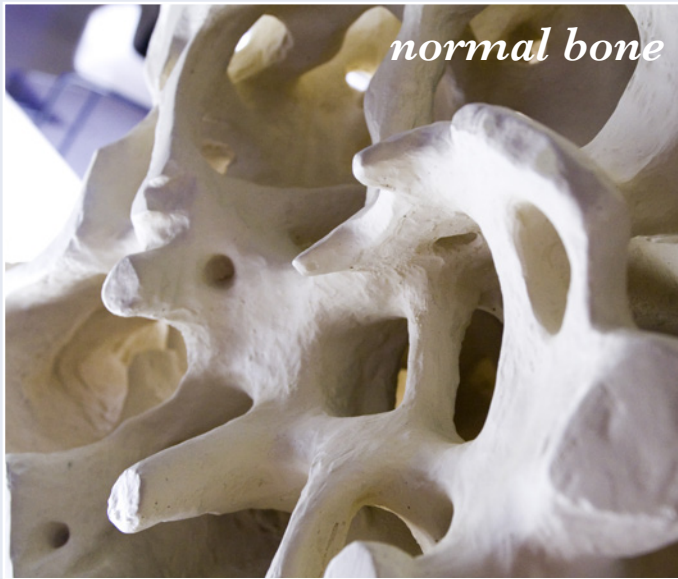


CAPTURE THE FRACTURE

A GLOBAL CAMPAIGN TO BREAK THE FRAGILITY FRACTURE CYCLE





WHAT IS OSTEOPOROSIS?

Osteoporosis is a disease characterized by low bone mass and deterioration in the microarchitecture of bone tissue, leading to an increased risk of fracture. Osteoporosis occurs when the bone mass decreases more quickly than the body can replace it, leading to a net loss of bone strength. As a result the skeleton becomes fragile, so that even a slight bump or fall can lead to a broken bone, (referred to as a fragility fracture). Osteoporosis has no signs or symptoms until a fracture occurs – this is why it is often called a 'silent disease'.

Osteoporosis affects all bones in the body; however, fractures occur most frequently in the vertebrae (spine), wrist and hip. Osteoporotic fractures of the pelvis, upper arm and lower leg

are also common. Osteoporosis itself is not painful but the broken bones can result in severe pain, significant disability and even mortality. Both hip and spine fractures are also associated with a higher risk of death - 20% of those who suffer a hip fracture die within 6 months after the fracture.

A COMMON DISEASE

It is estimated that worldwide an osteoporotic fracture occurs every three seconds. At 50 years of age, one in two women and one in five men will suffer a fracture in their remaining lifetime. For women this risk is higher than the risk of breast, ovarian and uterine cancer combined. For men, the risk is higher than the risk for prostate cancer. Approximately

50% of people with one osteoporotic fracture will have another, with the risk of new fractures rising exponentially with each fracture.

A GROWING PUBLIC HEALTH PROBLEM

The risk of sustaining a fracture increases exponentially with age due not only to the decrease in bone mineral density, but also due to the increased rate of falls among the elderly. The elderly represent the fastest growing segment of the population. Thus, as life expectancy increases for the majority of the world's population, the financial and human costs associated with osteoporotic fractures will increase dramatically unless preventive action is taken.

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By *missing the opportunity* to respond to the first fracture, healthcare systems around the world are *failing to prevent* the second and subsequent fractures

FOREWORD

Worldwide, a fragility fracture is estimated to occur every 3 seconds. This amounts to almost 25 000 fractures per day or 9 million per year. The human suffering associated with these common serious injuries is immense and the financial costs are staggering. The sums of 32 billion EUR per year in Europe and 20 billion USD per year in the United States reveal the burden that osteoporosis imposes on the world's economy. And that is now. In China, as the population ages, the 1.6 billion USD spent on hip fracture care in 2006 is set to rise to 12.5 billion USD by 2020 and 265 billion USD by 2050. Similar changes are projected across Asia, Latin America and the Middle East.



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Nature has provided us with an opportunity to systematically identify a significant proportion of individuals that will suffer fragility fractures in the future. This is attributable to the well recognised phenomenon that fracture begets fracture. Those patients that suffer a fragility fracture today are much more likely to suffer fractures in the future; in fact, they are twice as likely to fracture as their peers that haven't fractured yet. From the obverse view, we have known for three decades that almost half of patients presenting with hip fractures have previously broken another bone.



Paul Mitchell

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Science has provided us with a broad spectrum of effective pharmacological agents to reduce the risk of future fractures. These medicines have been shown to reduce fracture rates amongst individuals with and without fracture history, and even amongst those that have already suffered multiple fractures. Governments and private sector healthcare providers have recognised the opportunity for 'secondary fracture prevention', by creating policies and reimbursement criteria that support treatment of osteoporosis for patients presenting with fragility fractures. They have done so to improve the quality of care for those at risk of suffering future fractures, and because such strategies

have been shown to be highly cost-effective by many agencies responsible for resource allocation.

Regrettably, by missing the opportunity to respond to the first fracture, healthcare systems around the world are failing to prevent the second and subsequent fractures. Numerous audits of secondary preventive care show that the majority of fragility fracture patients never learn about the underlying cause of their fracture, or receive treatment to prevent it from happening again. However, there is reason for optimism. Innovators in many countries have tackled this

healthcare delivery challenge and created systems that close the current care gap. Systems with a dedicated post-fracture coordinator at their heart have transformed post-fracture osteoporosis care, resulting in significantly lower re-fracture rates and enormous cost savings.

This report aims to engage patients and their societies; healthcare professionals and their organizations; and policy makers and their governments to close the secondary fracture prevention care gap throughout the world. The opportunity is too good to miss.

