

Dairy foods are the richest source of Calcium in the diet and consuming 3 servings a day will help meet Calcium needs. In Ireland, however, Irish women consume, on average, just 1½ servings daily (Irish men consume 2½). The National Children's Food survey found that 28% of boys and 37% of girls aged 7-12 years consume less than the average daily requirement for Calcium. In women the figure is 36%. Calcium supplementation may be considered on an individual basis if required to achieve the recommended daily intake levels.

The perceived incidence of food allergy is significantly higher than the actual allergy. In reality, about 3% of adults and approximately 5% of children have a genuine food allergy<sup>4</sup>. It is important that any allergy be correctly diagnosed to avoid following unnecessarily restrictive diets.

The recommended daily allowance (RDA) for Calcium varies in different countries. In Ireland, the RDA is outlined in the Food Safety Authority of Ireland's report 'Recommended Dietary Allowances for Ireland, 1999'. These recommendations fall within accepted international guidelines for the daily intake of Calcium to promote bone health<sup>2</sup>. The RDA for Ireland is:

**Table 7(b).1: RDA Calcium by Age Group**

Age Group	Calcium mg/day
0-10	800
11-17	1200
18 – 64	800
65 +	800
Pregnancy	1200
Lactating*	1200

*\*Second half of pregnancy;  
First six months of lactation.*

## Vitamin D

Vitamin D is not widely available in natural food sources. It is primarily found in fish oils (including cod liver oil), some vegetables, fortified milk, cereals, and breads. Although Vitamin D can be obtained from some foods, people can obtain as much as 80% - 90% of their Vitamin D requirements from exposure to sunlight<sup>2</sup>. However, with Ireland's northerly latitude we cannot rely on sunlight as a main source of Vitamin D. Insufficient intake of Vitamin D is a concern for older people because the ability of the skin to synthesize the Vitamin declines with age and because some older people, especially those in long-term care facilities, have minimal exposure to sunlight.

Everyone over 65 years of age should aim to take 10µg (400IU) daily of Vitamin D. For the majority of people this can only be achieved by Vitamin D supplementation. To prevent insufficient Intake of Vitamin D among those at risk, such as in the case of housebound/people in residential care, a Vitamin D supplement of 20µg (800IU) is the recommended dose<sup>2</sup>. The recommendations from 'Recommended Dietary Allowances for Ireland' (FSAI 1999) are as follows:

**Table 7(b). 2: RDA Vitamin D by Age Group**

Age Group	Vitamin D IU/day
1-3	400
4-11	0-400
11-17	0-600
18-64	0-400
65+	400
Pregnancy	400
Lactating	400

In Irish adults the average daily intake of Vitamin D is 3.7 and 3.4µg per day in men and women respectively (136/148IU). In general intake in all ages, including children, pregnant women and older people are low. Some foods such as milk, yogurt, margarine, oil spreads, breakfast cereal, pastries, and bread are fortified with Vitamin D2. Expert advice suggests that cholecalciferol (Vitamin D3) is the preferred form for the purposes of fortification. The North/South Ireland Food Consumption survey found that natural sources of Vitamin D including fish and eggs contribute to 57% of dietary intake. Natural sources of Vitamin D include:

- Oily fish (sardines, salmon, mackerel)
- Liver
- Egg yolk
- Fortified milk
- Cereals
- Margarines.

### Alcohol

Evidence for alcohol as a risk factor for low BMD is inconsistent, as the majority of studies do not include subjects with excessive alcohol intake. Studies of people dependent on alcohol have suggested that high levels of consumption may be detrimental to bone, possibly as a result of protein and Calcium metabolism, mobility, gonadal function and a direct toxic effect on the osteoblast<sup>6</sup>. However, moderate consumption of alcohol has not consistently been linked with increased risk of fracture or reduced bone density.

Nonetheless, excessive intake of alcohol is not recommended. Alcohol increases the risk of falls and subsequent injury including fracture. The Department of Health and Children recommends the following guidelines for the consumption of alcohol:

Men: 21 standard drinks (@10g = 210g/week)

Women: 14 standard drinks (@10g = 140g/week)<sup>5</sup>  
(Not breastfeeding or pregnant)

### Smoking

Smoking is a risk factor for fracture. Cigarette smokers tend to be thinner, undergo earlier menopause, have increased catabolism of endogenous oestrogen, and experience more fractures<sup>7</sup>. Studies have shown that bone mineral density in smokers are 2% lower with each increasing decade after the menopause than with non-smokers with a 6% difference at 80 years. Men who smoke show greater loss at the trochanter. Female smokers have been shown to be at greater risk of hip fracture than non-smokers, with the risk increasing in line with consumption. The level of risk declines on quitting smoking but is not significantly reduced until 10 years after cessation<sup>8</sup>.

Advice regarding smoking cessation and safe drinking should always be given, not only because there is good evidence that these behaviours can increase the risk of fracture but also because, as with all the modifiable lifestyle factors, there is secondary gain for other conditions e.g. coronary heart disease and cancer<sup>9</sup>.

### Caffeine / Carbonated Drinks

It is frequently suggested that carbonated drinks or beverages containing caffeine are damaging to bone health. International guidelines recommend that individuals should avoid excess caffeine intake (more than four cups of coffee per day)<sup>8</sup>. There is mounting evidence that carbonated drinks are displacing dairy (milk) intake particularly among young people, thus reducing daily intake of Calcium necessary to promote and maintain bone health<sup>10, 35</sup>.

### Physical Activity

Epidemiological studies suggest a link between physical inactivity, bone mineral density and fracture risk<sup>11</sup>. Physical activity is associated with a reduced risk of minimal trauma fracture in women, however no randomised controlled trials of exercise with fracture as the end point have been conducted<sup>12</sup>. While it is unclear how many fewer fractures would result from a community-based exercise campaign, exercise confers a range of health benefits. Physical activity is important for bone health and increases muscle strength, balance and coordination. Exercising from a young age contributes to bone mass during growth, and continuing to exercise minimises bone loss later in life. Walking, aerobic exercise and resistance exercises are the best forms of activity to prevent osteoporosis<sup>13, 1</sup>. The current recommendation in Ireland is that every adult should accumulate at least 30 minutes of moderate intensity physical activity on most days. However 6 out of 10 Irish people do not take enough activity for health benefits<sup>14</sup>.

#### Type of activity

Resistance training can be classified as either low and moderate to high. Low intensity resistance training is usually referred to as *muscular endurance* training. Moderate to high resistance training is known as *strength training*. In order to produce gains in BMD resistance the training needs to be of the moderate to high intensity category. Furthermore, any form of strength training should be site specific i.e. targeting areas such as the muscle groups around the hips, the quadriceps, dorsi/plantar flexors, rhomboids, risk extensors and back extensors<sup>8</sup>.

There is mounting evidence to suggest that physical exercise reduces the risk of falling in

older people. Gait training, appropriate use of assistive devices and exercise programmes with balance training are key components of exercise programmes for community dwelling older people<sup>8</sup>.

### 7(b).2.2 Early Detection of Osteoporosis – Case Finding Approach

Bone mass is lost in the ageing process<sup>2</sup>. Early detection of osteoporosis is an important part of effective secondary prevention. Early detection and effective treatment can significantly reduce the impact of osteoporosis and improve quality of life<sup>2</sup>.

A case finding approach to identify people at high risk of osteoporosis is recommended<sup>15</sup>.

The presence of one or more of the follow criteria suggests referral for BMD testing:

Men and women with:

- Previous low trauma fracture;
- X-ray evidence of osteopenia;
- Corticosteroid use (i.e. prednisolone for three months or more);
- Family history of osteoporosis (especially maternal hip fracture);
- Other clinical risk factors: height loss, kyphosis, low Body Mass Index (<19 kg/m<sup>2</sup>);
- Possible secondary osteoporosis: primary hyperparathyroidism, poorly controlled thyrotoxicosis, malabsorption, rheumatoid arthritis, liver disease, alcoholism, primary hypogonadism.

Women with:

- Untreated oestrogen deficiency (surgical or natural menopause <45 years, secondary amenorrhoea > 6 months not due to pregnancy or primary hypogonadism)<sup>16</sup>.

### Diagnosing Osteoporosis – Skeletal Sites to Measure

The WHO defines osteoporosis in women as a BMD of 2.5 standard deviations or more below

the average for the young healthy female population (T-score). The same absolute BMD value can be provisionally used for men, although data on BMD and fracture risk in men is sparse. It is not possible to use a T-score to assess osteoporosis in children and younger adults. In such cases a Z-score should be used. A Z-score is the number of standard deviations below what is normally expected for someone of similar age<sup>1</sup>. T-scores obtained from different techniques and at different sites cannot be used interchangeably. A “gold standard” for diagnosis should therefore be based on a particular site and technology. Measurements of T-scores at the hip are the best predictors of hip fracture<sup>1</sup>.

Although not part of the WHO classification, the presence of a fragility fracture may also be considered diagnostic for osteoporosis provided other causes of non-osteoporotic fracture have been excluded (such as pathologic fracture). The following guidelines describe the skeletal sites to measure under specified circumstances and are taken from the International Society of Clinical Densitometry guidelines<sup>17</sup>.

Skeletal sites to measure:

- Measure BMD at both the PA spine and hip in all patients.
- Forearm BMD should be measured under the following circumstances:
  - Hip and/or spine cannot be measured or interpreted.
  - Hyperparathyroidism.
  - Very obese patients (over the weight limit for DXA table).

Spine Region of Interest:

- Use PA L1-L4 for spine BMD measurement.
- Use all evaluable vertebrae and only exclude vertebrae that are affected by local structural change or artifact. Use three vertebrae if four cannot be used and two if three cannot be used.
- BMD based diagnostic classification should not be made using a single vertebra.
- If only one evaluable vertebra remains after excluding other vertebrae, diagnosis should be based on a different valid skeletal site.

- Anatomically abnormal vertebrae may be excluded from analysis if:
  - They are clearly abnormal and non-assessable within the resolution of the system; or
  - There is more than a 1.0 T-score difference between the vertebra in question and adjacent vertebrae.
  - When vertebrae are excluded, the BMD of the remaining vertebrae is used to derive the T-score.
  - Lateral spine should not be used for diagnosis, but may have a role in monitoring.

Hip Region of Interest:

- Use femoral neck or total proximal femur, whichever is lowest.
- BMD may be measured at either hip.
- There are insufficient data to determine whether mean T-scores for bilateral hip BMD can be used for diagnosis.
- The mean hip BMD can be used for monitoring, with total hip being preferred.

Forearm Region of Interest:

- Use 33% radius (sometimes called one-third radius) of the non-dominant forearm for diagnosis. Other forearm regions of interest are not recommended<sup>17</sup>.

### 7(b).3 Section B - Treatment

The primary goals for pharmacologic and non-pharmacologic osteoporosis interventions are to:

- Prevent/reduce fractures
- Stabilise or achieve an increase in bone mass
- Relieve symptoms of fractures and skeletal deformity
- Maximise physical function (for example, halt progressive deformity).

The ability to achieve these goals depends on the patient's and the physician's commitment to therapy and the potential for the chosen therapy to yield results<sup>7</sup>. In general, the first choice



therapeutic option is a treatment that is effective in reducing both vertebral and non-vertebral fractures<sup>8</sup>.

### 7(b).3.1 Pharmacological Interventions

The decision to provide pharmacologic interventions for osteoporosis can be taken based on the severity of bone density loss, age and the presence or absence of age independent risk factors<sup>19</sup>. Pharmacologic treatments such as bisphosphonates, strontium ranelate, and Selective Estrogen Receptor Modulators (SERMs) are all suitable for initiation in primary care.

### 7(b).3.2 Anti-Resorptives

#### Bisphosphonates

A bisphosphonate (alendronate, risedronate, ibandronate) can be used as a first-line treatment for osteoporosis<sup>8, 20</sup>.

*Alendronate* and *Risedronate* reduce the incidence of both vertebral and non-vertebral (including hip) fractures in women with established osteoporosis. Alendronate and risedronate are both available as once-daily and once-weekly preparations. The anti-fracture efficacy was proven for once-daily dosing for both medications; once weekly medications were approved following bridging studies that demonstrated identical effect on bone mineral density<sup>20</sup>.

*Ibandronate*, 150 mg taken monthly, is a recently licensed bisphosphonate (September 2005) that may be considered as an alternative to the other daily and weekly bisphosphonate preparations. While proven evidence exists for ibandronate for vertebral fracture prevention, evidence for hip fracture reduction has yet to be confirmed<sup>22</sup>.

All bisphosphonates can cause upper gastrointestinal adverse effects but this side effect is significantly less common in once weekly dosing. In those patients with intolerance to oral bisphosphonates, parenteral bisphosphonate therapy could be considered.

Since September 2006, intravenous *Ibandronate* (3mg injection every 3 months) is approved for use and IV zolendronic acid (5mg yearly) has been proven to be effective though a European license is awaited. (Horizon Study)<sup>23</sup>.

Bisphosphonates should not be given to people who are unable to adhere to the dosing instructions<sup>22</sup>.

#### Selective Estrogen Receptor Modules (SERMS)

*Raloxifene* prevents bone loss in the lumbar spine and proximal femur. A significant reduction in the risk of vertebral fracture has been shown though this has not been demonstrated for hip fracture<sup>22</sup>. Raloxifene should be considered a second line treatment if a bisphosphonate or strontium ranelate is inappropriate or not tolerated. Raloxifene can increase the risk of venous thromboembolism threefold. Raloxifene is not a suitable alternative in older women at risk of non-vertebral fracture<sup>22</sup>.

#### Hormone Replacement Therapy

Recent studies have raised concerns about the safety of hormone replacement therapies (HRT) in the prevention of osteoporosis. If used only for the prevention of post-menopausal osteoporosis, the risks of using HRT may outweigh the benefits and it is not recommended as a first line therapy for the prevention or treatment of osteoporosis<sup>22</sup>.

### 7(b).3.3 Anabolic Treatments

#### Parathyroid Hormone

*Teriparatide* (a recombinant human parathyroid hormone) stimulates bone formation and is given daily by subcutaneous injection for a period of 18 months and is the most potent anabolic bone agent currently available<sup>24</sup>. It is reserved for patients with severe osteoporosis and those with a history of vertebral fracture and low BMD score on DXA. Depending on local arrangements, this treatment is usually initiated on the recommendation of a specialist. There is evidence that teriparatide reduces vertebral and non-vertebral fractures.

### Adjunctive Therapy

Calcium and/or Vitamin D supplementation should be given to all women who receive treatment for osteoporosis unless the clinician is confident that the woman has an adequate dietary intake of Calcium and is Vitamin D replete or taking a Vitamin D analogue<sup>22</sup>. Calcium and Vitamin D supplements are not sufficient therapy on their own for patients who have already had an osteoporotic fracture<sup>22</sup>.

### 7(b).3.4 Other

#### Strontium Ranelate

*Strontium ranelate* is a suitable alternative to bisphosphonates and should be considered a first line treatment if a bisphosphonate cannot be taken. There is evidence that strontium ranelate reduces the risk of vertebral, non-vertebral and

hip fractures compared with placebo<sup>22</sup>. Strontium ranelate has been found to both increase bone formation and reduce bone resorption. Adverse effects are mild and transient with nausea and diarrhoea occurring in approximately 6% of patients. Strontium ranelate should be used with caution by those at risk of venous thromboembolism<sup>22</sup>.

The decision to commence treatment with strontium ranelate or bisphosphonate should be taken on the basis of clinical assessment. Where treatment allows bisphosphonate or strontium ranelate, the relative merits of each should be discussed with the patient to maximum adherence.

**Table 7(b)2: Anti-Fracture Efficacy of common pharmacological interventions for Osteoporosis<sup>18</sup>**

Intervention	Vertebral	Non Vertebral	Hip
Alendronate	☑	☑	☑
Risedronate	☑	☑	☑
Etidronate	☑	-	-
Ibandronate	☑	-	-
Preotact	☑	-	-
Raloxifene	☑	-	-
Teriparatide	☑	☑	☑
Strontium Ranelate	☑	☑	☑



### 7(b).3.5 New Approaches

New treatments which may be licensed in the future for the treatment of osteoporosis in Ireland include<sup>25</sup>:

- Cathepsin K inhibitors - Cathepsin K, a cysteine protease of the papain superfamily, has been implicated in the process of bone resorption. Selective inhibitors of cathepsin K therefore could be promising therapeutic agents for the treatment of diseases characterised by excessive bone loss, such as osteoporosis.
- Sclerostin Inhibitors - Sclerostin is produced by osteocytes and inhibits bone formation, possibly by antagonising Wnt signaling. In animal studies, treatment with a monoclonal antibody that blocks sclerostin resulted in increases in BMD. Inhibitors of sclerostin, therefore, hold promise as a therapy to increase bone mass.
- Monoclonal antibodies against RANK ligand – Osteoprotegerin is a soluble decoy receptor that binds RANKL and prevents osteoclast activation. Osteoprotegerin administration in postmenopausal women leads to a rapid decrease in markers of bone resorption, consistent with reduced osteoclast-mediated bone breakdown, although the fact that neutralising antibodies can develop in patients has diminished enthusiasm for its use as an antiresorptive agent.
- Integrin antagonists - Adhesion of osteoclasts to bone surface is an important initial step for bone resorption. Integrins mediate cell–cell and cell–matrix interaction. Integrin inhibitors prevent osteoclast interaction with the extracellular matrix, thereby inhibiting bone resorption.
- Calcium-sensing-receptor antagonist - Administration leads to a transient rise in endogenous parathyroid hormone mimicking intermittently administered exogenous parathyroid hormone.

### 7(b).3.6 Men

Men's bones fracture at similar BMD levels to those of women. Although osteoporotic fractures are less common in men than women, men experience greater fracture associated morbidity and mortality. Men are also at increased risk from secondary causes<sup>8</sup>.

Alendronate currently has the best trial data in terms of effectiveness for treating men with osteoporosis. Men suffering vertebral and non-vertebral fractures have shown significant increases in BMD when treated with Alendronate<sup>22</sup>. Risedronate has recently been licensed for the treatment of vertebral and non-vertebral fractures in men who are also on steroid therapy.

### 7(b).3.7 Corticosteroids

Patients on corticosteroids require preventive treatment for osteoporosis if:

- a person is starting oral corticosteroids and is likely to be on these for at least 3 months;
- a person has had a previous fragility fracture.

More than three or four courses of corticosteroids taken in the previous 12 months is considered to be equivalent to more than 3 months of continuous treatment. If the intermittent courses are spread over a much longer term, the risk is not as high<sup>22</sup>.

Oral corticosteroids increase the risk of fracture over and above the effect of low BMD. As such, treatment of osteoporosis is recommended if the T-score is less than -1.5. People with corticosteroid induced osteoporosis should be offered lifestyle advice in conjunction with drug treatment. Evidence supports the use of bisphosphonates as a first line treatment<sup>22</sup>.