WHY SECONDARY FRACTURE PREVENTION MUST BE A PUBLIC HEALTH PRIORITY

FRAGILITY FRACTURES: A BURDEN FOR PATIENTS, HEALTHCARE SYSTEMS AND NATIONAL ECONOMIES

Osteoporosis has been described as a silent epidemic because ‘...it is a pain-free, symptomless disease in which bone becomes progressively porous, fragile and loses strength’². Like other chronic diseases, such as hypertension and hyperlipidaemia, osteoporosis is asymptomatic... up until the moment a sufferer breaks a bone. From that point on, the consequences of osteoporosis will be evident to the fracture patient, their medical team and those responsible for funding their healthcare system.

Fragility fractures, also referred to as low or minimal trauma fractures, usually occur as a result of a fall from standing height. Fragility fractures are common; 1 in 2 women over 50 years of age will suffer one, as will 1 in 5 men³⁻⁵. Globally, during year 2000, there were an estimated 9 million new fragility fractures, of which 1.6 million were at the hip, 1.7 million at the wrist, 0.7 million at the humerus and 1.4 million symptomatic vertebral fractures⁶. As shown in *table 1*, Europe and the Americas accounted for half of all these fractures, while most of the remainder occurred in the Western Pacific region and Southeast Asia⁶.

Whilst a relative abundance of good quality data on hip fractures has

enabled considerable evaluation of the morbidity, mortality and costs associated with this very serious injury^{7,8}, the impact of fragility fractures at other sites should not be underestimated. The age distribution of fractures at sites viewed as typical fragility fractures is presented in *figure 1*. Fractures of the wrist, humerus and spine tend to occur at a younger

year¹³. A considerable proportion of these staggering sums are associated with health and social care related to hip fracture. However, the cost burden of vertebral fractures and non-hip fragility fractures is considerable. In 2005, the cost of vertebral fractures in Europe was estimated to be 719 million EUR¹¹. In the Geisinger health system in the United States, health

...almost half of hip fracture patients provide us with an obvious opportunity for preventive intervention¹

age than hip fractures. Indeed, amongst Swedish women in their early fifties, such fractures have been estimated to account for six times the morbidity arising from hip fractures^{9,10}.

In 2005, the International Osteoporosis Foundation (IOF) estimated the total direct cost of osteoporotic fractures in Europe to be 32 billion EUR per year¹¹, a figure which is projected to rise to 38.5 billion EUR by 2025¹². In 2002, the combined cost of all osteoporotic fractures in the United States was estimated to be 20 billion USD per

economic modelling suggested 37% of all healthcare costs associated with osteoporotic fractures related to non-hip fragility fractures¹⁴.

The economic consequences of unchecked increases in the prevalence of osteoporosis amongst the rapidly ageing populations of Asia, Latin America and the Middle East must be a major concern for policy makers in these regions. In 2006, 1.6 billion USD was spent in China on hip fracture care, a figure that is set to rise to 12.5 billion USD by 2020 and 265 billion USD by 2050¹⁵.

TABLE 1 Estimated number of fractures (in thousands) at the sites shown in men and women aged 50 years or more in 2000 by World Health Organisation regions

Region	Hip	Spine	Forearm	Humerus	Other	All sites	Percentage
Africa	8	12	16	6	33	75	0.8
Americas	311	214	248	111	521	1406	15.7
Southeast Asia	221	253	306	121	660	1562	17.4
Europe	620	490	574	250	119	3119	34.8
Eastern Mediterranean	35	43	52	21	109	261	2.9
Western Pacific	432	405	464	197	1039	2536	28.6
Total	1627	1416	1660	706	3550	8959	100

FRACTURE BEGETS FRACTURE

The 'osteoporotic career' illustrated in figure 2 overleaf will be all too familiar to sufferers and their families. We have known since the 1980s that half of patients presenting with hip fractures today have experienced prior fragility fractures in the past¹⁶⁻¹⁹. This might have been a wrist fracture during their fifties whilst at work, a humerus fracture during their sixties on the day they retired, or a fracture of the spine when picking up a grandchild at their 70th birthday celebration. Two meta-analyses concluded that a prior fracture at any skeletal site is associated with a doubling of future fracture risk.^{20, 21} Thus, fracture begets fracture.

Given that a history of suffering a prior fragility fracture predisposes the sufferer to considerably increased risk of future fracture, what proportion of the population is in this high risk group? Investigators in Australia and

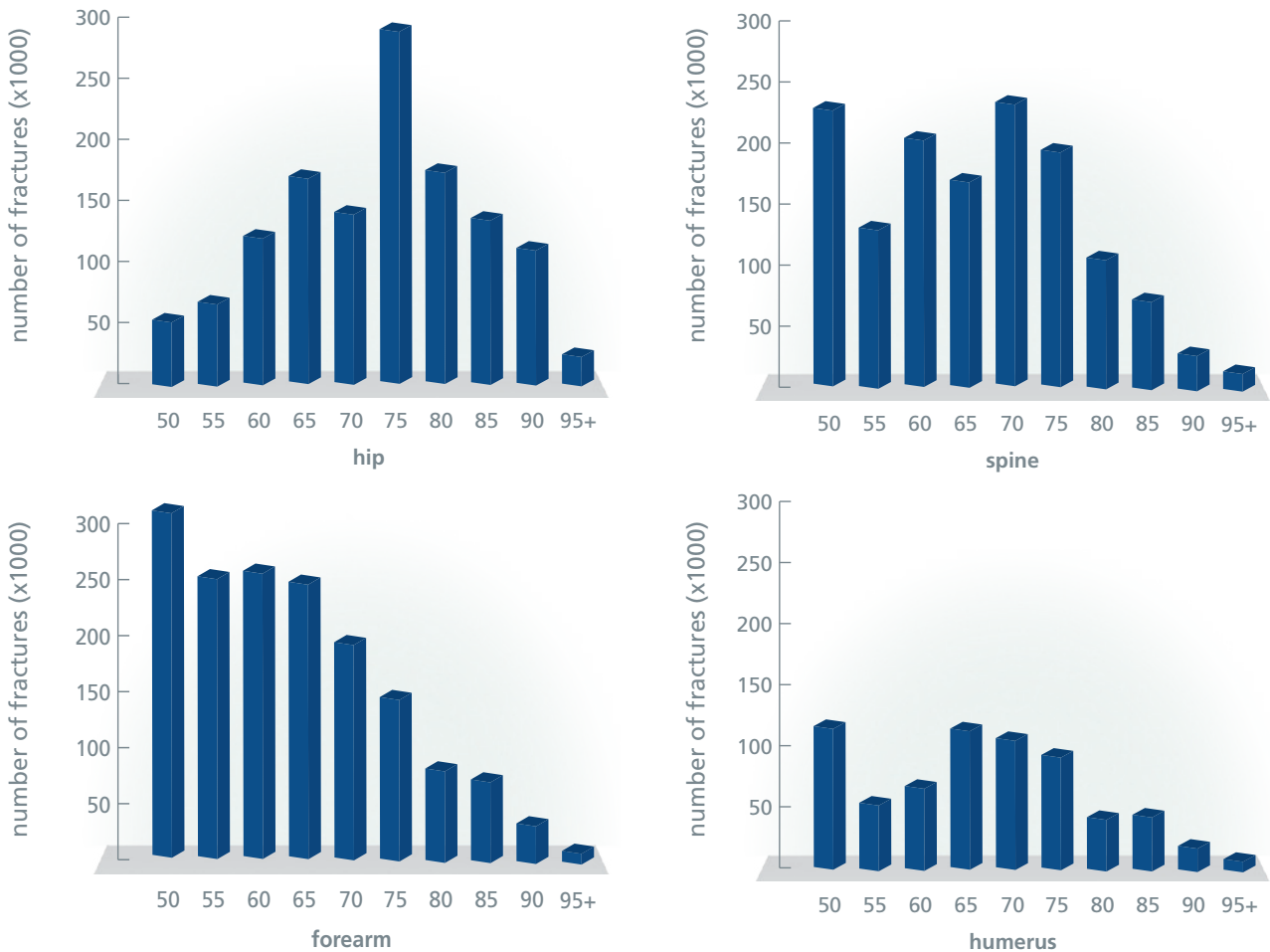


the United Kingdom have sought to answer this question:

Australia The Australian BoneCare Study²³ evaluated 70 000 women aged over 60 years from primary care physicians' lists. Eighty two

per cent reported the presence of a postmenopausal fracture or risk factors. Twenty nine per cent of these women reported a fracture history; 66% reported 1 fracture, 22% reported two fractures and 12% reported 3 to 14 fractures.

FIGURE 1 World wide distribution of typical fragility fractures by age (in thousands/year)⁶



Over the next 20 years, *450 million people will celebrate their 65th birthday*. On account of this, absolute hip fracture incidence will remain high and costly in the West and presents a major threat to financing of health systems in the East.¹

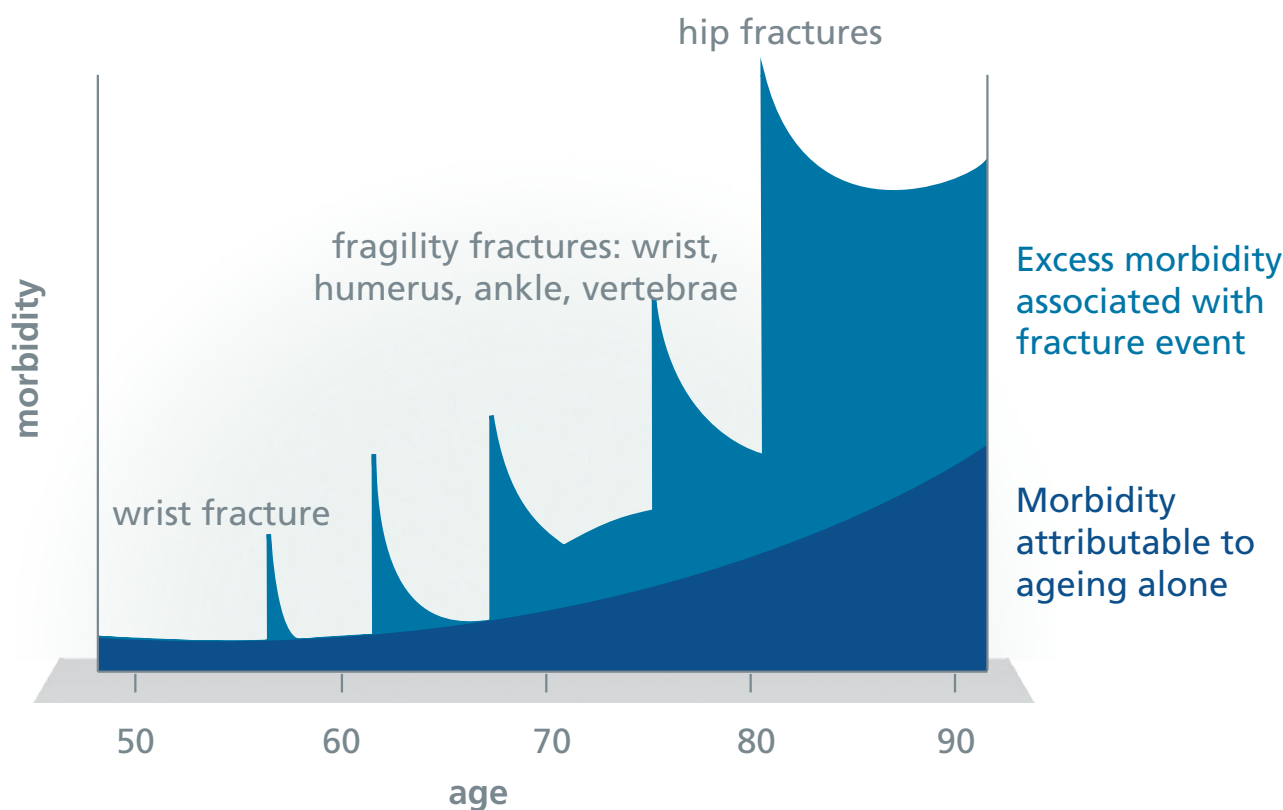
United Kingdom A burden of disease model published in 2011²⁴ estimated the number of postmenopausal women in the UK with osteoporosis and fracture history for the period 2010 to 2021. In 2010, over 1.5 million women were likely to have suffered >1 fracture representing 13% of the postmenopausal population. Notably, 380 000 of these women had suffered >2 fractures and 96 000 at least 3 fractures. The number of women with >1 fracture and >3 fractures is expected to