### 7(b)3.8 Non-Pharmacologic Interventions

#### *Physical Activity / Exercise*

Advice regarding exercise should be tailored to individual needs and capabilities. Some people may benefit from referral to an exercise programme. Balance and gait training for people at risk of falls should be provided. Moderate levels of activity, including walking, have been found to be associated with a substantially lower risk of hip fracture in postmenopausal women<sup>22</sup>. A number of systematic reviews suggested that an exercise programme combining low impact weight bearing exercise and high intensity strength training maintains bone density in men and post menopausal women<sup>8</sup>.

### 7(b) 3.9 Physiotherapy Management

Epidemiological studies suggest a link between physical inactivity, bone mineral density and fracture risk.<sup>11</sup> Physical activity is important for bone health and increases muscle strength, balance and coordination. Exercising from a young age contributes to bone mass during growth, and continuing to exercise minimizes bone loss later in life. Walking, aerobic exercise and resistance exercises are the best forms of activity to prevent osteoporosis<sup>13</sup>.

International evidence suggests that women were more likely to walk for exercise than men. Men were more likely to report moderate and vigorous exercise. In relation to exercise level (exercise type, frequency and duration), 65% of men and 74% of women engaged in exercise classified as sedentary and low levels. There was a small reduction in the number of people exercising at sedentary and low levels from previous surveys conducted in 1989-1990 and 1995<sup>26</sup>.

Physiotherapy is an essential component in the total management of osteoporosis and low BMD through individual prescriptive exercise programmes, specific techniques and activities with ongoing education. Appropriate treatment goals can be established following a thorough physiotherapy assessment related to the persons DXA results, risk factors for falls, and their overall health and functional status. The programme is dynamic, must be fully therapeutic and reviewed, developed and modified by the chartered physiotherapist as needed for each person throughout their lifespan<sup>27</sup>.

Since the aim is to maximise peak bone mass in children and adolescents, participation in a variety of high-impact activities should be encouraged. In the middle adult years, small increases in bone mass may be achieved by structured weight-training and weight-bearing exercise (especially pre-menopause in women). In the older adult years, particularly if osteopenia or osteoporosis is present, the aim is to conserve bone mass, reduce the risk of falls, protect fracture risk, improve posture and fitness, reduce pain, improve dynamic balance and co-ordination, improve muscle strength, joint mobility and personal confidence in activities of daily living. All these are essential to maximise quality of life for each person and their families/carers.

The Irish Society of Chartered Physiotherapists (ISCP) are currently developing a model on Physiotherapy Management of Bone Health throughout the Lifespan and includes the management of fragility fracture in persons with normal or low BMD, established osteoporosis and the secondary prevention of fractures. The draft (2007) algorithms on page 92 and 93 are reproduced with the kind permission of the ISCP<sup>27</sup>.

### 7(b)3.10 Serial BMD Measurement

There is insufficient evidence to determine the value of routinely monitoring bone mineral density (BMD) in people taking treatment for osteoporosis. If repeat DXA scanning is thought to be appropriate, in general this should not be carried out unless the person has been taking treatment for at least 2 years. The beneficial effect on the BMD occurs over many months. Women who lose BMD during the first year of treatment can gain BMD if the treatment is continued into a second year.

Repeat DXA scanning should be considered if a woman has another fragility fracture despite adhering fully to treatment with a bisphosphonate for one year. NICE recommends that if the BMD is found to be below the pre-treatment level, an alternative treatment should be considered<sup>22</sup>.

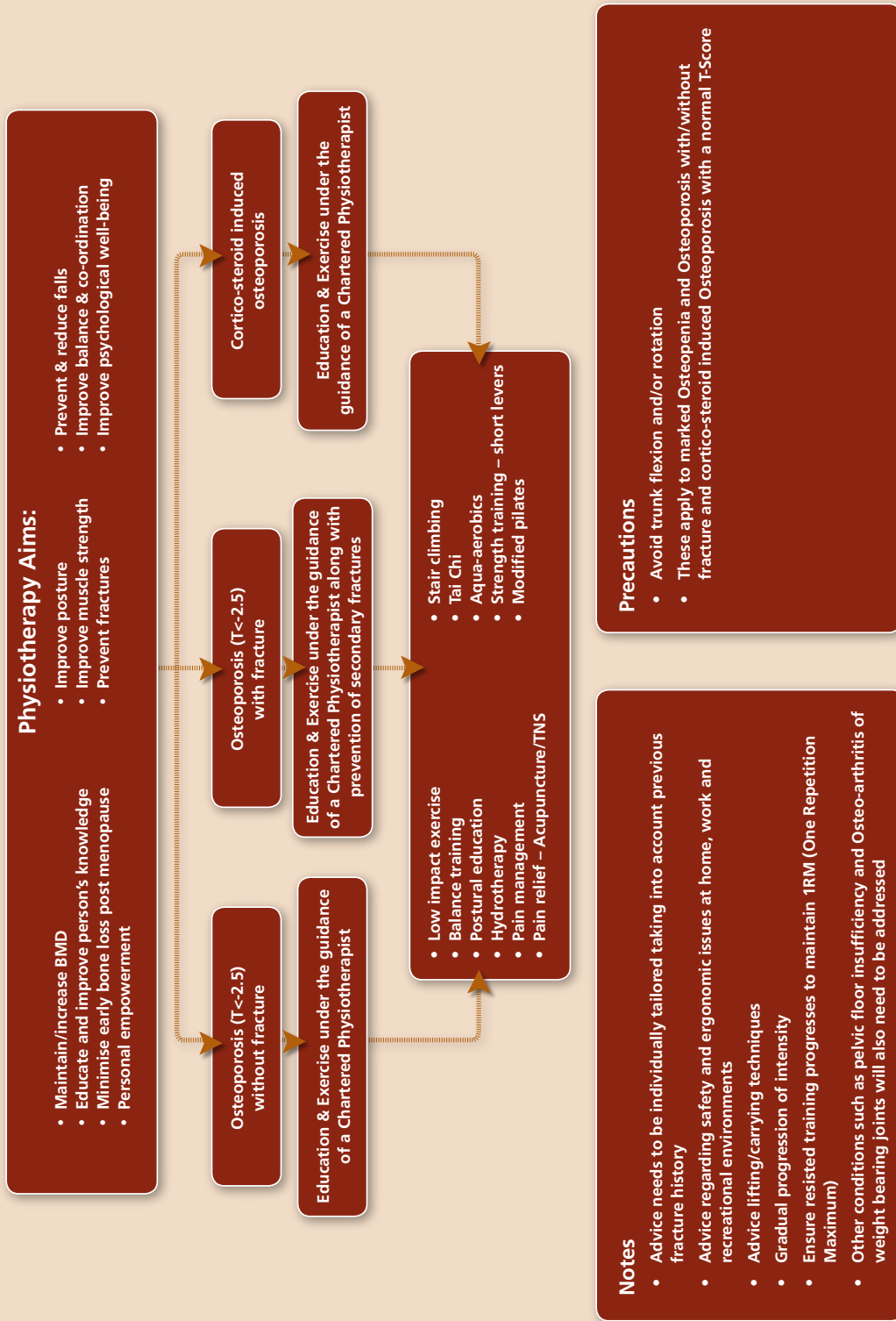
### 7(b)3.11 Biochemical Markers

Biochemical markers have the potential to have a major clinical impact on the investigation and management of osteoporosis. Biochemical markers alter with therapy and these changes may be used to predict subsequent changes in BMD.<sup>8</sup> Biochemical markers also can be a sensitive index of treatment compliance as responses to therapy occur within 3 months of starting treatments.

## Physiotherapy Management - Osteopenia



## Physiotherapy Management - Osteoporosis



## 7(b).4 Section C – Management and Rehabilitation

### 7(b)4.1 Post-Fracture Care and Rehabilitation

The optimum care of patients who have suffered fractures requires an integrated approach between a number of specialties including emergency services, emergency departments, hospital in-patient and outpatient departments and with primary/community care and rehabilitation services.

A consultant with specialist knowledge of osteoporosis and metabolic bone diseases is required to lead the secondary care service. The team includes related specialists, nursing and allied health professionals<sup>1</sup>. The ability of primary care physicians to manage osteoporosis effectively is severely restricted in a health system that does not have specialised services.

Challenges are faced by trauma and orthopaedic units in the delivery of high quality care to the large number of elderly osteoporotic fracture patients presenting to them<sup>28</sup>. Orthogeriatric pre- and post-operative acute medical management, rehabilitation and secondary prevention is as important as high quality surgery in the management of elderly fracture patients, as the majority have significant co-morbidities.

As soon as they are stable post-operatively, elderly osteoporotic fracture patients should be transferred to rehabilitation care where a multidisciplinary team led by a specialist is provided. Any modifiable factor for a fall or bone fragility should be corrected by the appropriate clinical specialists. This should apply to fragility fractures treated as outpatients, as well as those treated operatively.

Information and audit systems are needed to monitor osteoporotic fractures and the outcomes of fracture treatment and rehabilitation<sup>28</sup>. Audit needs to be an integral component of the services. One example of an audit approach is the Scottish Hip Fracture Audit which aims to improve hip fracture care by providing robust nationally comparable data on the care of hip fracture patients. The audit commenced in 1993

in four centres. In the 2006 annual report, data was presented on to 4,426 hip fractures in 2005 from 13 hospitals, which represented 72% of the 6,162 hip fractures reported in Scotland in 2005<sup>29</sup>. In addition to core data collection occasional time limited audits allow various areas of hip fracture care to be investigated in more detail. The audit has succeeded in providing a means of comparison of the varying multidisciplinary aspects of hip fracture care at different centres. Improvements in the care and rehabilitation of this frail and vulnerable group of patients have been successfully monitored by the audit.

The objectives of the audit are to:

- Improve the outcome of care for patients.
- Document the pathway of care of hip fracture patients.
- Allow comparison of current practice against recognised clinical standards e.g. SIGN Guideline No. 56
- Allow comparisons of subgroups e.g. age, gender, type of fracture and pre-fracture mobility and residence.
- Facilitate service improvements, by providing robust nationally comparable data for staff involved in hip fracture care.
- Monitor the effects of changes in practice.

The audit collects data on hospital performance, patient characteristics, emergency department management, surgical management and outcomes.

### 7(b)4.2 Proposal for an Integrated Approach to Care for Fragility Fracture Patients Involving Orthopaedic and Geriatric Services

The NHS 'National Service Framework for Older People' states that "at least one general ward in an acute hospital should be developed as a centre of excellence for orthogeriatric practice"<sup>30</sup>. The different models of orthogeriatric care currently include the following:

- The traditional model: The elderly fracture patient is admitted to a trauma ward where care and subsequent rehabilitation are mainly

managed by the orthopaedic surgeon and team. Any medical queries are dealt with by a consultative service.

- A variation on the traditional model, with regular input from geriatricians: This can be in the form of regular multidisciplinary ward rounds involving both geriatricians and orthopaedic surgeons.
- Pre-operative management by the orthopaedic team with early post-operative transfer to a geriatric rehabilitation unit: This may involve further combined orthopaedic and geriatric ward rounds in the rehabilitation unit.
- Combined orthogeriatric care: The patient is admitted to a specialised orthogeriatric ward under the care of both geriatricians and orthopaedic surgeons. The patient is assessed by the geriatric team both pre and post-operatively.

Although the choice of model depends on local resources and the actual size of the orthogeriatric service needs, the British Orthopaedic Association advocates the latter model.

The advantages of a combined orthogeriatric care model include:

- Superior medical care.
- Optimal scheduling of fracture surgery.
- Better communication with patients and their relatives.
- Better communication within the multidisciplinary team.
- Initiation of research, education and audit.
- Reduction in adverse effects.
- Earlier initiation of rehabilitation and more effective use of discharge resources.

### 7(b)4.3 Secondary Prevention of Osteoporosis

Orthopaedic surgeons are usually the first, and in some cases the only, physicians to see fracture patients. Consequently, they have a unique opportunity to advocate for the patient, ensuring they are channelled for treatment to reduce the risk of subsequent fractures. This does not mean that the orthopaedic surgeon should personally

take on the responsibility for medical assessment or the prescription of drugs. A multidisciplinary approach is necessary, with every fracture unit connected to services for the assessment and treatment of bone mineral density and conditions predisposing to falls.

#### 7(b)4.3.1 Fracture Liaison

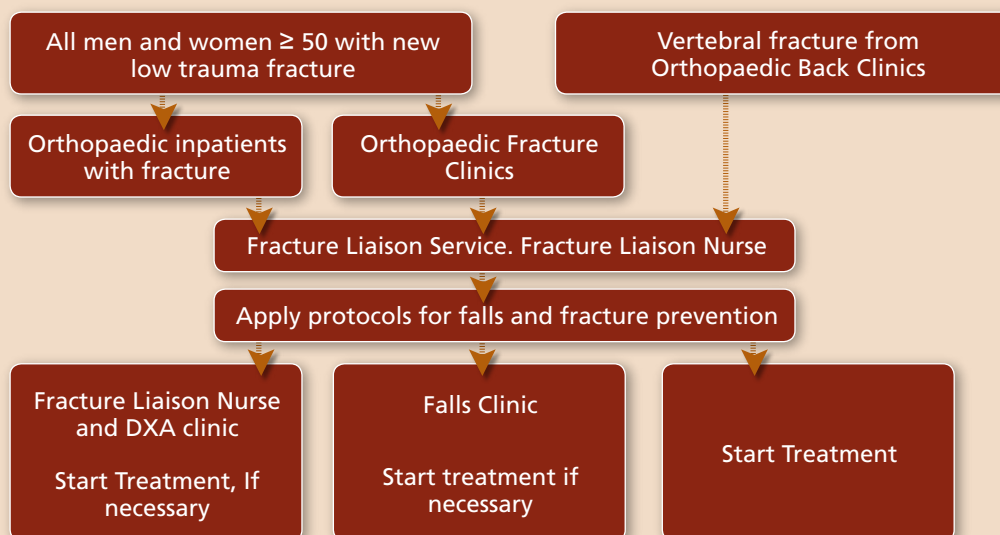
Liaison between the hospital and community facilitates the safe discharge of hip fracture patients and reduces in-patient hospital stay<sup>31</sup>. Playing a coordinating role, using agreed protocols, a fracture liaison nurse (FLN) can develop productive relationships with many health care professionals ensuring that fragility fracture patients are diagnosed and receive appropriate advice, treatment or preventive therapy. It is recommended that every acute hospital have a trained nurse to provide a fracture liaison service.

The principles of a Fracture Liaison Service have been described<sup>32</sup>. A designated clinical nurse specialist – the fracture liaison nurse (FLN) has responsibility for identifying fracture patients, both inpatient and outpatient and for providing the evaluation process<sup>32</sup>. After a patient is identified, the FLN contacts the patient's GP explaining the role of the service. Depending on protocol (Fig. 7(b)4.1), the FLN arranges a review consisting of a DXA plus a falls risk assessment, advice on falls and fracture prevention and intervention, as indicated.

Once a DXA scan is performed the FLN meets the patient to discuss the results and implications for treatment/management including lifestyle modifications. Risk factors for osteoporosis are identified, educational material on osteoporosis and reduction of fracture risk are provided, a report is sent to the GP and follow-up is arranged, as necessary.

The Fracture Liaison Service should maintain a computerised database for all fracture patients, including fracture history, past medical history, risk factors for osteoporosis, risk factors for fracture, current medication use, DXA results and interpretation, lifestyle recommendations, osteoporosis treatment recommendations, and arrangements for follow-up. It should also be capable of auditing the service and assessing capacity. Regular meetings among the staff of the service afford the opportunity to review



**Figure 7(b) 4.1: The Fracture Liaison Service Basic Model**

Source: Adapted from the Belfast Fracture Liaison Model 2005.<sup>33</sup>

the caseload and to identify and respond to any problems that have arisen. A system for monitoring the effectiveness and quality of care is essential. Monitoring involves the surveillance of conventional epidemiological parameters, such as the prevalence and incidence of osteoporosis and fractures, as well as the audit of both care process and outcome. To do this effectively, minimum sets of data to be audited should be defined<sup>1</sup>.

The objective of specialist multidisciplinary care is to provide a comprehensive clinical service and support to primary care. This clinical service should be reserved for patients with complicated or difficult problems on which consultant advice will be required. The primary care service can usually coordinate and advise on activities for improving bone health including health promotion, identification and follow-up of high-risk individuals, early identification and management of patients and referral for diagnostic investigation and specialist advice<sup>1</sup>.

### Improved Osteoporosis Practice

#### *Continuing Professional Development and Education*

National co-ordination of Continuing Professional Development for health professionals and local osteoporosis teams including specialists, primary care physicians, nurses, densitometry assistants,

physiotherapists, exercise therapists, occupational therapists, dieticians, and social workers is beneficial<sup>1</sup>.

Patient education programmes should emphasise the need for partnership with health professionals, the patient and the patient's family, so that patients can contribute to their own well-being. The primary objectives of education are to increase:

- understanding among patients;
- skills;
- satisfaction among patients;
- confidence; and
- continuance of treatment and self-management<sup>1</sup>.

### Chronic Care Management Model

Successful interventions in the care of chronic diseases such as osteoporosis are composed of complex sets of actions that address psychosocial and lifestyle issues as well as physical problems. The management of chronic diseases is rapidly becoming a major component of primary care. Nurses are particularly well qualified for chronic disease management due to their ability to address the multi-factorial nature of chronic problems.

Improving clinical outcomes requires a multifaceted approach. A Chronic Care Management model is based on the assumption that improvement in care requires an approach that takes into account patient, provider, and system level interventions.

The Chronic Care Management model consists of six distinct concepts identified as modifiable components of healthcare delivery:

- Organisational support
- Clinical information systems
- Delivery system design
- Decision support
- Self-management support
- Community resources

### *Organisational Support*

Organisational support addresses the culture of service provision as well as leadership. The ideal service has a culture where the optimal management of chronic disease and service improvement are key values. In addition, in the ideal service, leadership is committed and visibly involved, supports change and quality improvement and creates incentives for providers and patients to improve care and adhere to evidence-based practice.

### *Clinical Information Systems*

Improvement in services is not possible without information on trends in individual patients and the health of the population. Clinical Information systems are structured to organise patient, population, and health service provider information to describe the health of the population and to facilitate efficient and effective care.

### *Delivery System Design*

The delivery of effective, efficient clinical care through appropriate use of all team members, planned patient interactions, regular follow-up, and case management are all important parts of delivery system design.

### *Decision Support*

Evidence based best practice guidelines provide standards for care and should be readily available in daily practice, as should the integration of clinical expertise. Decision support includes mechanisms for increasing health service provider access to evidence based guidelines and to specialists for collaboration.