increase by 22% and 31% by 2020, respectively.

Currently, data on secondary fracture incidence is not available for many parts of the world. However, recent audits conducted by the IOF provide estimates of current hip fracture incidence, which gives a clear indication of the potential scale of the secondary fracture burden. The IOF Asian Audit¹⁵ estimated hip fracture incidence in China, India and Japan, at 687 000; 440 000 and 117 900 cases

per year, respectively. The IOF Eastern European and Central Asian Audit²⁵ and Middle East and Africa Audit²⁶ provide stark accounts of current standards of fragility fracture care and prevention in these regions. From Brazil, the BRAZOS study²⁷ suggests that 15% of women and 13% of men aged over 40 years have a history of fragility fracture. As the demographic composition of these populations shifts dramatically in the coming decades, fragility fracture incidence is set to rapidly increase.

FIGURE 2 The 'osteoporotic career': fracture associated morbidity across the life span²²



SECONDARY FRACTURE PREVENTION

An opportunity to break the fragility fracture cycle

Half of hip fracture patients have suffered prior fragility fractures. One sixth of postmenopausal women have suffered a fragility fracture.

Taken together, these two observations illustrate the major opportunity afforded by secondary fracture prevention strategies. Half of all individuals that will suffer hip fractures in the future bring themselves to clinical attention before breaking their hip, by suffering a prior fragility fracture.¹⁶⁻¹⁹ This group represents a comparatively small proportion^{24,28} of the entire population that could be readily targeted for intervention to reduce future fracture risk as illustrated in *figure 3*.

During the last two decades, a range of therapeutic interventions have been assessed in large-scale randomised

clinical trials that have demonstrated consistent fracture reduction efficacy. A meta-analysis of the principle agents licensed for the treatment of osteoporosis throughout the world suggests that a 30-50% reduction in fracture incidence can be achieved during 3 years of pharmacotherapy³⁰.

Fracture reduction efficacy of 50% during the same period of treatment has been demonstrated for patients with a history of multiple fractures³¹. We now have a broad choice of effective agents that can be taken as daily, weekly or monthly tablets, or as daily, quarterly, six-monthly or annual injections.

Half of hip fracture patients *have suffered* prior fragility fractures.

One sixth of postmenopausal women have suffered *a fragility fracture*.

INTERNATIONAL REVIEWS SHOW THAT, REGARDLESS OF THE STRUCTURE OF THE HEALTHCARE SYSTEM, FRACTURE PATIENTS ROUTINELY FAIL TO RECEIVE SECONDARY PREVENTIVE CARE.



Routine delivery of evidence-based secondary preventive care to patients presenting with fragility fractures provides an opportunity to break the fragility fracture cycle shown in *figure 4*. When patients present with a non-hip fragility fracture, a determined effort must be made to prevent secondary fractures, particularly at the hip. For half of hip fracture patients,

their hip fracture will be their first clinically apparent fracture. These individuals are at high risk of a second hip fracture³²⁻³⁴. Accordingly, secondary prevention must be routine care for hip fracture patients too. Crucially, many professional organization guidelines^{22,35-41} and national prescribing^{12,42,43} and reimbursement policies^{12,44,45} provide endorsement and

funding mechanisms for secondary preventive therapy.

A 2011 study has calculated the financial burden imposed by second fracture on the United States healthcare system. The nationally projected annual cost was almost 2 billion USD; 834 million USD for patients with commercial insurance and 1.13 billion USD for Medicare patients⁴⁷.

FIGURE 3 Fracture risk and ease of case-finding: effective targeting of healthcare resources²⁹

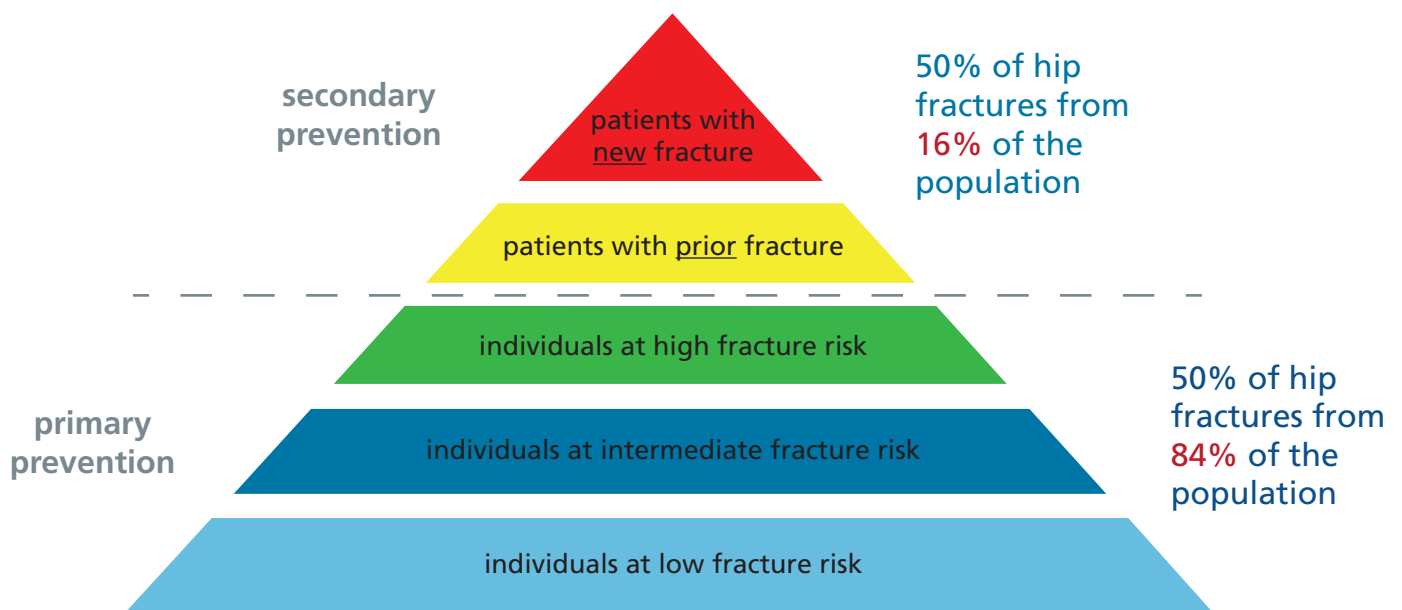
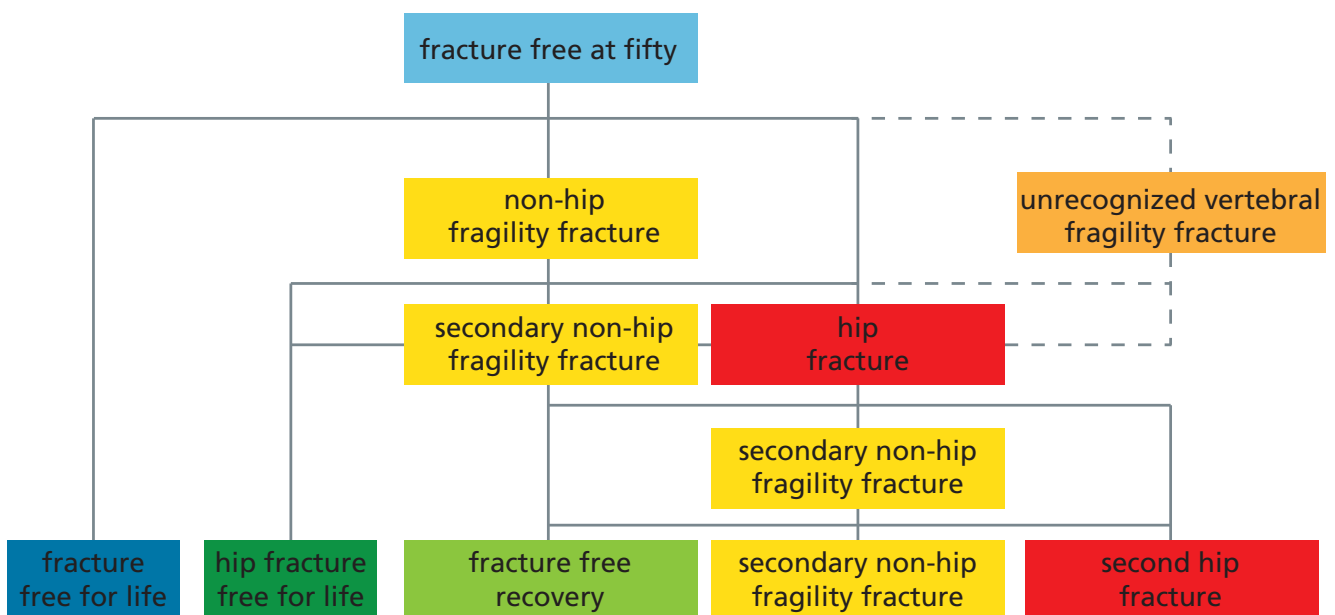


FIGURE 4 The fragility fracture cycle⁴⁶ (reproduced with permission of the Department of Health in England)



THE WORLDWIDE PROBLEM

The current care gap

Many professional organization guidelines^{22,35-41} and national prescribing^{12,42,43} and reimbursement policies^{12,44,45} *provide endorsement and funding mechanisms for secondary preventive therapy*

In light of this apparent consensus, what are the current rates of secondary preventive treatment for patients with fragility fractures? National⁴⁸⁻⁵⁹, regional^{18,60-66} and local^{17,19,67-94} audits conducted across the world have shown a secondary fracture prevention care gap to be ubiquitous. Documented standards of care in countries where national audit work has been done are summarized below.