### *Self-Management Support*

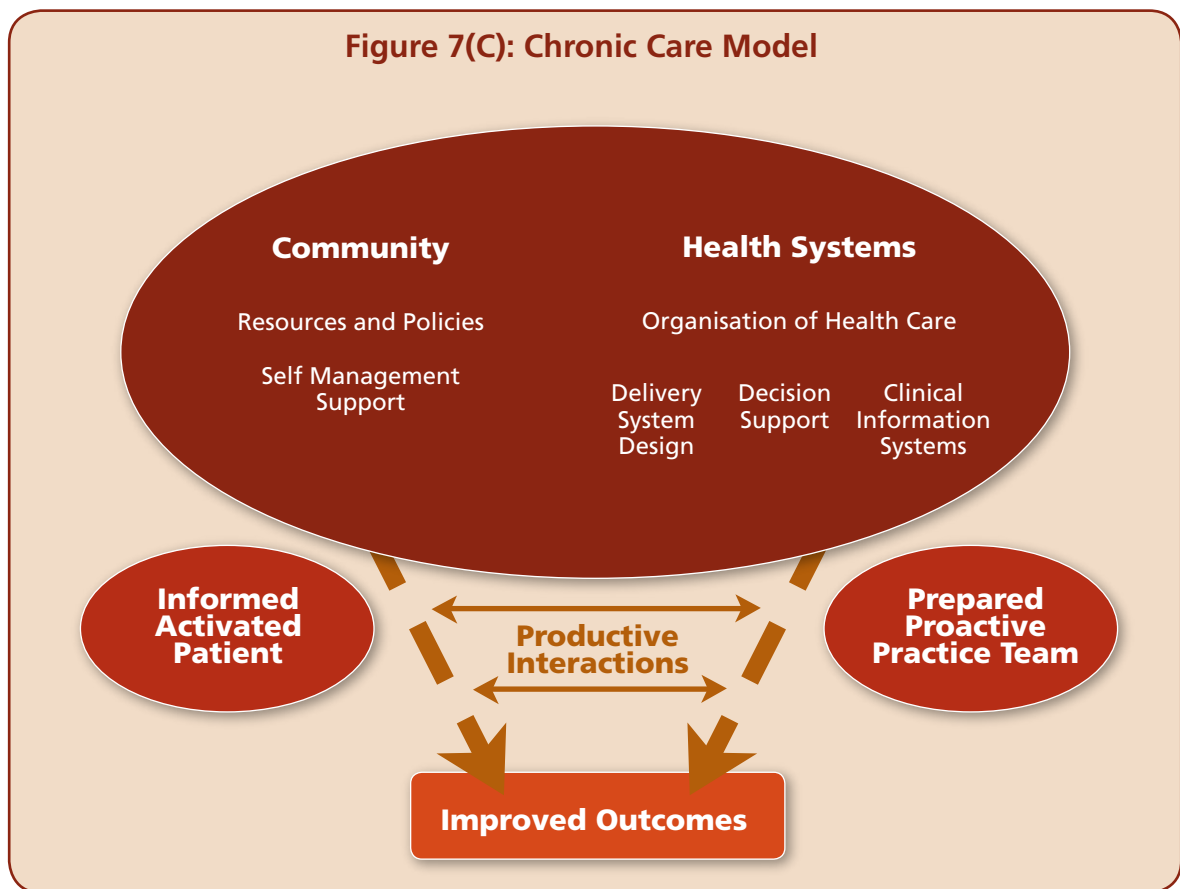
A critical component of the Chronic Care Management model is self-management support, emphasising the need for patient-centred interventions. These interventions can include tailored education resources, skills training, psychosocial support and collaboration between health care provider and patient to define problems, set priorities, establish goals, identify barriers, create treatment plans and solve problems. The goal of self-management support is to empower and prepare patients to manage their health and healthcare.

Core information must be personalised and given to the patient in a number of stages. At the initial consultation, the patient with osteoporosis needs information about the nature of the disorder, the types of treatment available and the rationale for the specific therapeutic interventions being recommended. Verbal information should be supplemented by written (or pictorial, for patients with poor literacy) information about osteoporosis. In early consultations, an individualised activity plan should be drawn up specifying what the patient must avoid or undertake. At follow-up consultations, the patient's questions should be answered, and any problems with osteoporosis and its initial pharmacological and non-pharmacological treatment discussed. The patient's understanding of the information and management skills should be assessed periodically<sup>1</sup>.

### *Community Resources*

The final component of the Model is community resources. The model acknowledges the importance of linkages with the community for peer support, care coordination, and community-based interventions. Figure 7C illustrates the structure of the Chronic Care Management model.





By adopting a systems approach to fracture prevention that crosses the artificial boundaries of primary and secondary care, collecting appropriate data, monitoring the flow of demand throughout the organisation and targeting resources appropriately, it is possible to significantly reduce the incidence of future fracture while ensuring value for money for both service user and provider<sup>34</sup>.

### References

1. World Health Organisation, *Prevention and Management of Osteoporosis*, WHO Technical Report Series 921, Geneva. 2003
2. Osteoporosis Action Plan Committee, *Osteoporosis Action Plan: An Osteoporosis Strategy for Ontario – Toronto*, Osteoporosis Society of Canada, 2003
3. North American Menopause Society, 2002, Management of Postmenopausal Osteoporosis, *Menopause*, 2002, Mar-Apr; Vol 9 (2), pp 84-101
4. Food Safety Authority of Ireland (FSAI) *Recommended Dietary Allowances for Ireland*, FSAI, Dublin 1999.
5. Department of Health and Children. The Facts about Alcohol, Health Promotion Unit, 2003.
6. Seeman, E The effects of tobacco and alcohol use on bone in Marcus R, Feldmen D, Kelsey J, eds. *Osteoporosis* San Diego, CA, Academic Press 1996 :577:597
7. American Association of Clinical Endocrinologists (AACE), *Medical Guidelines for Clinical Practice for the Prevention and Treatment of Postmenopausal Osteoporosis*, Osteoporosis Task Force, 2003 Jacksonville
8. Scottish Intercollegiate Guidelines Network (SIGN), No 71: *Management of Osteoporosis – A National Clinical Guideline* Edinburgh, SIGN 2003,
9. National Osteoporosis Foundation, *Physicians guide to prevention and treatment of Osteoporosis*, Washington D.C., NOF, 2003,
10. Skinner JD, Ziegler P, Ponza M Transitions in infants' and toddlers' beverage patterns, *Journal of the American Dietetic Association* 2004 104:1 pp 45-50
11. Russell, G Pathogenesis of Osteoporosis *Rheumatology*, 3<sup>rd</sup> Edition, Hochberg MC, Silman AJ, Smolen js et al Editors, 2003 Mosby London
12. Karlsson M Has exercise an antifracture efficacy in women? *Scandinavian Journal of Medicine and Science in Sports*. 14 Vol 1 pp 2-15 2003
13. Bonaiuti D et al Exercise for preventing and treating osteoporosis in post menopausal women (Cochrane Review) *The Cochrane Library* issue 1 2004
14. Department of Health and Children - Health Promotion Unit, 2003
15. Royal College of Physicians. *Osteoporosis: clinical guidelines for prevention and treatment*. London: RCP; 1999.
16. National Osteoporosis Society, *Primary Care Strategy for Osteoporosis and Falls* 2002
17. International Society for Clinical Densitometry (ISCD) *Official Positions of the International Society on Clinical Densitometry: Updated 2005* [www.iscd.com](http://www.iscd.com)
18. National Arthritis and Musculoskeletal Advisory Group (NAMSCAG), *Evidence to Support the National Action Plan for Osteoarthritis, Rheumatoid Arthritis and Osteoporosis*, 2005 Centre for Research on Disability and Rehabilitation
19. National Institute for Clinical Excellence (NICE), The clinical effectiveness and cost effectiveness of technologies for the secondary prevention of osteoporotic fractures in postmenopausal women, *Technology Appraisal No 87* 2005
20. The National Institute for Health and Clinical Excellence (NICE) *Bisphosphonates (alendronate, etidronate, risedronate), selective oestrogen receptor modulators (raloxifene) and parathyroid hormone (teriparatide) for the secondary prevention of osteoporotic fragility fractures in postmenopausal women* 2005 NICE [http://cks.library.nhs.uk/osteoporosis\\_treatment/view\\_whole\\_guidance](http://cks.library.nhs.uk/osteoporosis_treatment/view_whole_guidance)
21. O'Neil S et al. Guidelines for the management of postmenopausal osteoporosis for GPs, *Australian Family Physician* Vol. 33, No. 11, 2004
22. Prodigy Guidance, Osteoporosis - treatment (and prevention of Fragility fractures) National Health Service – Clinical Knowledge Summaries, 2005 [www.prodigy.nhs.uk](http://www.prodigy.nhs.uk)
23. Maricic M, New and emerging treatments for osteoporosis, *Current Opinion in Rheumatology*. 2007;19(4):364-369
24. Compston J, Recombinant Parathyroid Hormone in the Management of Osteoporosis, *Calcified Tissue International*, 2005, 77(2)
25. Mulder et al, Drug Insight: Existing and emerging therapies for Osteoporosis, *Nature Clinical Practice Endocrinology & Metabolism*, 2006, 12 (2)
26. Australian Bureau of Statistics, National Survey (Health) 2001, [www.abs.gov.au](http://www.abs.gov.au)

27. Irish Society of Chartered Physiotherapists, Physiotherapy Management of Bone Health throughout the Lifespan, (In development)
28. British Orthopaedic Association, The care of patients with fragility fractures: the 'blue book' , 2007, NHS National Library for Health
29. NHS Scotland, Scottish Hip Fracture Audit Report -2006, NHS
30. NHS, National Service Framework for Older People, 2001, NHS <http://www.dh.gov.uk/en/Policyandguidance/Healthandsocialcaretopics/Olderpeopleservices/index.htm>
31. EU Osteoporosis Interest Group, Osteoporosis in the European Union, Overview of Next Steps. 2003 [www.iofbonehealth.org](http://www.iofbonehealth.org)
32. McLellan, AR et al, The fracture liaison service: success of a program for the evaluation and management of patients with osteoporotic fracture *Osteoporos Int.* 2003 Dec;14(12):1028-34
33. Wright SA, et al, Osteoporosis fracture liaison experience: the Belfast experience, *Rheumatology International*, 2005, 25(6)
34. Fiandt K, The Chronic Care Model: Description and Application for Practice, *Advanced Practice Nursing eJournal.* 2006;6(4).
35. Cavadini et al. US adolescent food intake trends from 1995-1996. *Arch Dis Childhood* 2000; 83: 18-24.



# Chapter 8

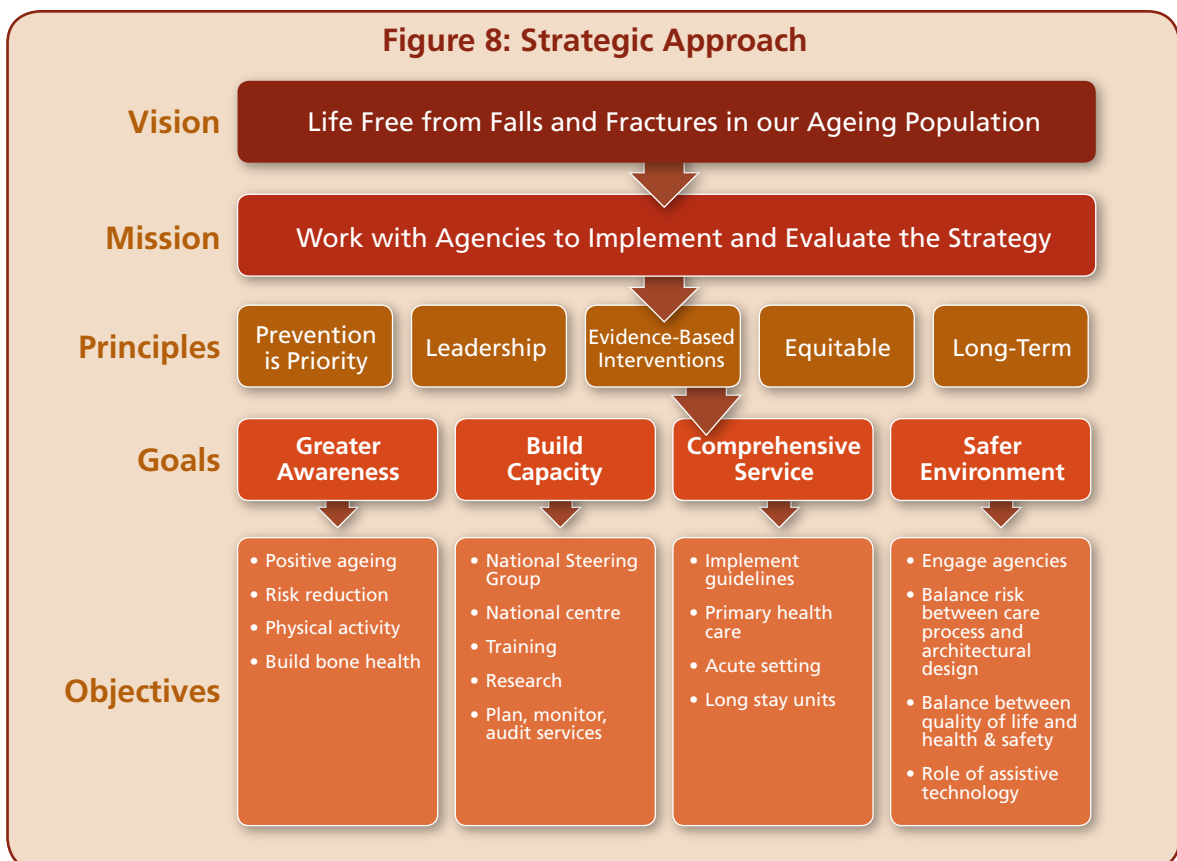
Strategy and Implementation

# 8. Strategy and Implementation

## 8.1 Introduction

This section proposes the strategic and implementation approach to provide a fall and fracture prevention service in our ageing population. As health is influenced by many factors outside the health sector, the implementation of this strategy must involve many organisations in partnership e.g. local authorities and voluntary agencies. Successful outcomes will include better bone health, a reduction in fracture and fall rates in older and high risk people and better quality of life.

Previous sections show that fall related injuries in older people are serious, predictable, preventable and costly. They exert a huge negative impact on people’s lives and on the health service. This Report presents evidence based interventions that can be used by health personnel to implement multi-factorial fall and prevention programmes in a planned manner.



## 8.2 Vision, Mission, Principles and Goals

**Vision:** A Life Free of Falls and Fractures in Our Ageing Population.

**Mission:** To Work with all Relevant Agencies to Implement and Evaluate this Strategy.

### Principles:

1. The prevention of falls and fractures in an ageing population is a priority for the HSE.
2. The HSE shows leadership and works in partnership with relevant agencies to deliver an integrated approach to fall and fracture prevention.
3. Evidence based multifactorial interventions are resourced, implemented, monitored and evaluated.
4. Fall and fracture prevention services are equitable to all.
5. A long term approach is taken.

### High Level Goals:

1. Increase awareness about the problem of falls and fractures in high risk groups, their families and communities, health personnel and policy makers.
2. Build capacity among health personnel and communities to reduce falls and fractures in older people.
3. Provide comprehensive, integrated fall/fracture prevention services in Primary, Secondary and Residential Care.
4. A safer, friendlier physical environment is a priority.

## 8.3 Objectives

**Goal 1:** Increase awareness about the problem of falls and fractures in high risk groups, their families and communities, health personnel and policy makers.

**Recommendation 1:** Health promotion and primary prevention should be provided for community dwelling older people and their families/carers to promote healthy ageing and well being. This can reduce the risk of falls and fractures.

**Recommendation 2:** Guidance on how to minimise intrinsic and extrinsic fall risk factors and to modify clinical risks for osteoporosis are needed. Information should be easily available and in multi-media format.

**Recommendation 3:** Our ageing population should understand the benefits of, and engage in physical activity and exercise programmes. As people age they should get advice from trained and experienced personnel, e.g. chartered physiotherapists, regarding their physical activity. This should be part of an Ageing Well Programme.

**Recommendation 4:** Health personnel should recognise the importance of falls and fractures and that they can be prevented.

**Recommendation 5:** Bone health awareness should begin at school and continue throughout life.

**Goal 2: Build capacity among health personnel and communities to reduce falls and fractures in older people and high risk groups.**

**Recommendation 6:** Establish a National Centre for Falls and Fracture Prevention. This Centre would be guided by a National Steering Group and provide leadership in Training, Research and Support for health personnel. It would prepare health information and evaluate progress in the implementation of the fall and fracture prevention strategy.

**Recommendation 7:** All health personnel should be trained to identify those at risk in the general population and older people (of any age).

**Recommendation 8:** Research needs to be ongoing to ensure that high quality services reflect best-practice and enhance skills.

**Recommendation 9:** The cost-effectiveness of fall/fracture prevention interventions should be undertaken.

**Recommendation 10:** Information and audit must be an integral part of the service.

1. Information systems need to be developed to record and report data on falls/fractures in ED, Primary Care, Acute Services and Residential Care. These data should be analysed and results disseminated.
2. Reporting against national performance indicators and outcome targets in the different health settings should be part of the HSE service plan e.g. hip fracture admission rates.
3. All long stay residential settings should report on falls and related injuries as a part of injury risk management procedures.

**Goal 3: Provide comprehensive, integrated fall/fracture prevention services in Primary, Hospital and Rehabilitation settings.**

**Recommendation 11:** Evidence-based standards of care for fall and fracture prevention are presented in Chapter 7. They should be implemented.

**Recommendation 12:** Primary Health Care

1. The Primary Health Care providers should be aware of their role in terms of identifying people at risk of falls and fractures, implementing appropriate interventions and referral pathways.
2. Pharmacists should advise older patients about fall risks associated with medication and attach labels that warn 'May increase the risk of falling' to medications that are known to be associated with falling.
3. Continuing Professional Development activities in Primary Care should include guidance on fall and fracture risk assessment.

**Recommendation 13:** Acute Hospitals

Each acute hospital should provide an Integrated Fall/Fracture Service. This service should adhere to best practice guidelines, (Chapter 7):

1. All older people and those at risk (adults of any age) who attend ED or are admitted due to a fall related injury should be assessed by the Fall/ Fracture service and the appropriate intervention should be arranged.
2. Falls that occur in hospital should be recorded on a register and be critically analysed for corrective action.
3. People at risk of fragility fractures and those who attend OPD fracture clinics should be assessed.
4. Bone protection treatment should be provided for patients receiving long-term corticosteroids.
5. A small number of specialist tertiary fall services should be provided on a population basis (e.g. one centre per Hospital Network).

**Recommendation 14:** Residential Long Stay Care

1. All residential care settings should have a Fall prevention policy and be resourced to implement it.
2. All residents should receive a Fall Risk Assessment annually. A Fall Risk Assessment should also take place on admission and when health status changes occur.
3. Falls in residential care and nursing care homes should be recorded on a register. Each fall should be critically analysed for corrective action. It should be recorded by nursing home inspection teams and reported to the HSE.