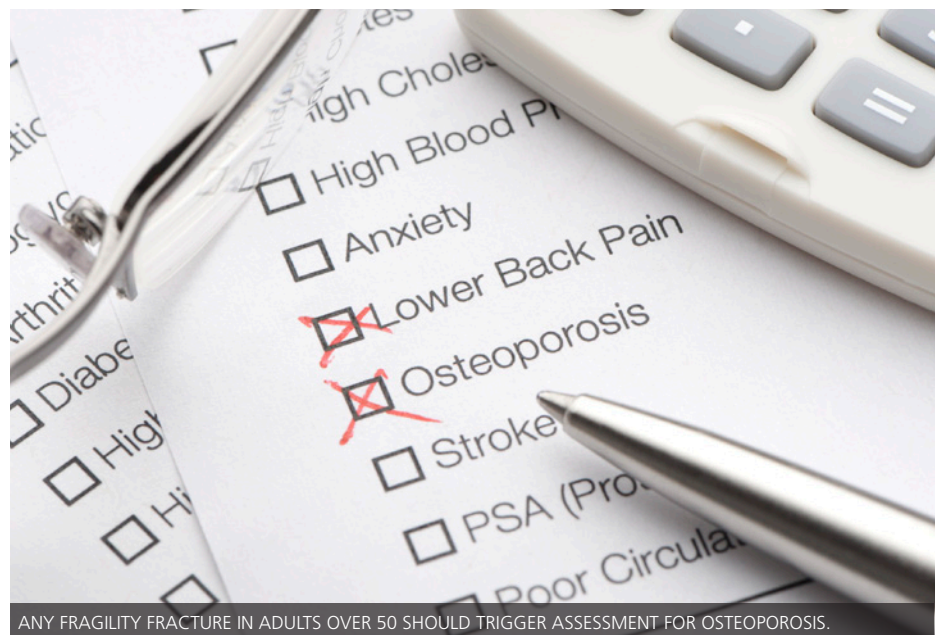
Australia

An audit⁴⁸ of 16 Australian hospitals involving 1829 fragility fracture cases found that <13% had risk factors for fracture identified. Ten percent were appropriately investigated, 12% were commenced on calcium and 12% on vitamin D, 8% started bisphosphonates and 1% selective oestrogens receptor modulators in the acute setting.

‘Most patients presenting to Australian hospitals with minimal trauma fracture are neither investigated nor treated for osteoporosis. As this group is at high risk of subsequent fracture, this is a missed opportunity to reduce fracture burden.’

Canada

Audits conducted in Ontario⁶⁰, Quebec⁶¹ and Manitoba⁶² consistently reported that 80% of fragility fracture patients did not receive appropriate assessment or treatment. In addition, the Canadian Multicentre Osteoporosis Study (CaMos) evaluated the care gap in men with fragility fractures⁴⁹. At baseline only 2% of men with a clinical fracture received a diagnosis of osteoporosis, which increased to just 10% at 5 years. Unsurprisingly, therefore, only 10% of men were on appropriate treatment at 5 years. The significance of these findings were



ANY FRAGILITY FRACTURE IN ADULTS OVER 50 SHOULD TRIGGER ASSESSMENT FOR OSTEOPOROSIS.

summarised in a recent White Paper from Osteoporosis Canada⁹⁵:

‘To achieve the most dramatic reduction in future fracture rates and orthopaedic health care costs, Canada must first target those patients who have already fractured because they are the ones at highest risk for more fractures.’

Germany

A prospective cohort study⁵⁰ conducted at 242 acute care clinics in Germany evaluated the inpatient care of 1201 patients aged >65 years with a distal radius fracture. The investigators noted:

‘Although evidence of osteoporosis was observed in 62% of women and 50% of men, only 7.9% of patients were prescribed osteoporosis-specific medication.’

Switzerland

A nationwide survey⁵¹ evaluated osteoporosis care of 3667 fragility fracture patients that presented to 8 centres between 2004 and 2006. Only 22% of patients were initiated on appropriate osteoporosis treatment as a result of their fracture presentation.

‘Osteoporosis remains widely underdiagnosed and undertreated in Switzerland, even in a high risk population of elderly patients with fragility fractures. This fact is even more worrisome for men.’

The Netherlands

A study⁵² used the population-based database, PHARMO, to assess the proportion of patients treated with osteoporosis medications during the first year after hospitalisation with a fracture. Of the 1654 patients aged

>50 years in the study population, half had fractured their hip. Only 15% were prescribed osteoporosis medications within a year of being discharged from hospital.

‘The results of this study suggest that treatment for osteoporosis for post-fracture patients in current practice is still quite appalling.’

Sweden

The National Board of Health and Welfare (NBHW) together with the Swedish Association of Local Authorities and Regions (SKL) collate data on the national level from the regional health care providers. Since 2005 register data is available on the use of drugs in addition to the national patient register (ICD 10 codes). The 2011 report highlights the very low proportion of women over the age of 50 with fragility fractures that are on pharmacological treatment for osteoporosis at 6-12 months after fracture. As illustrated in figure 5, the national average is 13.9%, ranging from 9.2% to 19.3% in the various regions. Furthermore, compared to the data from 2005-2007 there appears to be no significant improvement⁹⁶ (figure 6).

‘The result of the national data is cause for both concern and an incentive for action. Clearly, some regions have been more successful than others, while all too many patients remain without treatment.’

United Kingdom

The Royal College of Physicians (RCP) has managed an ongoing national audit⁹⁷ of the organization of services and standards of clinical care for patients with falls and fragility fractures, from 2005 until the present day. In May 2011, the most recent round of this audit was published⁵³. Key findings included:

- 32% of non-hip fracture and 67% of hip fracture patients had a clinical assessment for osteoporosis and/or fracture risk
- 33% of non-hip fracture and 60% of hip fracture patients received appropriate management for bone health

‘The majority of high-risk patients miss the best or only opportunity for their falls and fracture risk to be identified in the majority of hospitals and most primary care organizations lack adequate services for secondary falls and fracture prevention.’