**Recommendation 15:** Bone Mineral Density Testing

1. The identification of those at risk of fractures and poor bone health should be by a case-finding approach as recommended by the WHO.
2. Bone mineral density (BMD) testing should be provided in a timely manner (within 6 weeks of request).
3. A system of quality assurance/ accreditation should be introduced to ensure that all DXA units operate in accordance with best practice.
4. One DXA machine per 100,000 population is required. Each can perform 1,000 scans per year. They should be located in the same hospital site where at least one element of Fall/Fracture service is based. Quality Assurance protocols should be regularly carried out.
5. As many DXA machines are located in the private sector it is recommended that in the immediate term, existing DXA facilities should be utilised to avoid delay in implementation of overall Strategy, including purchase of scans from private sector if this is the only local service available.

6. GPs should be facilitated in directly referring patients for DXA scanning using agreed guidelines.

**Goal 4: A safer, friendlier physical environment is a priority.****Recommendation 16:** The Environment

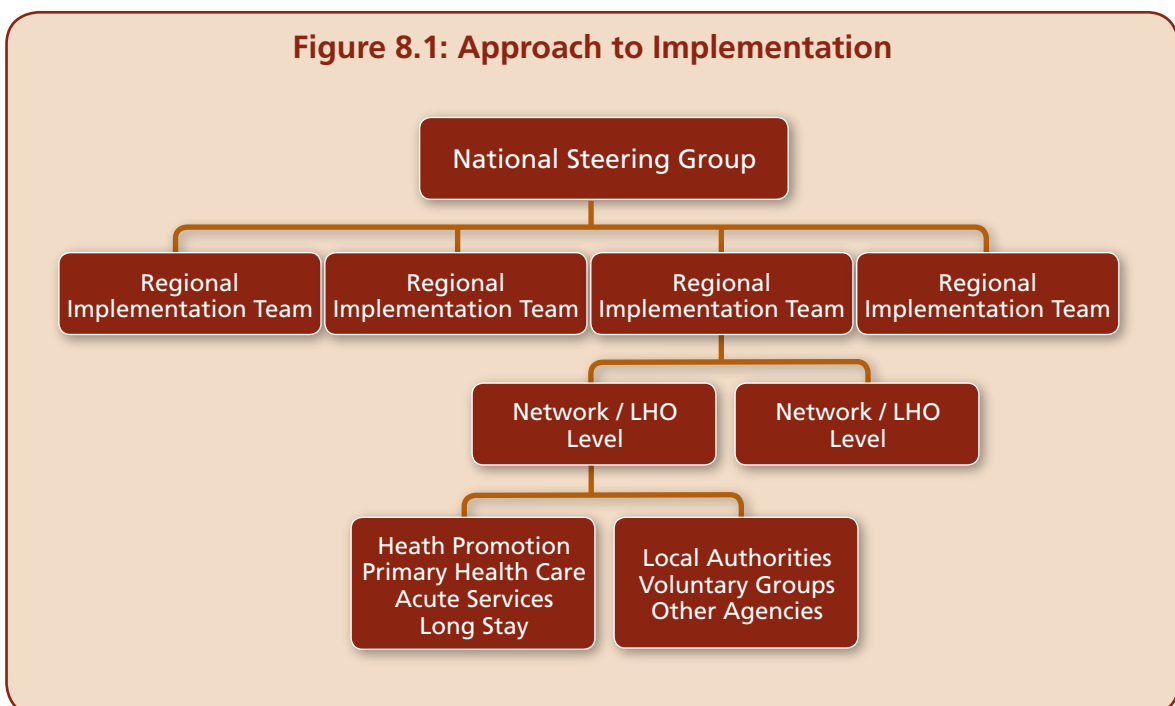
1. The health sector should engage with all relevant agencies to ensure an integrated approach to care and fall prevention.
2. Examine the risk between the care process and architectural design/ environmental design.
3. Evaluate the balance between Health and Safety and people's quality of life.
4. Audit the environmental health needs of older people.
5. Explore and establish the role and benefits of assistive technology in design of future housing options for older people.
6. Residential and acute health care facilities should conform to legislated safety requirements.
7. Regular audits of acute and long stay residential health settings should take place to identify and modify physical hazards in these settings.



## 8.4 Implementation Approach

1. A National Falls and Fracture Prevention Steering Group will need to be established: (*target- September 2008*). This will involve key stakeholders from relevant disciplines and agencies. It will provide direction and guidance on priorities for national planning, implementation, audit, research and training, Figure 8.1.
2. The National Falls and Fracture Prevention Steering Group will support a newly established National Centre for Falls and Fracture Prevention: (*Target- June 2009*). This will be the nerve centre for national leadership in fall and fracture prevention including training, research and health information materials.
3. Regional Planning/Development teams will need to be established at HSE Area level: (*Target – September 2008*). These teams will provide leadership and direction in each Area on the development, implementation, monitoring and evaluation of Area Plans. They will comprise of personnel with responsibility for Health Promotion, Primary Health Care, Acute Services, Environmental Health, Long-Stay residential services and others in the Area. They will also liaise with other relevant non-health services e.g. local authorities.
4. Local Implementation Teams at Network / Local Health office Area will also need to be established (*September 2008*). This is to facilitate a partnership approach between all disciplines and to promote integration between the various parts of the health service and other relevant agencies in relation to local plans.
5. Each acute hospital should have a multidisciplinary Integrated Fall and Fracture Prevention Programme (IFFP) to undertake falls and fracture assessment and intervention in accordance with evidence based practice: (*Target September 2008*). This service must ensure the primary role of the GP and primary care team in the overall management of the patient.
6. Each IFFP will be consultant led and will have dedicated nursing personnel in falls and fractures to co-ordinate the service. Assessments will be carried out by a multidisciplinary team involving a:
  - Consultant
  - Clinical Nurse Specialist
  - Dietician
  - Physiotherapist
  - Occupational Therapist
  - Radiographer

**Figure 8.1: Approach to Implementation**



Following assessment, an individual multifactorial intervention programme will be developed.

7. Multifactorial interventions will require access to a range of disciplines, based on the assessment. Disciplines commonly involved in interventions include; Geriatrician, GPs, Allied Health Professionals and other clinical specialties.
8. The multidisciplinary team approach will enable the majority of interventions to take place in the community. The hospital, community and primary health care services will need to work together to develop this integrated, seamless approach.
9. A small number of tertiary specialist falls services should be provided on a population basis of approximately one centre per Network Area. These centres will carry out a range of assessments including blood pressure assessments using beat to beat blood pressure equipment and haemodynamic response to carotid sinus stimulation, prolonged tilt testing. Referral criteria need to be agreed.
10. Patients who attend the service will have a patient held record, containing details of their individual multifactorial intervention programme. Interventions received will be recorded and signed off as appropriate. This

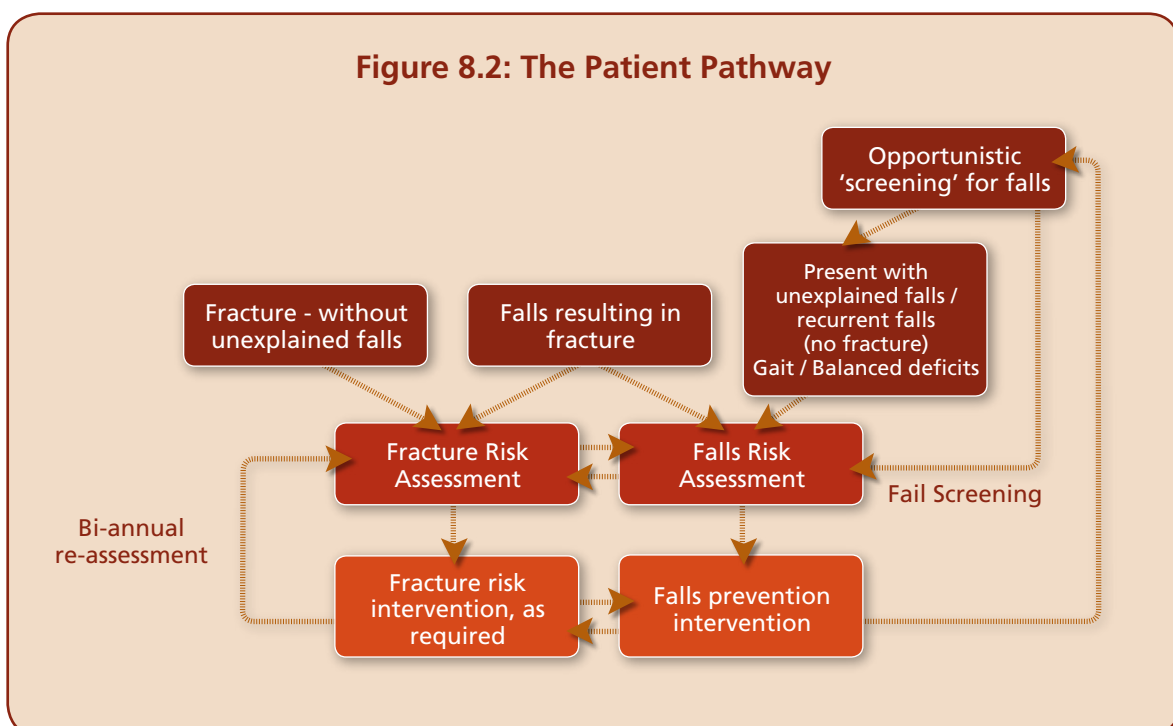
will facilitate effective communication and the delivery of an integrated service.

The service is patient focussed and outcome based. It is described as a pathway of care, not constrained by location. Patients enter the IFFP in one of four ways, Figure 8.2. The referring event determines the assessment required, as outlined in Chapter 7.

1. A patient presenting with an unexplained fall and/or recurrent falls without fracture receives a multifactorial **falls** risk assessment.
2. A patient who fails the opportunistic 'screening' and/or has gait and balance deficits receives a multifactorial **falls** risk assessment.
3. A patient presenting with a fall resulting in a fracture receives both a **falls** risk assessment and a **fracture** risk assessment.
4. A patient presenting with a fracture, without an unexplained fall (including asymptomatic vertebral fractures identified on radiology reports) receives a **fracture** risk assessment.

People referred for a falls risk assessment who have clinical risk factors for osteoporosis (as indicated in Chapter 5b) should be referred for Fracture Risk Assessment. People referred

**Figure 8.2: The Patient Pathway**



for a fracture risk assessment who fail the opportunistic 'screening' criteria for falls and/or have balance and gait deficits, should be referred for Falls Risk Assessment.

Following falls assessment, a multifactorial individualised fall prevention programme is developed. Similarly, following fracture risk assessment, intervention based on clinical need is provided. Where a person has received both falls and fracture assessment, an integrated intervention will be provided as appropriate.

## 8.4 Performance Measurement

Outcome Measurement strategy implementation is essential. Suggested measures are shown in Figure 8.3.

### Figure 8.3: Performance Measurement - Outcomes

**Target: 20% decrease in fracture admission rates in 65+ age group in 5 years**

- **Death rates:**
  - Falls 65-74, 75-84, 85+
  - Hip fracture
  - Head injury
- **Residential care:**
  - % with fall policy
  - Hip fractures reported
  - % residents received yearly assessment
- **Hospitalisation:**
  - Hip fractures
- **Fracture prevention:**
  - % fractures that received fracture assessment
  - Wait time for BMD
  - Standards and QA for BMD service
- **ED attenders due to fall:**
  - % received MDT assessment
  - % received MDT Intervention



# Appendix 1

Members of the National  
Steering Group

# Appendix 1: Members of the National Steering Group

## Chairperson

Dr Marie Laffoy, Assistant National Director, Strategic Health Planning, Population Health Directorate, Health Service Executive, Dr Steeven's Hospital, Dublin

## Members

Dr Catherine Blake, Head School of Physiotherapy, UCD, Dublin

Mr Rodd Bond, Architect, Institute of Technology Dundalk.

Mr Robbie Breen, Assistant Principal Officer, Health Promotion Unit, Department of Health and Children, Dublin

Dr Melissa Canny, Specialist in Public Health Medicine, HSE Dublin Mid-Leinster

Dr Brian Carey, Consultant Geriatrician, Bantry Hospital, Cork

Mr Bob Carroll Director, National Council on Ageing and Older People, Dublin (retired)

Ms Gabrielle Jacob, National Council on Ageing and Older People, Dublin (replaced Bob Carroll)

Ms Patricia Dawson, Senior Training and Education Officer, Age and Opportunity, Co Wicklow

Ms Geraldine deLorey, Assistant Health Promotion Officer, HSE West

Ms Una Dunne Shannon, Project Manager / Physiotherapy Manager, HSE West

Dr Patricia Fitzpatrick, Senior Lecturer, School of Public Health and Population Science, UCD

Dr Frances Horgan, Senior Lecturer, Royal College of Surgeons of Ireland, Dublin

Prof Rose Anne Kenny, Consultant Physician in Geriatric Medicine, St. James's Hospital and Trinity College, Dublin

Ms Cathy Lyons, Health Promotion Unit, Department of Health and Children, Dublin

Dr Sheila McEvilly, Principal Medical Officer for Older People, HSE Dublin Mid-Leinster (retired January 2007)

Ms Cecilia McQuade, Clinical Nurse Specialist, Nursing & Midwifery Planning & Development Unit, Ballyshannon, HSE West

Dr Geraldine McMahon, Consultant in Emergency Medicine, St. James's Hospital, Dublin

Ms Aoife O'Brien (Ms Sarah Callanan) Research Officer, Women's Health Council, Dublin

Ms Lean O'Flaherty, Senior Community Dietician, Irish Nutrition and Dietetic Institute, Dublin

Mr Dan Quaid, Community Development Officer, HSE West

Ms Tracy Swanton, Occupational Therapy Manager, Irish Society of Occupational Therapists, St. Vincent's University Hospital, Dublin

Prof Bernard Walsh, Consultant Geriatrician, St James's Hospital, Dublin

Ms Sheelagh Wright, Senior Health Promotion Officer, HSE Dublin Mid-Leinster

Ms Olga McDaid, Healthy Ageing Programme Coordinator, National Council on Ageing and Older People, Dublin

### **Project Management and Support**

Ms Deirdre Carey, Medical Statistician, Population Health Directorate, HSE

Ms Fiona Mc Mahon, National Hospital Office, HSE

Dr Máire O'Connor, Specialist in Public Health Medicine, HSE

Ms Eileen O'Neill, Population Health Directorate, HSE

Dr Eve O'Toole, Population Health Directorate, HSE

### **Research**

Ms Anna de Siún, Health Services Research Consultant, National Council on Ageing and Older People, Dublin

Mr Stephen O'Hare, Research Officer, National Council on Ageing and Older People, Dublin

### **Administrative Support**

Ms Sinead Kenny, Population Health Directorate, HSE

Ms Mary McCann, Population Health Directorate, HSE



# Appendix 1a

Members of the Falls Sub-Group

Members of the Environment  
Working Group



# Appendix 1a: Members of the Falls Sub-Group

## Chairperson

Professor Rose Anne Kenny, Consultant Physician in Geriatric Medicine, St. James's Hospital and Trinity College, Dublin

## Members

Mr Rodd Bond, Architect, Institute of Technology Dundalk.

Mr Robbie Breen, Assistant Principal Officer, Health Promotion Unit, Department of Health and Children, Dublin

Dr Brian Carey, Consultant Geriatrician, Bantry Hospital, Cork

Ms Geraldine deLorey, Assistant Health Promotion Officer, HSE West

Ms Una Dunne Shannon, Project Manager / Physiotherapy Manager, HSE West

Ms Frances Horgan, Senior Lecturer, Royal College of Surgeons of Ireland, Dublin

Ms Cathy Lyons, Health Promotion Unit, Department of Health and Children, Dublin

Ms Olga McDaid, Healthy Ageing Programme Coordinator, National Council on Ageing and Older People, Dublin

Dr Sheila McEvilly, Principal Medical Officer for Older People, HSE Dublin Mid Leinster (retired January 2007)

Dr Geraldine McMahon, Consultant in Emergency Medicine, St. James's Hospital, Dublin 8

Mr Dan Quaid, Community Development Officer, HSE West

Ms Tracy Swanton, Occupational Therapy Manager, Irish Society of Occupational Therapists, St. Vincent's University Hospital, Dublin

Ms Sheelagh Wright, Senior Health Promotion Officer, HSE Dublin Mid Leinster

## Environment Working Group

### Chairperson

Mr Martin Devine, Assistant National Director - Environmental Health, Population Health Directorate, HSE, Millennium Park, Naas, Co Kildare

### Members

Mr Alastair Graham, Population Health Directorate, HSE

Ms Mary Van Lieshout, Head of Research and Standards, National Disability Authority

Ms Lucia Carragher, School of Policy Studies, University of Ulster

Mr Rodd Bond, Architect, Institute of Technology, Dundalk

Ms Eileen O'Neill, Population Health Directorate, HSE

Ms Tracy Swanton, Occupational Therapy Manager, Irish Society of Occupational Therapists, St. Vincent's University Hospital, Dublin

Dr Tadhg Stapleton, Lecturer in Occupational Therapy, Trinity College, Dublin

Ms Rosemary Lennon 'The Clinic', Carrickane, Cavan



# Appendix 1b

Members of the Osteoporosis  
Sub-Group

# Appendix 1b: Members of the Osteoporosis Sub-Group

## Chairperson

Dr Melissa Canny, Specialist in Public Health Medicine, HSE Dublin-Mid Leinster

Dr Donnacha O'Gradaigh, Consultant Rheumatologist, Irish Osteoporosis Society, Waterford Regional Hospital, Waterford

## Members

Dr Miriam Casey, Consultant Geriatrician St James's Hospital, Dublin

Dr Tadhg Stapleton, Lecturer in Occupational Therapy, Trinity College, Dublin

Ms Avril Craig, Specialist Physiotherapist in Bone Health, St Vincent's University Hospital, Dublin

Ms Eilish Thornton, Senior Radiographer, St James's Hospital, Dublin

Ms Elizabeth Culleton Quinn, Lecturer in Physiotherapy, Trinity College Dublin

Ms Susan van der Kamp, Clinical Nurse Specialist, St Vincent's University Hospital, Dublin

Dr Denis Egan, General Practitioner, Spiddal, Co Galway

Prof Bernard Walsh, Consultant Geriatrician, St James's Hospital, Dublin

Ms Cecilia McQuade, Assistant Health Promotion Officer, HSE Western Area, Co Donegal

## Research Assistance

Ms Aisling Sheridan, Researcher, HSE Dublin North-East

Ms Sarah Mooney, Senior Radiographer, Galway Regional Hospital, Merlin Park, Galway

Ms Ita Hegarty, Researcher, HSE Dublin North-East

Ms Helen Moore, Specialist Physiotherapist, HSE West

Dr Eithne Murphy Consultant Rheumatologist James Connolly Memorial Hospital, Dublin

Dr Sean Murphy, Consultant Geriatrician, Midlands Regional Hospital, Mullingar

Ms Aoife O'Brien (Ms Sarah Callanan) Research Officer, Women's Health Council, Dublin

Dr. Máire O'Connor, Specialist in Public Health Medicine, HSE Dublin Mid-Leinster

Ms Lean O'Flaherty, Senior Community Dietician, Irish Nutrition and Dietetic Institute, Dublin



# Appendix 2

Level of Evidence  
for Falls Risk Factors

## Appendix 2: Level of Evidence for Falls Risk Factors

### Level of Evidence

Risk Factor	Community	Institutional
Mental-Status	1	2
Depression	5	2
Urinary incontinence	3	2
Orthostatic or postprandial hypotension	3	2
Dizziness	3	2
Vision	2	2
Hearing	6	2
Balance	2	2
Decreased grip or upper extremity disability	4	3
Decreased lower extremity strength or disability	2	2
General appearance of weakness		4
Decreased lower extremity co-ordination	4	3
Loss of spinal range of motion		3
Decreased peripheral neuromuscular function	2	6
Basic mobility, activities of daily living, instrumental activities of daily living	2	2
Gait abnormality	4	2
Use of walking aid	2	2
Limited activities/low activity level	4	2
Moderate activity level	2 protective	
High activity level	3	
Poor social network	4	6
Psychotropic drugs	1	2
Cardiac drugs	3	2
Anti-inflammatory drugs	6	
Analgesics		2
Multiple drugs	2	3
Use of mechanical restraint		2
Environmental hazards	2	2
Alcohol consumption	2 protective	

Ref: Moreland et al, *Evidence-based Guidelines for the Secondary Prevention of Falls in Older Adults, Gerontology, Vol 49, No 2, 2003*



# Appendix 3

Examples of Fall Prevention  
Services in Community, Hospital,  
Rehabilitation and Long-Stay  
Settings

## Appendix 3: Examples of Fall Prevention Services in Community, Hospital, Rehabilitation and Long-Stay Settings

A scoping exercise was undertaken to identify and describe Fall Prevention Services that are operational on a national basis.

- All geriatricians who were listed in the Irish Medical Directory as having an interest in Fall Prevention were consulted
- Members of the Steering Committee consulted with their colleagues to identify services.

In many cases, services were identified through word of mouth.

The following tables give an example of the type of services that exist in the different health settings. It was not possible to comprehensively identify all services that may be in place in all settings.

**Table A3.1 The Community Setting**

**Community Rehabilitation and Support Team (CRandST), Cork.**

**Service Outline:**

Intervention is for a minimum of 3 weeks and a maximum of 12 weeks. Referral criteria: >65, community dwelling, living within 5 miles of city centre, admitted to hospital with fall related injury, MTS 8+, no communication difficulties, no further inpatient treatment required, no active alcohol problems, requires input from 2+ disciplines, self sufficient, has family support on weekends. A hospital-based registrar assesses all older inpatient fallers for their suitability for the programme and refers as appropriate. Co-ordinator contacts family prior to discharge.

**Assessment:**

While in hospital: demographic details; falls assessment (developed by registrar), history of fall, details of fall, medical history, osteoporosis risk factors, vision history, home circumstances, MTS, short form MMSE, lower limb strength, balance, medication review. At home: Bartel, Berg Balance Test, MMSE. OT environmental assessment carried out prior to discharge.

**Intervention:**

Following assessment, the team develop an individual care plan and set client goals. Interventions are tailored to clients' individual needs. Standard e-mail/letter sent to GP/PHN/ Community Physiotherapist/Community OT to inform them that client is receiving service.

**Staff:**

Registrar, 0.5 Public Health Nurse, 1 Community/Home Care Nurse, 1 Physiotherapist, 0.7 Occupational Therapist, 2 Rehabilitation Assistants. Co-ordinator role rotates among staff.

**Referrals From:**

The registrar based in St Finbarr's Hospital. The team also accept referrals from Mercy Hospital and South Infirmary, Cork. If possible, referrals will be considered from Public Health Nurses, Community Physiotherapy, OT and GPs. Workload constraints make it impossible to accept all referrals.

**Numbers Seen:**

Aug – Dec 2004: 34 clients; Jan – Dec 2005: 82 clients; Jan – Nov 2006: 96 clients.

**Evaluation:**

The service has been piloting two assessment tools over the past 3 months: FRASE (Fall Risk Assessment Scale for the Elderly) and the Personal Risk Assessment. Results are due to be completed by the end of the year.

**Limitation:**

Limited as to the number of clients who can be seen due to staff limitations. Major difficulty is the need for a full time Occupational Therapist and full time Co-ordinator.



### **Table A3.2 Community Based Inpatient Rehabilitation Care Setting:**

**Our Lady's Hospice, Harold's Cross. 26 bed Community Reablement Unit.**

#### **Service Outline:**

The service is linked to St James' Hospital, referrals undergo full physical examination to determine fitness for rehabilitation. People accepted are offered 2 weeks rehabilitation initially, though this time scale is flexible. People are referred for reasons including recurrent falls, and chronic conditions such as osteoporosis, stroke and Parkinson's.

#### **Assessment:**

Physiotherapy Assessments: Berg Balance Test, EMS, CONFBAL Scale.

OT Assessments: MMSE; Falls Efficacy Scale (FEX).

Nursing Assessment: Orem; self-care deficit model.

An admissions team assesses each referral individually, once the examination in St James' has been carried out.

No standard assessment criteria is used and all assessments are based on the individual e.g. motivation.

#### **Intervention:**

Individually tailored daily physiotherapy intervention. OT intervention in the home. Social work intervention if required. Individual nursing intervention. Review of medication.

#### **Staff:**

3 Physiotherapists, 1 Care attendant (Physio), 2 Occupational Therapists, 1 Social Worker, 1 Medical Officer, Medical Director, Nursing Staff, Care Attendants.

#### **Referrals From:**

Geriatricians in hospitals; Local Health Offices 3, 4 & 5, General Practitioners, Public Health Nurses, Occupational Therapists, Physiotherapists.

### Table A3.3 Long Term Care

#### Long Term Care Facilities *in former Northern Area Health Board*

##### Service Outline:

An 8-week pilot programme

##### Assessment:

Berg Balance Test, Functional Reach and MMSE.

##### Intervention:

8-week course consisting of 30 minute individualised strength and balance programme, and one 60 minute group activity per week.

##### Numbers Seen:

In the original pilot, 17 were assigned to the experimental group, with 13 in the control group.

##### Evaluation:

Quasi-experimental non-randomised case control study where 2 groups of residents were matched. Following the 8-week programme a significant improvement in the Berg Balance Test and the Functional Reach was found in the experimental group while no changes were found in the control group. There were no significant changes in the MMSE for either group. Qualitative data highlighted psychological gains from participating in the course.

## St Monica's Age Related Health Care Facility, North Dublin.

### Service Outline:

A Fall and Injury minimisation programme was developed and tailored for the facility by the Health Promotion Officer and Senior Physiotherapist. A monitoring committee was established and staff training developed. Training included: demographics of older adults; rationale for falls and injury minimisation programme; context of falls and injuries in St. Monica's; risk factors for falling; remedial risks and how to reduce falls and injuries occurring. A dietician provided training to staff on nutrition issues in the elderly, menu planning, nutrition policy, meal service and provision. The final phase of the programme was the implementation of multi-faceted initiatives.

### Assessment:

Falls Risk Assessment Tool (Frat) Pack. Occupational Therapy environmental audit; general building and immediate environment of high-risk patients. Optician screening. Medical reassessment of all patients.

### Intervention:

General Interventions: Removing clutter, reviewing cleaning practices, increased reporting of maintenance issues, reviewing meals/nutrition, OT intervention to general environment.

Individual interventions: assessment for and appropriate prescription of Vitamin D and Calcium supplements; OT intervention; provision of appropriate aids, hip protectors for high-risk patients. Individual and group physical activity sessions.

### Numbers Seen:

All residents were screened.

### Evaluation:

The programme was evaluated through process, impact and outcome. Staff training was evaluated through pre-training questionnaires and six weekly post-training questionnaires. The monitoring committee intend to conduct an audit of the programme.

### Limitations:

The programme is constrained by the limited support community services can provide and without a dedicated Physiotherapy, Occupational Therapy and Dietetic service to St Monica's, and without more physical activity sessions the programme will not fulfil its full potential.

**Table A3.4 Acute Hospitals**

**St James' Hospital Dublin, Falls Liaison Clinic.**

**Service Outline:**

5 dedicated comprehensive falls assessment clinics are run per week.

**Assessment:**

4 bedded dedicated falls and blackout facility. Full history and clinical examination is conducted. Clinical examination includes blood pressure assessments using beat-to-beat blood pressure equipment and haemodynamic response to carotid sinus stimulation. Optional tests include ambulatory heart rate, ambulatory blood pressure, prolonged tilt testing and CT head scan. Each assessment takes 1.5–2 hours per person.

**Intervention:**

Assessment and intervention as per AGS/BGS Falls Guidelines and European Cardiac Society Guidelines.

**Staff:**

2 WTE Doctors, 2 WTE Nurses.

**Referrals From:**

The clinic is physically beside the ED. Older people presenting to ED with a fall or blackout are referred to the clinic.

**Numbers Seen:**

Between Jan. and Sept. 2006, 839 patients with a fall or blackout have been seen.

## Midland Regional Hospital Mullingar, Physiotherapy Led Falls Prevention Programme.

### Service Outline:

Following assessment, patients are given an 8-week intervention based on the OTAGO exercise programme. Patients are seen on week 1, 2, 4 and 8 for class based intervention. If they have scored well on the Berg Balance Test, the intervention is given to them by a Physiotherapy Attendant. If they score poorly, the intervention is given by a Physiotherapist. Once the initial programme is completed, patients are seen for a 3 and 6-month review.

### Assessment:

Physiotherapist /OT carry out the following assessments: Musculoskeletal Assessment; Falls History; Berg Balance; Falls Efficacy Scale (Fear of Falling), Environmental Checklist. OT will interview to determine if a home visit is necessary. If necessary, patients can be referred to Ophthalmology, Pharmacology and/or Dietician.

### Intervention:

An eight week class intervention based on the Otago exercise programme. Education is given during the programme on nutrition, footwear, eyesight, home hazards etc. If necessary, one to one intervention can be given.

### Staff:

The programme is being run within the current services. A half time physiotherapist has been assigned to the programme from existing services.

### Referrals From:

Orthopaedic clinic, inpatient referrals, Community Physio/OT, PHN and Self Referrals. There are inclusion/exclusion criteria guidelines, though no formal screening. Clients are referred with a history of falls, fear of falling and/or reduced mobility.

### Numbers Seen:

Since Jan/Feb 2006, approximately 100 people have been referred to the service. Approximately 60 have completed the 8-week intervention, 24 have completed the 3-month review and 10 have completed the 6-month review. Currently on average 5 new people are seen each week and one new class is started every week.

### Evaluation:

As this is a pilot programme, there has been ongoing evaluation. A preliminary report is expected in February 2007, while a full report may be completed by June/July 2007.

### Limitations:

The fact that the service is being operated from current hospital physiotherapy service limits the number of people who can be seen. Ideally would like to see formal links between the service and ED and more GP referrals encouraged.

**Clinical Age Assessment Unit, Mid Western Regional Hospital, Dooradoyle, Limerick.**

**Service Outline:**

Aim of the unit is to provide older people with ready access to specialist medical and nursing management backed by readily accessible diagnostic facilities in a user-friendly environment.

**Assessment:**

Syncope study, DXA scanning, 24 hours blood pressure monitors and Holter (ECG) monitors, limited pulmonary function testing.

**Intervention:**

All reports are reviewed by Geriatrician, and medical intervention recommended if required. A full report is returned to the point of referral (GP or consultant)

**Staff:**

2WTE nurses. Under direction of 2 consultant Physicians/Geriatricians.

**Referrals From:**

Service available to inpatients and outpatients of Geriatrician's, and other referring consultants. GPs may refer patients for DXA scanning.

**Numbers Seen:**

Approximately 450 – 500 per annum.

**Bantry General Hospital, Cork.****Service Outline:**

A falls clinic is run one afternoon a week.

**Assessment:**

Medical review, including weight, ECG, and blood pressure. Review of medication, full falls history. If necessary, tilt-testing.

**Intervention:**

Following the initial clinic visit, appropriate community OT, Physiotherapy and District Nursing Services are organised. An advice sheet on falls prevention has been designed and is given to patients.

**Referrals From:**

GPs, ED, Medical and Surgical colleagues and community based Physiotherapists.

**Numbers Seen:**

200 – 400 new patients per year.

**St Vincent's University Hospital, Dublin.**

**Service Outline:**

STRATIFY was introduced to screen for falls risk in a 28 bedded care of the elderly ward.

**Assessment:**

STRATIFY.

**Referrals From:**

All inpatients screened.

**Numbers Seen:**

200 inpatients screened during initial pilot period (2004).

**Evaluation:**

Data collected over a 1-year period (2004). All patients over 65 admitted to a 28-bedded care of the elderly ward incorporating a 9-bedded stroke unit were assessed. 200 patients screened for falls. After introduction of assessment tool there was a significant reduction in the recorded falls from 79 (2003) to 28 (2004) as reported by hospital risk management.





# Appendix 4a

Examples of Physiotherapy Led  
Multidisciplinary Programmes

## Irish Society of Chartered Physiotherapists (July 2007)

### ACUTE HOSPITALS FALLS SERVICES

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE Dublin / North East	YES	No additional staff allocated. Current staff from COE provide cover; Falls initiative on 4 wards- MDT ward round, risk stratification, hip protector pads (assessment by physiotherapist, provided by nursing personnel). Day hospital screening for outpatients. Inpatient and outpatient balance classes	Extension of current service/ expansion of day hospital to 5 days. If additional resources (especially staffing) could provide better service on wards, more active rehabilitation etc.	Fiona Keogan Acting Physiotherapy Manager Fionakeogan@beaumont.ie
HSE Dublin / North East	YES	MDT falls prevention team established in rehab. Unit comprising- PT/OT/NURSE/SPR/HEALTH PROMOTION. FRASE assessment tool in use. Hip protectors in use as appropriate. ED Physio/OT assessment available. Footwear/orthotic involvement available.	Assessment tool to be rolled out hospital wide for use by nursing staff. Development of MDT falls prevention classes. Develop post fall protocols. Provision of on going training for new nursing staff on use of screening tool.	Mary Lyons Senior Physiotherapist mary.lyons2@hse.ie
HSE Dublin / North East	NO	Current service - falls prevention group in-house looking at falls integrated care pathway (MDT); balance class for inpatients available, hip protector pads on wards, OPD - BP taken, bloods etc and medication checked.		Anne Horgan Acting Deputy Physiotherapy Manager ahorgan@mater.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE Dublin South	YES Medical led falls and blackout clinic No funded Physio involvement	Physio assistant led balance class in day hospital. ED - mobility/ falls Physio assessment and referral to other services e.g. community for treatment. 0.1WTE post. Balance class in rehab unit Physiotherapy osteoporosis focus group that holds public lectures for at risk patients that includes fall information.	Proposal submitted for a clinical specialist physiotherapist for falls in care of the elderly but would also work in ED and other acute medical area.	Niamh Murphy Physiotherapy Manager nimurphy@stjames.ie
HSE Dublin South	NO		We propose to set up a multidisciplinary education programme in the near future.	Niamh Ni Fhloinn Physiotherapy Manager N.NiFhloinn@stmichaels.ie
HSE Dublin South	NO	Physiotherapy assessment in a day hospital setting with input from medical and nursing staff, OT, Social Work.  Access to refer into community based OTAGO falls prevention programme from ED, Day hospital and ward settings.  Nursing staff at ward level provides hip protectors.  OT provide a footwear clinic	Currently developing a post for falls prevention nurse specialist – this has been advertised twice unsuccessfully and may now be opened up to other disciplines	Catherine Toole Physiotherapy Manager St Vincent's University Hospital, Elm Park, Dublin 4, Ireland. Phone (353) 01 221 4592 / 221 4467 Bleep 162 c.toole@st-vincent's.ie
HSE Dublin Midlands	NO	Physiotherapist carrying out falls assessment and providing individual balance training and exercise programmes. Referral to footwear clinic	MDT falls assessment and service as part of service planning	Letitia Gilhooly Senior Physiotherapist letitia.gilhooly@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE South East	NO	None	Falls Protocol being developed currently	Mary T Moynahan Physiotherapy Manager maryt.moynihan@hse.ie
HSE South East	Not really- those referred to the geriatricians are seen at day hospital by multidisciplinary team but it is not exclusively for fallers.	None really apart from geriatric day hospital where there is a 0.5 WTE physio. All physios can provide hip protectors if they feel indicated. We can refer for shoes to many different suppliers - we only refer and have no further input. No input from ED at all re fallers - they refer, with e.g. soft tissue injury but not otherwise.	None at present – if the geriatric day hospital is extended to a full day service and the appropriate staffing comes with it then it would be something we would hope to do. At the moment though there are no definite plans.	Eileen Long Deputy Physiotherapy Manager eileenplong@hse.ie
HSE South	YES Yes, falls and funny turns consultant led clinic, for assessment, medical treatment, or onward referral to local physio service. OT involvement pending.	3.5 hours per week given by hospital based Physio, common PT assessment form follows patient to local physiotherapy dept where from it may be more appropriately completed, Fall Classes, i.e. awareness, and exercise given at all Day Care Centres by PTs, 1 to 1 programmes, and falls prevention classes in development where facilities appropriate in 2 centres. 1 senior physio as Lead Physio in Falls, and each service location is devising a Falls Action Plan appropriate to their needs/facilities/resources.	Elder Care Group planning a MDT/Public/ GP/Home Helps/family Fall Prevention Awareness Week this November, I am lead in planning same, 1 week of education in many forms at many locations to; Educate on prevention; Raise awareness of the need and how to prevent. ; Involve everyone in same, as a first step in an effective MDT/Multifactorial Fall Prevention action I have also drawn up plans to create an outside Fall Prevention training ground at Clonakilty DCC; this will include paths of different surfaces, i.e. gravel, tarmacadam, concrete, steps, reaching activities plus additional sensory stimuli. We are awaiting Pobal Funding for same.	Liz O'Sullivan Physiotherapy Manager Liz.osullivan1@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED Input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE South	YES	Falls and Mobility Group run in Day Hospital. Referral criteria incl. living at home, history of falls, referred from Rehabilitation Unit or Geriatric OPD. No GP referrals. 6-8 people in a group, runs for 6 weeks. Physio and OT led. Comprises balance, strength and endurance class, falls recovery, education and home visit if required. Berg Balance Scale and falls recovery used as tools. Hip protectors offered to all. Group takes 2 hrs once a week.	Expand exercise component, as space is limited at present. Run an ongoing balance and exercise class post falls group to maintain gains made in 6 weeks. Develop links with community led falls groups in Cork City. Develop standardised assessment form for falls group	Sinead.gallagher@hse.ie Elizabeth.shinnick@hse.ie
HSE South	NO	OPD service following local Geriatric referral. Assessment, Orthotics, Hip Protectors in OPD/Wards. 2.8 WTE Physios. No OT service. Community Service follow up at home	Geriatrician planning of future services is now looking to Community service for falls clinic/physio follow up.	Norma O'Shea Physiotherapy Manager Norma.oshea@hse.ie
HSE South	NO	Falls pathway in place, 1 BG physio with special interest doing 5 hours week falls, Balance Class – 6/52 course	Funding being sought for clinical nurse specialist and senior physio for falls	Lisa Broderick Physiotherapy Manager lbroderick@muh.ie
HSE West / North West	NO	Use Hip Protectors Orthotic Clinic x 1/12 in Physio Dept	Nothing specific but may be on the objectives for late 2007/08	Roisin O'Hanlon Physiotherapy Manager Roisin.ohanlon@hse.ie
HSE West / North West	NO	No classes held for this client group. 1 snr PT care of elderly, 2 PT WTE med rehab, 2 PT WTE surgical rehab	1PT WTE pilot, ED, no impact on this client group to date, currently under review to include this group. PT in care of the elderly keen to set up classes, has PT	Norah Kyne Physiotherapy Manager Norah.kyne@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE West / North West	NO	MAU do some screening but no PT input	No plan at present but as MAU is developed we will be involved	Margaret Egan Physiotherapy Manager Margaret.egan@hse.ie
HSE West / North West	NO, we had a service for a while but Consultant with interest in same left. No resources for this at moment	Medical rehab physio covers specific referrals e.g. from AE for assess / balance re-ed / hip protectors.	Would like to see the previous level of service running again but not being seen as priority in the hospital at present. Had MDT running a weekly clinic in OPD but no resources to keep it running.	Fiona McGrath Physiotherapy Manager Fiona.mcgrath@hse.ie
HSE Dublin Midlands	NO	Laois Physiotherapy service is a combined Acute/PCCC service. Physiotherapy led Falls classes (with GP clearance) have been carried out in 2006 & 2007 in 4 locations across the county (including MRHP OPD - time allocated from WTE in OPD service for the duration of the classes). These have focused on the physiotherapy element (balance, strength & safety) with input from other disciplines where available (relevant disciplines not consistently available in all areas). Hip protectors are available as required. ED referral system in place and links are well established within the physiotherapy service for onward referral to our PCCC staff to follow up people at home for home based interventions as indicated.	Physiotherapy Manager currently on a working group (Acute & PCCC in the former Midland Area) led by one of the Risk Managers - designing a Multidisciplinary Falls Risk assessment tool & flowchart of action plan to be used in all settings. Also under discussion are standardised Physiotherapy and Occupational Therapy Assessment tools to further assess those identified as at risk of falling. This process will facilitate MDT approach to the management of falls; Physiotherapists (with Dieticians) have been active with local community groups – giving talks on prevention and management of osteoporosis. Discussions will be commencing in August between members of the Laois Physiotherapy Service and local authority sports partnership regarding promotion of sport in older people.	Mary Gorman Physiotherapy Manager Laois Services. MRH Portlaoise 086-8069840 057 8696555/8696553 Physiotherapy Dept. 057 8696554 Mary.gorman@hse.ie