United States

A 2007 study⁵⁴ of data from National Health and Nutrition Examination Survey (NHANES) estimated that 17% of older women who have sustained a fragility fracture in the United States are receiving osteoporosis treatment. Another study⁵⁵ evaluated osteoporosis treatment of 51 346 hip fracture patients admitted to

318 hospitals across the United States. The authors reported that 6.6% of patients received calcium and vitamin D supplements, 7.3% received antiresorptive or bone-forming drugs and only 2% received a combination of these therapies, the approach advocated as optimal in most guidelines worldwide. In an associated editorial⁹⁸, Dr. Robert Adler’s conclusion sign-posts the solution to this universal problem that will be considered in detail in the next section of this report:

‘There are several different performance measures for management of osteoporosis after fracture, and most institutions would fail. A small investment in a fracture coordinator can result in appropriate diagnostic and therapeutic management of patients who have suffered fractures. This should result in fewer fractures and perhaps fewer deaths. Surely we can do better.’

WHY IS SECONDARY FRACTURE PREVENTION NOT HAPPENING?

These studies provide a snapshot of the current standard of secondary preventive care across the world. A common theme is self-evident. Two systematic literature reviews have sought to understand why secondary preventive care does not reliably happen. In their 2004 paper⁹⁹, Elliot-Gibson and colleagues identified the following issues:

FIGURE 5 Percentage of women in Sweden with a fragility fracture over the age of 50 on pharmacological treatment at 6-12 months after the fracture during 2008-2010 (light blue indicates treatment during 2005-2007)

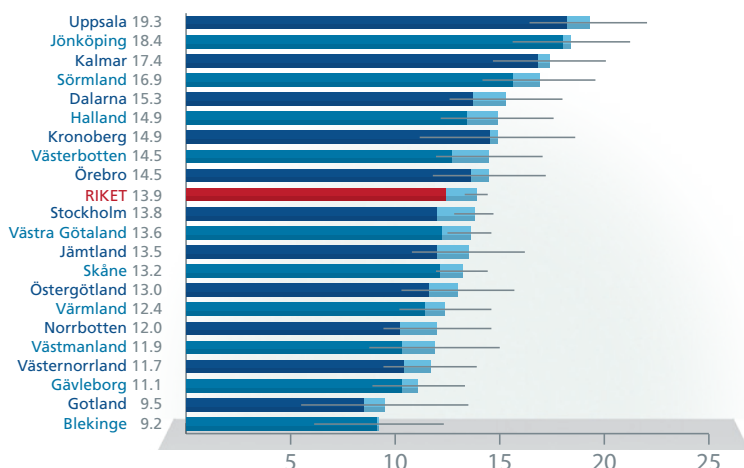
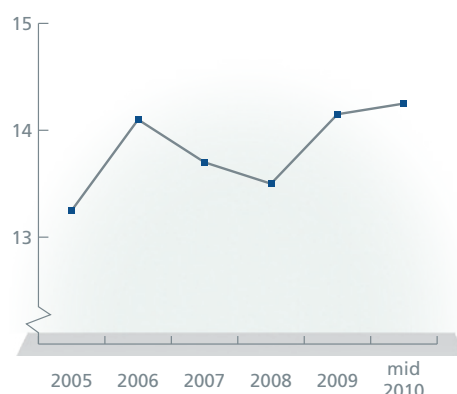


FIGURE 6 National data summarized from year 2005 to mid-2010 in percentage values. Women in Sweden over the age of 50 years.





SECONDARY PREVENTION MUST BE ROUTINE CARE FOR HIP FRACTURE PATIENTS TOO, AS THEY ARE AT HIGH RISK OF A SECOND HIP FRACTURE.

- Cost concerns relating to diagnosis and treatment
- Time required for diagnosis and case-finding
- Concerns relating to polypharmacy
- Lack of clarity regarding where clinical responsibility resides

The subsequent review¹⁰⁰ from Giangregorio and colleagues published in 2006 identified the following patterns of care:

- Treatment was offered more frequently for patients with vertebral fractures in comparison to patients with non-vertebral fractures
- Older patients were more likely to be diagnosed with osteoporosis yet younger patients were more likely to receive treatment
- Males were less likely to be treated than women
- Post-fracture falls assessment are not often conducted and rarely reported as an outcome of the studies

These international systematic reviews suggest that regardless of the specific structure of the particular healthcare system, fracture patients routinely fail to receive secondary preventive care. The difference between treatment

rates for patients with vertebral fractures relative to those with non-vertebral fractures is notable, given that the majority of vertebral fractures do not come to clinical attention^{101,102}. The observation that younger patients are more likely to be treated would appear at odds with targeting resources to patients at highest fracture risk.

The issue regarding a lack of clarity of where clinical responsibility resides is paramount. Professor Timothy Harrington's metaphorical depiction¹⁰³ has resonated with the experience of clinicians in many countries:

‘Osteoporosis care of fracture patients has been characterized as the Bermuda Triangle made up of orthopaedists, primary care physicians, and osteoporosis experts into which the fracture patient disappears.’