HOSPITAL		Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE Dublin Midlands	Midland Regional Hospital Tullamore		<p>Similar to Laois, our service spans acute and community.</p> <p>Currently providing a multi –d (physio, OT and nursing) falls prevention programme in Birr Community Nursing Unit (Day care patients) Otago programme</p> <p>Osteoporosis class running in MRHT which addresses strength, ROM and balance but not specifically for falls.</p> <p>Hip protectors provided in the community as required. In domiciliary setting individualised falls prevention strategies carried out</p>	<p>Group formed (regional) to look at falls risk assessment in all sites from acute-long stay- domiciliary. Screening tool being developed with clinical pathway. Same as mentioned by Mary Gorman.</p>	<p>Claire Donnelly Physiotherapy Manager claireB.donnelly@hse.ie</p>
HSE Dublin Midlands	Midland Regional Hospital Mullingar	YES	<p>.5 WTE physiotherapist from existing staff compliment Consultant, Gerontology Nurse specialist/ osteoporosis clinic coordinator, OT, ophthalmology if indicated. Musculoskeletal/balance assessment/ fear of falling questionnaire, osteoporosis advice/info, osteoporosis exs, Otago balance prog, safety in home/home visit by OT (if available) if reqd. osteoporosis clinic.</p> <p>Hip protectors/orthotic clinic as indicated</p>	<p>Bone Health with group advice/exs. Information leaflet</p>	<p>Sheelagh Canavan Physiotherapy Manager Sheelagh.canavan@hse.ie</p>
HSE North East	Our Lady's Hospital Navan	NO	<p>Patients referred for reduced mobility seen as urgent cases in the OPD Orthotic Clinic once monthly in department</p>	<p>None planned currently. Believe we have good community based projects.</p>	<p>Lara Bourton Cassidy Physiotherapy Manager Lara.bourtoncassidy@hse.ie</p>

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
HSE North East	No	No such service within acute site	Development re Fall's prevention in Louth PCCC-see attached.	Shay Englishby Physiotherapy Manager Shay.englishby@hse.ie
HSE North East	NO			Karen Gunn Physiotherapy Manager Karen.gunn@hse.ie



## NON-ACUTE HOSPITALS FALLS

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
St Michael's House		We provide services for clients with intellectual disability. We have a large population and we have commenced some balance/falls screening and some individual and small group classes/exercise programmes in our adult workshops. We have seen some improvement in Berg assessments following intervention but have limited resources to expand. We also find that the benefits are short term and need to be repeated.		Riana O'Coifaigh Physiotherapy Manager Riana.ocofaigh@smh.ie
Our Lady's Hospice Harold's Cross Dublin	YES – MID Team	3 WTE physiotherapists The Falls Programme is running in conjunction with 2 WTE OTs with previous input from Pharmacy. Falls and exercise education class fortnightly Safety in the home class (OT fortnightly) Balance classes twice weekly Clients receive daily individualised exercise programmes including balance re-education Hip protectors provided where indicated Referrals made to onsite footwear clinic where appropriate	Current service running for the past two years An audit of the programme is currently being carried out in conjunction with the OTs	Eithne Walsh Physiotherapy Manager eithne.walsh@olh.ie
Cappagh Orthopaedic Hospital	NO	All patients will be assessed and their risk of falling/balance issues form part of that assessment. We prescribe exercise pre and post joint replacement that include specific exercises for balance and fall prevention		Jill Long Physiotherapy Manager jilllong@eircom.net

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
Clontarf Orthopaedic Hospital	NO	Sub acute orthopaedic rehabilitation hospital We have only 7 part-time senior posts to provide a daily physiotherapy service for 96 in-patients and no out patient physiotherapy service. Since I started here I was fortunate enough to get involved in the Balance Interest Group (BIG) - a network group set up in the Dublin North East area initially and are therefore in touch with latest best practice and available programmes in our area and recommendations and pitfalls for same.	We are presently entering a development phase - building has already commenced on a new clinical service unit and replacement of an existing ward. Following on from that our bed capacity is due to increase by 64 beds for medical rehab by April 2009 and I'm on the working group to decide patient profile. There will be 2 joint consultant posts associated with these extra beds - one from Beaumont and one from the Mater and PCCC are also involved. Initial talks lead me to believe that patient profile will remain ortho-geriatric plus patients from the acute hospital with falls/ balance disorders who have been assessed and neurological/cardiovascular causes ruled out. So looking to the future it would appear that falls programmes and resources for same will be extremely important for us also.	Gráinne O'Hara Physiotherapy Manager Incorporated Orthopaedic Hospital of Ireland, Castle Avenue, Clontarf Dublin 3 Tel: (01) 8333799 physio@ioh.ie
St Mary's Phoenix Park	NO	Patients are assessed on an individual basis by whatever physio is available and followed up as individually required and staffing permitting. Footwear or hip protectors are sourced on an individual assessed basis. We don't have any balance/falls classes at this time. Patients are also seen by other members of MDT as individually required.	None planned at present	Marian Glynn Physiotherapy Manager Marian.glynn@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
Sacred Heart Hospital, Castlebar	NO		Physiotherapy and Occupational Therapy are at present liaising with the Geriatrician to set up such a service and intend to link in with SALT, Dietician, Chiroprapist, Orthotist, Social Worker, Public Health Nurse and Psychologist. We also intend to link in with the Acute Services of Mayo General Hospital as I am aware that they have a falls prevention service at the moment	David Sands Physiotherapy Manager Sacred Heart Hospital Castlebar Co. Mayo Tel: 094 9021122 extn. 2481 Fax: 094 9026055 David.sands@hse.ie
Baggot St Community Hospital	NO	Physios treat long stay patients; assess and treat respite and day care patients. All the patients are assessed using the FRASE (Baltinglass). The day care patients attend a group class, which incorporates some balance activities (OTAGO). Patients are referred to the relevant community care area for the provision of EHP or to the footwear clinic as necessary. Four staff members including a physiotherapist are trained in giving a staff in-service on Falls Prevention.		Julia Stephenson Physiotherapy Manager Julia.stephenson@hse.ie
St Joseph's Hospital Ennis	NO	Nursing staff carry out FRASE (All wards). Physio Staff use BergTest on pts. At Risk Hip Protectors occasionally given.	Following on from Falls Project run in 2006 the FRASE and Berg are to be contd. Starting in Oct an Exercise Class for 'Fallers' will be run on weekly basis by a Physio, with an Assistant	Helen Harnett Physiotherapy Manager St. Joseph's Hospital Ennis Co. Clare 065-6863843 helen.harnett@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, OPD, ED input, footwear clinic	Please give a brief description of any planned falls service	Contact details
St. John of God Carmona Services, Dun Laoghaire for clients with an Intellectual Disability		We will continue with our groups and have developed outcome measures to suit our population. We use hip protector pads for some of our clients Orthotics clinics are held every 3 weeks and there is a constant review of 'at risk clients' We initially held group classes 3 weekly but had to cut the classes down to once a week due to staff constraints. Classes at present are held in the local community leisure centre for 2 different groups and address balance and exercise tolerance.	We have not linked in with the community services as our population require basic exercise. Need to be able to change exercise if clients are not attending, and increased staff support	Theresa.ghalaieny@sjog.ie
Peamount Hospital	YES	Official Falls Prevention Team initiated in August 2006 Make – up: CNS for Older Persons, Snr Physiotherapist and Snr Occupational Therapist. Monthly Meetings. Introduced Notification/Referral form, trialed for 3/12 then adopted. Forms collected weekly and discussed and recommendations made. Agreement from physiotherapy department that hip protectors would be prescribed and supplied by Falls Team. (Prior to this the physiotherapist in the C of E units would have assessed for and supplied most suitable hip protection, and advice on falls prevention) Posters supplied to all relevant units Physiotherapists using CSP (UK) Falls Prevention Guidelines.		Anne Sheedy Physiotherapy manager asheedy@peamount.ie

## COMMUNITY PHYSIOTHERAPY SERVICES

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
Dublin North Central LHO	NO	<p>Postural Stability Class – based on the Later Life Training Programme (FaME).A pilot programme for 12 weeks started in a community centre in Marino on 18 July. Class is for 1 hour per week followed by tea and discussion. Staffing: 2 physiotherapists: 10 participants.</p> <p>Currently all physiotherapists screen everyone over 65 referred for physiotherapy using the Elderly Falls Screening Tool and offer individual interventions for people at risk. Interventions include exercise programmes – e.g. Otago, FaME</p> <p>Footwear assessment and supply of appropriate shoes. Hip protectors are supplied following assessment when indicated. Assessment for mobility aids</p> <p>Referral to other health professionals</p>	<p>Planning a pilot project to implement a falls and osteoporosis prevention programme for older people enrolled with the Primary Care Team in Ballymun. It's a multidisciplinary programme and a partnership between Population Health and PCCC services. We're using the NICE guideline 21 the NHS Connecting for Health Do Once and Share Falls Pathway as a basis for the programme. Start date – November 2007</p>		<p>Aine O Riordan Acting Physiotherapy Manager LHO Dublin North Central 56 North Clarence St Dublin 1 Email: aine.oriordan@hse.ie 087 9081051</p>
Meath PCCC	YES Pilot	<p>In Meath PCCC, we have run 2 different pilots, a uni and a multidisciplinary pilot in an inpatient/outpatient/day hospital facility and a day hospital facility respectively. We are hoping to lobby locally for some level of resources to support the rollout of this programme across the county to be available for all those at risk with a keen emphasis on reaching the population before they are at risk, increasing their awareness of prevention and early detection etc. We have a long way to go but when I see the potential to prevent falls, cost of healthcare savings and QOL for fallers, their families, the HSE and society at large, it drives us to continue.</p>			<p>Ann Bourke Physiotherapy Manager 046 9097852 anne.bourke@hse.ie</p>

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
St. Vincent's Hospital Mountmellick, Co. Laois	NO	<p>Clients with falls risk or incidence are absorbed onto general caseloads of OPD, in-pt caseload (LTC facility of 160 beds) and daycare service (15-20 clients a day PT Domiciliary service in Laois is also very comprehensive (fallers regularly crop up on this service). Falls class was completed earlier this year, and we do have access to OT on site.</p> <p>Use hip protectors as indicated- provision of such to local intellectual disability site also. Have run footwear clinics in the past to great effect. Clients were very much encouraged to self fund their footwear unless they had a specific disability</p>	<p>Planned falls service - more of the same including taking on an 8-bedded Alzheimer unit in Jan where fall incidence may well be a factor. Will repeat falls class if numbers sufficient.</p> <p>Also tying in with the Laois Sports partnership group to run educational sessions on Osteoporosis, falls etc. in '08.</p>		Physio.mountmellick@hse.ie
N/S Lee PCCC	YES	<p>Includes 1 WTE Senior Community Physiotherapist as well as Nursing OT, Specialist Geriatric Registrar and Rehabilitation assistants.</p> <p>0.2 dedicated WTE Clin Specialist Physio, balance class and individual treatment, hip protectors yes, Physio orthotic clinic once a month not specifically for falls but can refer fallers</p>	<p>Mapping project of existing services for fallers in our area currently underway to improve hospital PCCC coordination of service provision.</p>		Eileen.moriarty@hse.ie
Limerick Community	NO	WTE dedicated to same	We did draw up Guidelines for the assessment and treatment of a person at risk of falling in 2006.		Kathy.nugent@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
LHO North Dublin	MDT service-NO	<p>8 week balance class with pre and post assessment and reviews at eight weeks and six months post class; three classes running ongoing.</p> <p>Hip protectors are sanctioned for medical cardholders living in Nursing Homes and are occasionally ordered for people in the Community.</p> <p>There are two footwear/orthotic clinics held in the area every four-five weeks.</p> <p>We have not been given extra resources to run these classes/clinics. Four Physios are involved, all of whom carry a caseload as well as running the classes/clinics.</p> <p>The Community Physios identify appropriate clients for the classes/clinics but as with all of our services we operate an open referral system.</p> <p>Mobility devices are ordered and OT referrals sent as necessary.</p>	<p>Due to the development of a long waiting list for the balance class in the city end of this area, we recently set up a second balance class.</p>	<p>The Physios involved in the balance class here meet up with other Physios in the area (acute and PCCC) who are running the same class based on the OTAGO programme. We have taken clients off the Beaumont balance class waiting list in the past when we have had spare capacity. We do not have a joint service with the acute hospital.</p>	<p>Jane Hourihan A/Physiotherapy Manager Jane.hourihan@hse.ie</p>
West Kerry Primary Care	NO	<p>Physio calls out to patients and inform them about falls management techniques, and also provide hip protectors walking aids etc where needed.</p>			<p>Emilie.roberts@hse.ie</p>

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
North Cork Community Services Mallow	NO		With a staff of 6 WTE across a population of 73,000 the staffing levels have been one of the main limiting factors affecting initiating such a programme. The second limiting factor is suitable clinic space. None of our community physiotherapy facilities have sufficient space.	We have close linkages with Mallow General Hospital and receive referrals from the geriatrician who is also keen on initiating such programmes. Limiting factors are as listed.	Patricia.morrisroe@hse.ie
Clare Community Service	NO	There are 3.4 WTE senior staff employed to cover the county population predominantly elderly and disability caseload. Berg Balance Scale is routinely used.	None	St. Joseph's Hospital in Ennis may be initiating a falls clinic- hoped to liaise with St. Joseph's to follow up on patients attending the falls clinic in the domiciliary setting.	Physiotherapy Manager Sheila.nyan2@hse.ie
Mid West Primary Care	NO	Our current falls service is on a one-to one basis. Recurrent fallers are assessed either as in-or out-patients using a standard neuromusculoskeletal assessment. The Berg balance scale is the outcome measure used. Patients are treated as necessary and may be followed up in day hospital on discharge. Patients can be assessed for suitable footwear which they can purchase at their own expense. Patients may also be measured for hip protectors, usually if cognitive problems impair their response to active treatment. Again, the patient must get these at his/her own expense.	We are hoping to start a falls class in the next few weeks. this is still under discussion but will probably start as an in-patient service. We link with clinical age assessment unit in the MWRH if patients require tilt or osteoporosis work-ups		Fiona.bourke@hse.ie



HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
Mayo PCCC	NO	No Structured group of MDT activity. However we accept referrals for patients with falls history and provide treatment including balance, orthotics hip protectors etc	Hope to develop falls service within the next year in conjunction with our new Primary Care Physio Staff.	Have linked closely with staff in Mayo General Hospital and will incorporate acute link in proposed new Community Services	Anne Canning Physiotherapy Manager Health Centre, Swinford Co. Mayo 094 9251000
Limerick PCCC	Yes in one primary care team area MDT Falls prevention programme in operation	Falls prevention programme including Doctor, PHN, OT, Dietician, Physio, Therapy assistant 1 hour exercise programme including cardiovascular work and endurance, balance, strengthening, flexibility and backward chaining. Followed by a session on education coping with a fall, home safety, diet, footwear, over 10 weeks. Service to individuals at risk or who have a history of falls is limited to domiciliary visits as clinic space is not available in other areas. Falls guidelines have been developed that follow recommendation of CSP and NICE guidelines	Expected with the roll out of additional primary care teams and availability of clinic space that clients can be offered a more comprehensive clinic based service.	None	Mary O'Malley Physiotherapy Manager Maryc.omalley@hse.ie
North Tipperary/ East Limerick	NO	Falls training on an individual basis as needs arise.	Plans to work with the Clinical specialist for the elderly to develop a falls programme for primary care teams in the future	None	Physiotherapy manager aislingM.ryan@hse.ie

HOSPITAL	Does your hospital have a specialised multidisciplinary falls service? YES or NO	Please give a brief description of the current falls service e.g. WTE physiotherapy staff, other MDT, balance class, use of hip protector pads, footwear clinic other	Please give a brief description of any planned falls service	Joint services with local acute hospital physiotherapy services	Contact details
Carlow/ Kilkenny	NO	<p>Community Care Physiotherapists worked in collaboration with physiotherapists working in Acute sector in 2005 – 2006 to devise "Carlow/ Kilkenny Protocol for Physiotherapeutic Management of Falls"; This evidence based protocol is used by all physiotherapists working with persons over 65 years.</p> <p>In Carlow/ Kilkenny, there is one full time post in Community Care specifically for Care of the Elderly. This physiotherapist in this post uses the Protocol described above for management of persons over 65 years. Hip protectors are ordered for patients if indicated. There is a monthly orthotic clinic run in Carlow and Kilkenny, within which physiotherapists are involved. Also, there is a specialist footwear clinic in Kilkenny, where clients may be referred if deemed necessary.</p> <p>Carlow/ Kilkenny Community Care physiotherapists currently do not offer group classes for management of falls.</p>	<p>Primary Care teams are presently being rolled out across Carlow/ Kilkenny Care. It is envisioned that Falls Prevention may be an area considered for team-run health promotion activities. The current full time Community Care post specifically for Care of the Elderly may be re-configured to allow more time for developing specific falls prevention activities</p>	<p>Both Community Care and Acute hospitals follow the "Carlow/ Kilkenny Protocol for the Physiotherapeutic Management of Falls".</p> <p>Use of same assessment tools e.g. EMS, Berg Balance and Tinetti Scale allow ease of transfer of patients from acute services to community care.</p>	<p>Sinead Gavin Sen Physiotherapist, Community Care, Kilkenny Sinead.galvin@hse.ie</p> <p>Collette McDonald Physiotherapy Manager 059 9136527</p>



# Appendix 4b

Occupational Therapy Submission

# Appendix 4b: Occupational Therapy Submission

## Falls and Fractures Prevention - July 2007

Submitted on behalf of AOTI by:

Tadhg Stapleton, Lecturer in Occupational Therapy, Discipline of Occupational Therapy, Trinity College Dublin.

Tracy Swanton, Occupational Therapist Manager, St. Vincent's University Hospital, Dublin.

### 1. Introduction

Multidisciplinary, multifactorial, health/environmental risk factor screening and intervention in the community are interventions that are likely to be beneficial for older people with a history of falling or who are at risk of falling.

Gillespie LD., Gillespie WJ, Robertson MC., Lamb SE., Cumming RG., Rowe BH. (2003) Interventions for preventing falls in elderly people. *The Cochrane Database of Systematic Reviews* 2003, Issue 4. Art. No.:CD000340. DOI: 10.1002/14651858.CD000340

Multifactorial falls risk assessment and management programmes consisting of exercise, environmental modifications, and education has been found to be the most effective combination in the reduction of falls.

Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttrop MJ, Roth EA, Shekelle PG (2004). Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomised clinical trials. *British Medical Journal*. 328, March 2004, 680-683.

Suggested areas of Occupational Therapy involvement in the assessment of a person who has fallen should take cognisance of the person, their environment and their everyday occupations and how the interplay of all three elements may influence the occurrence of falls.

A systematic review of Occupational Therapy for elderly people found some evidence for the efficacy of occupational therapy in reducing the incidence of falls among elderly people. The occupational therapy interventions focussed on a combination of skills training and home hazard assessment decreased the incidents of falls in elderly people at high risk of falling.

Steultjens E, Dekker J, Bouter L, Jellema S, Bakker E, van den Ende C (2004). Occupational therapy for community dwelling elderly people: a systematic review. *Age and Ageing*. 33, 453-460.

A study by Tolley et al (2003) found that falls had a negative impact on the elderly person's participation in leisure activity and increased their anxiety that impacted negatively on their execution of ADL tasks. Participation in an occupational therapy falls prevention programme was found to reduce the negative impact of falls on the person's everyday participation and activity.

Tolley L, Atwal A (2003). Determining the effectiveness of a falls prevention programme to enhance quality of life: an Occupational Therapy perspective. *British Journal of Occupational Therapy*. 66(6), 269-276.

Occupational Therapy assessment of the person who has fallen, or who may be at risk of falling, should include a Home Hazards assessment, personal and extended activities of daily living assessment, development of a fall behaviour profile that would include

examination of the persons' habitual mode of completing everyday activities and how the person's habitual interaction with their environment contributes in a positive or negative manner to their fall behaviour or risk of falling. Performance components that may contribute to the fall behaviour should also be assessed, these components should include, but are not necessarily limited to, cognition (including attention and divided attention), vision and visual perception, balance and functional mobility.

## 1.2 Occupational Therapy Falls Assessment and Intervention

Evidence suggests that the role of Occupational Therapist lies in the following four areas listed below:

- i. Home hazard assessment and intervention**
- ii. Cognitive impairment**
- iii. Visual abnormalities and perceptual deficits**
- iv. The older persons perceived function and fear of falling**

### i. Home Hazards and Falling

Interventions combining exercise, home hazard modification and management of reduced vision showed significant reduction in falls. Home safety interventions for known fallers reduced the risk of falling.

Gillespie LD., Gillespie WJ, Robertson MC., Lamb SE., Cumming RG., Rowe BH. (2003) Interventions for preventing falls in elderly people. The Cochrane Database of Systematic Reviews 2003, Issue 4. Art. No.:CD000340. DOI: 10.1002/14651858.CD000340

Cesari et al (2002) found that elderly people who lived in an unsafe environment with environmental hazards had a greater risk of falling (Odds ratio 1.51: 95% CI 1.34-1.69)

Cesari M, Landi F, Torre S, Onder G, Lattanzio F, Bernabei R (2002) Prevalence and Risk factors for Falls in an older community-dwelling population. *Journal of Gerontology*. 57A(11), 722-726.

In a randomised controlled trial among elderly people with visual impairment an occupational therapy based home safety programme was found to be the most effective programme in reducing falls among the participants. The programme was home based and focussed on home environment modification and behaviour change.

Campbell AJ, Robertson MC, La Grow SJ, Kerse NM, Sanderson GF, Jacobs RJ, Sharp DM, Hale LA (2005). Randomised controlled trial of prevention of falls in people aged >75 with severe visual impairment: the VIP trial. *BMJ*. 331, 817

A randomised controlled trial examining the outcomes of a combined medical and occupational therapy assessment found a significant reduction in falls among the intervention group at 12 month follow up. The occupational therapy intervention consisted of one home visit focussed on identification of environmental hazards, minor environmental modifications were completed, minor assistive equipment was supplied, and referral made for social services occupational therapy follow-up for more structural modifications within the home.

Close J, Ellis M, Hooper R, Glucksman E, Jackson S, Swift C (1999). Prevention of falls in the elderly trial (PROFET): a randomised controlled trial. *The Lancet*. 353, 93-97.

NICE UK guidelines on falls assessment and prevention state: 'older people who have received treatment in hospital following a fall should be offered a home hazard assessment and safety interventions/modifications by a suitably trained healthcare professional'. (A)

Falls the assessment and prevention of falls in older people. National Institute for Clinical Excellence (NICE). Clinical Guideline 21, November 2004.

Cumming et al (1999) looked to determine whether home assessments targeted at environmental hazards reduce the risk of falls and concluded that a home visit by an Occupational Therapist can prevent falls among older persons at increased risk.

Cumming RG, Thomas M, Szonyi G, Salkeld G, O'Neill E, Westbury C, Frampton G: (1999). Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomised trial of falls prevention. *Journal of the American Geriatrics Society*. 1397-1402.

Gill (2000) carried out detailed analysis and reported the following contributors to the risk of falls:

Loose rugs and mats: hazard ration = 5.87/ 95% C11.42) and carpet folds as tripping hazard: hazard ratio 3.45/95% CI 1.29-9.27)

Level B evidence that older persons at increased risk of falls should have an assessment of their home by an Occupational Therapist.

Falls the assessment and prevention of falls in older people. National Institute for Clinical Excellence (NICE). Clinical Guideline 21, November 2004.

Paressus et al (2002) in a RCT examined if Occupational Therapy (OT) Home Visits reduced the risk of falling and improved autonomy. The study concluded that OT home assessment during hospitalisation of older people at risk of falls better preserved the patient's long term autonomy.

Paressus V, Puisieux F, Di Pompeo C, Gaudefroy C, Thevenon A, Dewailly P: (2002). Benefits of home visits for falls and autonomy in the elderly: a randomised trail study. *American Journal of Physical Medicine and Rehabilitation*. 247-252.

NICE (2004) clinical practice guidelines recommend that in its rehabilitation strategies the following are included:

- Teaching awareness of hazards and how to avoid them
- Improving the safety of the older person's environment by removing, replacing or modifying any hazards.

Fall programmes focussed on exercise, home hazard identification and fall prevention education have been found to significantly reduce the incidence of falling among the intervention group compared to the control group. Home hazard identification and reduction was perhaps the most significant contributing factor to the reduction in falls.

Deiner D, Mitchell J. (2005). Impact of a Multifactorial Fall Prevention Program upon falls of older frail adults attending an Adult Day Care Centre. *Topics in Geriatric Rehabilitation*. 21 (3), 247-257.

Based on research to date it is recommended that fall prevention programmes maintain a multifactorial approach that includes exercise, home hazard management and client education. Emphasis should be placed on the context of the fall behaviour and should ideally include some home based intervention. The fall prevention programme should focus on facilitating increased awareness of fall risk behaviour, encourage behavioural change particularly related to habits and routines that have become automatic but may be increasing the person's risk of falling.

## ii. Cognitive Impairment and the Occupational Therapist Role:

### Attention and Falling

Research has shown a relationship between attention and postural control. When required to complete two tasks simultaneously there is typically a dual task decrement where the performance of the individual tasks is usually better under single task conditions. Most of the research in this area to date is with people with neurological deficit such as CVA, there has been little research examining dual task performance or divided attention among elderly fallers. Dual task decrement is typically observed when subjects are required to divide attention between a cognitive and a mobility task.

One study specifically examining dual task performance of healthy elderly fallers compared with that of non-fallers found a significant difference in gait parameters between fallers and non-fallers when tested under dual task conditions. The focus of this research was on gait parameters, however it does highlight the impact of dual task or divided attention and its' negative impact on gait and stability.

Toulotte C, Thevenon A, Watelain E, Fabre C (2006). Identification of healthy elderly fallers and non-fallers by gait analysis under dual-task conditions. *Clinical Rehabilitation*. 20, 269-276.

A simple test referred to as 'stops walking when talking' was found to have a high positive predictive value in identifying elderly people who were at risk of falling. Elderly subjects who were unable to complete the dual task of walking and talking simultaneously, i.e. those who stopped

walking when they had to answer a question thus displaying some element of impaired divided attention, had a higher proportion of falls than those who could perform the two tasks simultaneously.

Lundin-Olsson L, Nyberg L, Gustafson Y (1997). "Stops walking when talking" as a predictor of falls in elderly people (Research Letter). *The Lancet*. 349, 617.

Sustained and divided attention deficits correlated with functional impairment and falls in a sample of community dwelling people with stroke. Attention deficit might contribute to accident prone behaviour.

Hyndman D, Ashburn A (2003). People with stroke living in the community: attention deficits, balance, and ADL ability and falls. *Disability and Rehabilitation*. 25(15), 817-822.

### iii. Vision

#### Perception and Falling

Spatial disorientation is considered to be a risk factor related to falls. Environment issues related to visual perception and attention i.e. colours and patterns, interior furnishings, negotiation of space, background noise, object recognition.

#### Visual abnormalities:

Recommend adaptive strategies incorporating behavioural and environmental components to reduce the risk of falling. (Exploratory piece of research based on observational research, no hard evidence/quantitative measure of fall or fall reduction).

Buri H., Picton J., Dawson P (2000). Perceptual dysfunction in elderly people with cognitive impairments: a risk factor for falls? *BJOT*. 63(6). 248-253.

### iv. Assessment of the older person's perceived functional ability and fear of related falling: Behaviour and Falling

Research has found several behavioural factors associated with falls in the elderly.

Collision in the dark, failure to avoid hazards, excessive environmental demands, habitual environmental use, and environment characteristics were patterns of behaviour associated with falling.

This study highlighted the issues of the persons' habits and 'way of doing things' that might be putting them at risk of falling. Elimination of the factors is likely to be closely related to the person's perception that their environment or how they use their environment as well as their desire to make any changes.

Connell BR., Wolf SL. (1997). Environmental and Behavioral Circumstances Associated with Falls at Home Among Healthy Elderly Individuals. *Arch Phys Med Rehabil*. 78. 179-186.

An in-depth qualitative study exploring the behavioural factors contributing to older adults falling in public places identified 10 behaviours that were factors in the fall events reported by 15 older adults. Several of the factors identified had an attentional component, such as not attending to the route ahead, not attending to environmental hazards and being distracted by other elements in the environment. Physical factors such as not using assistive walking devices, hurrying, and previous overexertion causing fatigue were common. Behavioural factors such as lack of confidence and the need to alter behaviour particularly when in an unfamiliar environment contributed to the fall events.

Clemson L, Manor D, Fitzgerald MH (2003). Behavioral factors contributing to Older Adults falling in Public Places. *OTJR: Occupation, Participation and Health*. Summer 2003, 23 (3), 107-117.

The 'Stepping On' group education programme found a significant reduction in falls in the elderly treatment group compared to the control group. The programme employed a cognitive-behavioural approach and consisted of group and individual treatment sessions. The treatment



sessions included community mobility, home and community safety, medication management, coping with visual impairment, and balance and strength exercise. The main focus of the programme was on encouraging behavioural changes and follow through of fall prevention strategies in everyday lives.

Clemson L, Cumming RG, Kendig H, Swann M, Heard R, Taylor K (2004). The effectiveness of a community-based program for reducing the incidence of falls in the elderly: A randomised trial. *Journal of the American Geriatrics Society*. 52, 1487-1494.

Fear of falling and avoidance of activity were found to be associated with higher age, poor perceived general health and multiple falls in a cross sectional study of 4,031 community living older people. Health professionals may need to look at strategies to reduce fear of falling and also reduce activity restriction among elderly fallers

Zijlstra GAR, van Haastregt JCM, van Eijk J, van Rossum E, Stalenhoef PA, Kempen GJM (2007). Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. *Age and Ageing*. 36 (3), 304-309.

## 2. Occupational Therapy Measurement Tools in Falls Intervention

Suggested measurement tools for use by Occupational Therapists in the Assessment of the person who has fallen and also tools that may be used to measure outcomes of intervention are as follows:

### 2.1 Home Hazard and Assessment Outcome Measures

Some home environment rating scales have been developed that look specifically at fall risks and hazards in the home environment. The tools rate hazards both inside and outside the home.

- **Safer-Home v.3.**  
COTA Health. (COTA Health. SAFER-HOME v.3. [www.cotahealth.ca](http://www.cotahealth.ca) )

- **Westmead Home Safety Assessment (WeHSA). Clemson L. (1997)**  
Clemson L (1997). Home Fall Hazards. A guide to identifying fall hazards in the homes of elderly people and an accompaniment to the assessment tool, the Westmead Home Safety Assessment (WeHSA). Co-ordinates Publications. Victoria.
- **HOME FAST**  
Mackenzie L., Byles J., Higginbotham N. (2000). Designing the Home Falls and Accidents Screening Tool (HOME FAST): Selecting the items. *BJOT*. 63 (6). 260-269

### Cognition and Perception assessments

MMSE for generic screen  
Attention Measure – Test of Everyday Attention  
Visual Attention – Behavioural Inattention Test  
Stops Walking when Talking Test (to measure divided attention functionally related to mobility)

Consider the demands the environment places on perception and attention when assessing risk in the home environment; focus should not be just on physical access and mobility.

### 2.2 Falls Behaviour and Fear of Falling Scales

#### FaB – The Fall Behaviour (FaB) Scale for the Older Person

Behavioural dimensions were identified as being associated with falling and avoiding falls – cognition, protective mobility, avoidance, awareness, pace, practical strategies, displacing activities, being observant, changes in level, and getting to the phone.

The FaB tool consists of 30 self rated questions and has been found to be reliable and valid for determining the presence or absence of fall protective behaviours.

Clemson L., Cumming RG, Heard R. (2003). The Development of an Assessment to Evaluate Behavioural Factors Associated with Falling. *American Journal of Occupational Therapy*. 57 (4). 380-388.



The Falls behavioural (FaB) Scale for the Older Person. Clemson L., Cumming R.G., Heard R. (2003). [www.ot.fhs.usyd.edu.au/publications.html](http://www.ot.fhs.usyd.edu.au/publications.html)

## Falls Efficacy Scale (FES)

### Falls Efficacy Scale-International (FES-I)

The FES-I was developed from the original Falls Efficacy Scale (FES) (Tinetti et al 1990), the FES-I consists of 16 items which include the original 10 items from the FES. The additional 6 items include walking on slippery, uneven surfaces, slopes, participating in social outings and walking in crowded places. The 16 items are rated on a 4 point scale assessing the level of concern or fear of falling while engaging in the activity (1 = not at all concerned, 4 = very concerned).

Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C (2005). Development and initial validation of the Falls Efficacy Scale-International (FES-I). *Age and Ageing*. 34, 614-619.

This is a 10-item rating measure that looks at functional based activities such as getting out of bed. Each item is scored on a scale of 1-10

Tinetti ME, Richman D, Powell L. (1990) Falls efficacy as a measure of the fear of falling. *J Gerontology Psych Sci* 1990; 45: 239-243

### Modified Activities – Specific Balance Confidence Scale (ABC- UK)

This is a self-rating questionnaire based on 16 items.

Items are very functionally based and include the persons rating of their ability as a percentage to carry out the following: picking a slipper up from the floor, reaching for a small tin of food from a shelf at eye level, walking in a crowded shopping centre

S W Parry, N Steen, S R Galaway, R A Kenny, J Bond. (2001). Falls and confidence related quality of life measures in an older British cohort.

**Frenchay Activities Index:** Assesses the frequency in which domestic and community ADLs have been completed in the previous 3- 6 months.

15 items scored on a 4 point scale form 0-3.

Jolanda cm Van Haastregt, Jos PM Diedricks, Erik Van Rossum. (2000). Effects of a programme of multifactorial home visits on falls & mobility impairments in the elderly population at risk: randomised control trial. *BMJ*, 21, 321 . 994- 998.

### Prescription and Teaching of Assistive Devices:

Grade C evidence to the benefits of assistive devices if used as part of a multifactorial intervention programme, little evidence to support their isolated use alone reduces falls.

Falls the assessment and prevention of falls in older people. National Institute for Clinical Excellence (NICE). Clinical Guideline 21, November 2004.

## Hospital Based Services

### Slán Abhaile Equipment Service

The Slan Abhaile initiative was originally set up February 2004 with the aim of providing home support and timely provision of equipment, and facilitating speedy discharges for four hospitals, St. Vincent's University Hospital, The Royal Hospital Donnybrook, St. Colmcille's Hospital, Loughlinstown and St. Michael's Hospital, Dun Laoghaire.

If the Manager of the service is of the opinion that the need for equipment is genuinely delaying a patient's hospital discharge then access to the equipment pool is granted for the following patients:

- Those aged 65 years +
- Have issues related to safety associated with discharge.
- Are not a priority 1 on the Community OT priority system
- Who would not be referred to District Care Unit (DCU)
- Are not currently known to Community OT Service.
- Who have a history of falls or dependent frail.
- Need pressure care and have a Waterlow Score of 15 – 20.

### 3. Responsive Provision of Equipment - MAN WITH A VAN:

The 'Man with a Van' service commenced in February 2005. This service includes delivering, fitting and collection of equipment, fixing small rails, stair rails and moving of furniture. He does not provide building services such as construction of ramps, fabrication of rails for external paths this is still referred to our community colleagues. The main service input was the provision of a person and the van. This service is available to four hospitals as well as Community Occupational Therapists in areas 1, 2 and 10.

#### Brief Outline of Benefits

- Patients' have continuity of service from one professional from hospital to home
- Hospital Occupational Therapists have autonomy in completing the urgent provision of equipment and facilitating safer discharges for those 'at risk' patients'.
- Community Occupational Therapists are freed up to do the more complex cases, which require their expertise.

#### Costs

To date it is estimated from the acute hospital side that the average cost per patient of discharge equipment and possible rails is €400.

It is also estimated that the reduction in length of acute hospital stay once patient is medically fit for discharge has gone from between 21- 28 bed days to 5-7 days.

#### Community Based Extension of the Service

While the 'Man with a Van' is currently hospital based it is recommended that this service be extended to the Primary/ Community Care services as they need a similar person to provide a more timely provision of community based rails to those at risk or who have had a history of falls.



# Appendix 4c

## Nutrition and Falls Prevention

# Appendix 4c: Nutrition and Falls Prevention

by Lean O'Flaherty  
Irish Nutrition and Dietetic Institute

Good nutritional status is a key component of maintaining mobility, muscle strength and bone health. Falls prevention strategies published in recent years include low body weight or body mass index (BMI) < 19 as a risk factor for falls in older people. Protein energy malnutrition, inadequate Calcium and Vitamin D and dehydration may all play a role in the propensity to fall. The evidence suggests that the relationship of poor nutrition risk of falls is indirect, affecting risk through reduced strength and resistance to the consequence of falling.

Studies comparing fallers and non-fallers report that, fallers have higher levels of nutritional risk, poorer physical fitness, including balance, lower extremity strength, and functional endurance. A poorer sense of well-being, and lower levels of confidence in activities of daily living have also been identified (Johnson *et. al.* 2003). A study of 75 elderly women admitted to hospital with a fractured neck of femur found evidence of a significantly higher prevalence of nutritional frailty and poorer dietary intake compared to day care controls. Women suffering fractured femurs had lower BMIs, body weight, mid upper arm circumferences and triceps skinfolds. They also had lower intakes of energy, fat, protein, Calcium, Vitamin D, iron, Vitamin B6 and other nutrients (Lumbers *et. al.* 2001).

One study of 330 older women with wrist or hip fracture found that, women who had suffered a hip fracture had a significantly lower BMI (Bernstein *et. al.* 1999). The authors remarked that adipose tissue over the hip, associated with a normal body weight, offered a protective mechanism. Under weight, indicated by low body mass index (BMI) in elderly women, is the best predictor of a very low bone mineral density (BMD) and general frailty. The definition

of nutritional frailty usually centres around accelerated weight loss and an associated loss of mass and strength of skeletal muscle (Kinney, 2004).

As outlined in the report of the osteoporosis subgroup, nutrition plays an integral role in the prevention of osteoporosis. Low BMI; low levels of Vitamin D; low Calcium intake; high caffeine intake; low levels of physical activity; smoking and alcohol abuse may all increase risk of osteoporosis. There is a high prevalence of osteoporosis in Ireland and osteoporosis sufferers are more likely to experience a fracture following a fall. Adequate Calcium and Vitamin D intake is crucial to develop optimal peak bone mass and to preserve bone mass throughout life. Vitamin D is necessary for the maintenance of normal plasma Calcium levels, involved in the uptake of Calcium from the gut. In addition, muscle weakness may result from Vitamin D deficiency and is reversible on supplementation (Janssen *et. al.* 2002).

According to the recent report on Vitamin D from the Food Safety authority of Ireland, suboptimal Vitamin D status is widespread in our community and includes infants, pregnant women, teenagers and older people. Older people are more likely to experience Vitamin D deficiency due to: poor dietary intake, diminished sunlight exposure, reduced skin thickness, impaired intestinal absorption and impaired activation by the liver and kidneys. Due to Ireland's northern latitude and the use of sunscreens, we cannot rely on sunshine as a source of Vitamin D. In addition to being photoconverted in the skin, Vitamin D can be obtained from the diet through ingestion of Vitamin D-containing products (eg. oily fish), from Vitamin D-fortified milk, margarine and butter, from eggs and cheese and supplementation.

Protein Energy Malnutrition (PEM) may also indirectly affect risk of falls in older people. Using a nutrition screening tool, the prevalence of malnutrition has been estimated at 14% of older people in the community and up to 21% of those in institutions (Margetts *et al.* 2003). One Irish study found 11% of older adults admitted to an acute hospital to be undernourished (Corish *et al.* 2001). PEM may increase risk of hip fracture following a fall, as a result of muscle weakness and impaired co-ordination and reaction times. Furthermore, a reduction in the protective layer of soft tissue padding decreases the protection available.

Specific nutrients may also influence risk of falls. Deficiencies of nutrients such as Vitamins B<sub>6</sub>, B<sub>12</sub>, D, A, C, E and folic acid may influence various physiological systems responsible for maintaining balance and postural stability and to increase risk of falls. In the case of B12 deficiency, symptoms include uncoordinated muscular movements, lack of balance and orthostatic hypotension, along with neurological symptoms (Shanthi and Johnson 2003). Iron deficiency may lead to anaemia, fatigue and weakness, which in turn can increase the tendency to fall.

Assessment of nutritional status, which may be carried out using a nutritional screening tool (for e.g. MUST), will identify older people who may be at risk. Appropriate dietary intervention and improvements in nutritional status may then help reduce overall risk of falls as part of the multidisciplinary team approach.

## References

- Bernstein J, Grisso JA and Kaplan FS (1999). Body mass and fracture risk. A study of 330 patients. *Clin. Orthop. Relat. Res. Vol 364*, 227-30.
- Corish CA, Flood P, Mulligan S and Kennedy NP (2000). Apparent low frequency of undernutrition in Dublin hospital in-patients: should we review the anthropometric thresholds for clinical practice? *B. J. Clin. Nutr. 84 (3)*, 325-35.
- Janssen H, Samson M and Verhaar H. (2002). Vitamin D deficiency, muscle function and falls in elderly people, *Am J. Clin. Nutrition Vol. 75, No. 4*, 611-615, April.
- Johnson CS (2003). The association between nutritional risk and falls among frail elderly, *J. of Nutr., Health & Aging Vol 7 (4)*, 247-50.
- Kinney JM (2004). Nutritional frailty, sarcopenia and falls in the elderly. *Curr. Opin. Clin. Nutr. Metab. Care Vol 7 (1)*, 15-20.
- Lumbers M, New SA, Gibson S and Murphy MC (2001). Nutritional status in elderly female hip fracture patients: comparison with an age-matched home living group. *Br. J. Nutr. Vol 85 (6)*, 733-40.
- Margetts BM, Thompsom RL, Elia M and Jackson AA (2003). Prevalence of risk of undernutrition is associated with poor health status in older people in the UK. *Eur. J. Clin. Nutr. 57(1)*, 69-74.
- Shanthi Johnson C., (2003) The Association Between Nutritional Risk and Falls Among Frail Elderly. *The Journal of Nutrition, Health & Aging, Volume 7, Number 4*



# Appendix 4c.1

Details of member dietitians  
working in the area of falls/  
osteoporosis in the Republic  
of Ireland – Report from Irish  
Nutrition and Dietetic Institute

HOSPITAL/DEPARTMENT	DETAILS OF LOCAL FALLS/ OSTEOPOROSIS ACTIVITY	LEVEL OF DIETETIC INPUT	CONTACT DETAILS OF DIETITIAN
Community Dietetics Department Letterkenny	Pilot multi-disciplinary falls prevention programme being set up in Ballyshannon/Bundoran.	Community Dietitian is a member of MDT, high risk clients will be referred to the dietitian.	Sarah Harkin Community Dietitian Sarah.harkin@hse.ie
Department of Nutrition and Dietetics, AMNCH	Falls clinic being run by a clinical nurse specialist in falls. MDT team for falls in place and nurse refers to other team members as needed.	Dietitian secretary of MDT. Regular meetings to set up and develop the service. At risk clients will be referred to the dietitian and seen within 1-2 weeks	Pauline Thomas Dietitian Pauline.thomas@amnch.ie
Department of Nutrition and Dietetics, St. James Hospital	Falls clinic being run in the hospital.	Department are seeking funding to offer a service to the falls clinic and hope to accept referrals for at risk clients. A dietitian does provide a joint talk with the physiotherapist.	Linda Dooley Dietitian lidooley@stjames.ie
Department of Nutrition and Dietetics, James Connolly Hospital	DXA scanning in place and run by an osteoporosis nurse.	No dietetic service attached to the DXA scanner	Linda Killeen Dietician Manager Linda.killeen@hse.ie
Department of Nutrition and Dietetics, Our Lady's Hospital for Sick Children	No specific service	Anecdotal evidence from dietitian of increased fractures in children on long term steroids for asthma. Bone health not formally monitored, no dietetic input.	Ruth Charles Dietician Ruth.charles@olhsc.ie
Department of Nutrition and Dietetics Cork University Hospital	A falls nurse is planned for the elderly rehab department. A DXA scanner is in operation.	Very few referrals to the dietitians from the DXA scanner.	Anne-Marie Fanning Dietician Manager Anmemarie.fanning@hse.ie
Department of Nutrition and Dietetics, Sligo General Hospital	No service	No service	Annette Smyth Dietician Manager Annette.smyth@hse.ie
Department of Dietetics, Mid Western Regional Hospital	No service	No service	Sheila Bowers Dietician Manager Sheila.bowers@hse.ie

HOSPITAL/DEPARTMENT	DETAILS OF LOCAL FALLS/OSTEOPOROSIS ACTIVITY	LEVEL OF DIETETIC INPUT	CONTACT DETAILS OF DIETITIAN
Department of Community Dietetics, HSE Dublin Mid Leinster	Falls prevention working group convened a few years ago, with Anna de Siun researcher. Developed screening tools, booklets and awareness campaigns.	Community dietitians were involved in this process, particularly where nutrition and hydration were identified as key issues.	Gráinne Flanagan Clinical Specialist Dietitian for Older People Grainne.flanagan@hse.ie
The National Dairy Council	Produce awareness booklets on bone health/ Calcium/osteoporosis for the general public and for health professionals. Organise educational lectures for health professionals and awareness evenings for women. Run a '3-a-day' awareness campaign on the importance of 3 servings of dairy a day. Have resources for schools including 'the teachers toolkit for healthy teeth and bones'.	Nutrition team in place who co-ordinate these programmes.	Hilda Griffin Dietitian hgriffin@ndc.ie
Department of Nutrition and Dietetics, St. Vincent's Hospital	DXA scanner in place, nutrition and health advice offered by nurse. MDT talk for clients once a month.	Dietician speaks once a month at MDT talk. CF or anorexia clients at high risk of osteoporosis are advised by dietitian in that speciality, no assigned service to bone health.	Liz Barnes Dietician Manager l.barnes@st-vincent's.ie
Department of Community Dietetics, Cork-HSE South	A city wide falls initiative is being set up in Cork.	No dietetic input.	Hilary Devine Dietician Hilary.devine@hse.ie
Department of Community Dietetics, Killarney- HSE South	A falls prevention programme has been set up in Listowel.	No dietetic input.	Maria Browne Dietician Maria.browne@hse.ie
Department of Community Dietetics, LHO Dublin North Central-HSE Dublin North East	Multidisciplinary steering group in place for Dublin North Central: for falls prevention (will also include osteoporosis screening). Ballymun Primary Care Team chosen for pilot project. St. Monica's, St. Clare's and Seanchara Nursing Homes in the area have implemented falls prevention programmes.	Dietician member of the steering group for Dublin North Central and a member of the MD falls team in Ballymun Primary Care Team. Community dietitians involved in staff training in 3 nursing homes who have implemented falls prevention programmes- osteoporosis and bone health included in this. Health Promotion Dietitians have delivered 'Bone Fun Days' to schools.	Leán O'Flaherty Dietician Lean.oflaherty@hse.ie





# Appendix 5

List of persons/organisations  
contacted in consultation process

# Appendix 5: List of Persons/ Organisations Contacted in Consultation Process

## **Irish College of General Practitioners (ICGP)**

Lincoln Place  
Dublin 2

## **Institute of Public Health Nurses (IPHN)**

Baggot Street Hospital  
Dublin 4

## **Irish Nursing Homes Organisation (INHO)**

Unit 6, Block G  
Centre Point Business Park  
Oak Road  
Dublin 12

## **The Federation of Irish Nursing Homes,**

193 New Cabra Road  
Dublin 7

## **Irish National Health Promoting Hospitals**

James Connolly Memorial Hospital  
Blanchardstown  
Dublin 15

## **Dept of Geriatric Medicine**

Bantry General Hospital  
Bantry  
Co. Cork

## **Irish Nutrition and Dietetic Institution**

Ashgrove House  
Kill Avenue  
Dun Laoghaire  
Co. Dublin

## **Age Action Ireland**

30/31 lower Camden Street  
Dublin 2

## **Chairperson – Executive Council**

Institute of Obstetrics and Gynaecology  
C/O Royal College of Physicians of Ireland  
6 Kildare Street  
Dublin 2

## **Irish Society for Rheumatology**

James Connolly Memorial Hospital  
Blanchardstown  
Dublin 15

## **Irish Society for Rheumatology Secretariat**

Arthritis Foundation of Ireland  
1 Clanwilliam Square  
Grand Canal Quay  
Dublin 2

## **Royal College of Surgeons in Ireland**

Cappagh National Orthopaedic Hospital,  
Finglas,  
Dublin 11

## **Irish Society of Chartered Physiotherapists**

Royal College of Surgeons in Ireland  
123 St Stephen's Green  
Dublin 2

## **Faculty of Radiologists**

Royal College of Surgeons Ireland  
123 St Stephen's Green  
Dublin 2

## **National Council for the Professional Development of Nursing**

Unit 6/7  
Manor Street Business Park  
Manor Street  
Dublin 7

**Irish Practice Nurse Association (IPNA)**

Cormoy  
Culloville Road  
Carrickmacross  
Co. Monaghan

**HSE Health Promotion – Northern Area**

Park House  
North Circular Road  
Dublin 7

**Social, Personal and Health Education (SPHE)**

Support Service Post Primary  
Marino Institute of Education  
Griffith Avenue  
Dublin 3

**Women’s Health Council**

Block D  
Irish Life Centre,  
Abbey Street Lwr  
Dublin 1

**Irish Osteoporosis Society**

33 Pearse Street  
Dublin 2

**Communications Co-ordinator**

Irish Association of Social Workers  
114–116 Pearse Street  
Dublin 2

**Third Age Centre**

Summerhill  
Co. Meath

**The Carers Association**

Priors Orchard  
John’s Quay  
Kilkenny

**Age & Opportunity**

Marino Institute of Education  
Griffith Avenue  
Dublin 9

**The Irish Association of Older People**

Room B15  
University College  
Earlsfort Tce  
Dublin 2

**The Irish Senior Citizens Parliament**

90 Fairview Strand  
Dublin 3

**ALONE**

1 Willie Bermingham Place,  
Kilmainham Lane  
Dublin 8

**Federation of Active Retirement Associations**

Shamrock Chambers,  
59/61 Dame Street,  
Dublin 2

**Friends of the Elderly.**

25 Bolton Street  
Dublin 1

**Care Alliance Ireland**

30/31 Lower Camden Street  
Dublin 2

**Older Women’s Network - OWN**

Senior House  
All Hallows College  
Grace Park Rd  
Dublin 9



# Appendix 6

Evidence for fall prevention  
intervention grades, by  
multi-factorial assessments

# Appendix 6: Evidence for Fall Prevention Intervention Grades, by Multi-Factorial Assessments

## Taken from AGS

The categories of evidence for the guidelines were classified as follows:

**Class I:** Evidence from at least one randomised controlled trial or meta-analysis of randomised controlled trials.

**Class II:** Evidence from at least one controlled study without randomisation or evidence or evidence from at least one other type of quasi experimental study.

**Class III:** Evidence from non-experimental studies, such as comparative studies, correlation studies and case-controlled studies.

**Class IV:** Evidence from expert committee reports or opinions and/or clinical experience of respected authorities.

The strength of the recommendations is classified as follows:

- A. Directly based on Class I evidence.
- B. Directly based on Class II evidence or extrapolated recommendation from Class I evidence
- C. Directly based on Class III evidence or extrapolated recommendation from Class I or II evidence.
- D. Directly based on Class IV evidence or extrapolated recommendation from Class I, II, or III evidence.

### AGS Levels of Evidence (2001)

Level	Criteria
<b>A</b>	Good evidence to support recommendation for use (should do this all of the time)
<b>B</b>	Moderate evidence to support recommendation for use (should do this most of the time)
<b>C</b>	Poor evidence to support a recommendation for or against use (may or may not do this)
<b>D</b>	Moderate evidence to support recommendation against use (should not use or do this)
<b>E</b>	Good evidence to support a recommendation against use (contraindicated)



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive



National Council on  
Ageing and Older People  
An Chomhairle Náisiúnta um  
Aosú agus Daoine Aosta



Department of  
Health & Children  
AN ROINN SLÁINTE AGUS LEANAÍ

**Health Service Executive**  
Strategic Health Planning  
Dr Steeven's Hospital  
Dublin 8

Phone: +353 1 6352170  
Fax: +353 1 6352103  
[www.hse.ie](http://www.hse.ie)

**National Council on Ageing  
and Older People**  
11th Floor  
Hawkins House  
Hawkins Street  
Dublin 2

Phone: +353 1 6743299  
Fax: +353 1 6743245  
[www.ncaop.ie](http://www.ncaop.ie)

**Department of Health and Children**  
Hawkins House  
Hawkins Street  
Dublin 2

Phone: +353 1 6354000  
Fax: +353 1 6354001  
[www.dohc.ie](http://www.dohc.ie)