Investigators in the United Kingdom sought to understand the disconnection between orthopaedic surgeons and primary care doctors, the two clinical constituencies seemingly most well placed to deliver secondary preventive care. The survey¹⁰⁴ asked orthopaedic surgeons and general practitioners (GPs) about their routine clinical practice regarding investigation of osteoporosis in three clinical scenarios:

- A 55 year old woman with a low trauma Colles fracture

- A 60 year old woman with a vertebral wedge fracture
- A 70 year old woman with a low trauma neck of femur fracture

Respondents recognised that fragility fracture patients should in principle be investigated for osteoporosis (81% of orthopaedic surgeons, 96% of GPs). However, in the case of the Colles fracture the majority of orthopaedic surgeons (56%) would discharge the patient without requesting investigation for osteoporosis. When faced with this scenario, the majority of GPs would take no action having assumed that the orthopedic surgeons would have conducted investigations if appropriate (45%) or would instigate investigations only if prompted by the orthopaedic surgeon to do so (19%). Only 7% of orthopaedic surgeons and 32% of GPs would assess and/or start treatment themselves.

The hip fracture scenario generated similar responses; 66% of orthopaedic surgeons would discharge the patient without osteoporosis assessment whilst 40% of GPs would file the letter and a further 19% of GPs would initiate assessment only if recommended by the orthopaedic surgeon. Notably, in the case of vertebral wedge fracture a minority of orthopaedic surgeons (29%) would discharge the patient without any action to trigger assessment whilst the majority of GPs (58%) would routinely assess and/or start treatment themselves.

A PROVEN SOLUTION

Coordinator-based, post-fracture models of care

Coordinator-based systems *facilitate* bone mineral density testing, osteoporosis education and care in patients following *a fragility fracture* and have been shown to be *cost-saving*²⁸

In 2011, the Fracture Working Group of the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF) published a position paper²⁸ on coordinator-based systems for secondary prevention in fragility fracture patients. The paper consolidated knowledge of the development, effectiveness and common factors that underpin successful clinical systems designed to close the secondary fracture prevention care gap. A systematic literature review¹⁰⁵ found that two-thirds of such systems employed a dedicated coordinator who acts as the link between the orthopaedic team, the osteoporosis and falls services, the patient and the primary care physician. Exemplar service models have been referred to as 'Fracture Liaison Services' (UK¹⁰⁶⁻¹¹⁰, Europe^{111,112} and Australia¹¹³⁻¹¹⁵), 'Osteoporosis Coordinator Programs' (Canada^{116,117}) or 'Care Manager Programs' (USA^{118,119}). A range of other terms have been used to describe other published models with similar characteristics¹²⁰⁻¹²⁹. This body of literature illustrates that common principles can be applied to close the secondary fracture prevention care gap in many healthcare systems across the world.

A common success factor reported by lead clinicians of successful and sustainable services is to clearly define the scope of the service from the project outset. In this regard, *figure 7* provides a context to consider which groups of fracture patients should be targeted. Some of the established models of care began by targeting hip fracture patients. The scope was subsequently expanded to include all patients admitted to hospital and, finally, all patients managed in the out-

patient fracture clinic setting. Other services aimed for total patient capture from the outset.

The objectives of a comprehensive coordinator-based, post-fracture service could be summarised as follows. The system will ensure fracture risk assessment, and treatment where appropriate, is delivered to all patients presenting with fragility fractures in the particular locality or institution. The service will be comprised of a dedicated case worker, often a clinical nurse specialist, who works to pre-agreed protocols to case-find and assess fracture patients. The service can be based in secondary or primary care and requires support from a medically qualified practitioner, be they a hospital

doctor with expertise in fragility fracture prevention or a general practitioner with a specialist interest. The hospital-based service structure depicted in the British Orthopaedic Association – British Geriatrics Society 'Blue Book'²² in *figure 8 on next page* illustrates how UK-based Fracture Liaison Services (FLS) are configured.

CASE STUDIES OF SUCCESSFUL SERVICES

The following examples of coordinator-based, post-fracture models of care demonstrate that a systematic approach to fragility fracture prevention has been successfully implemented in many countries, with structurally distinct healthcare systems.

FIGURE 7 Definition of the patient groups to be targeted by post-fracture services

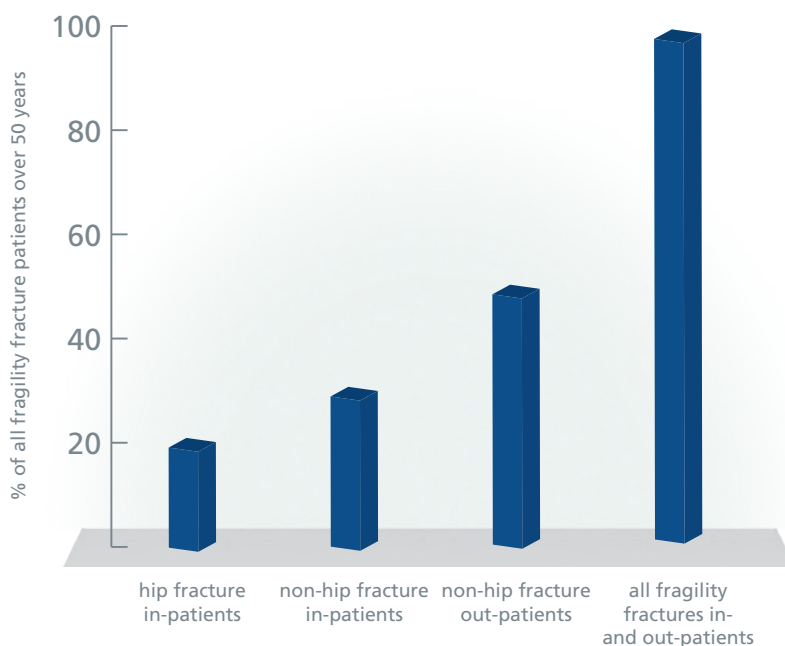
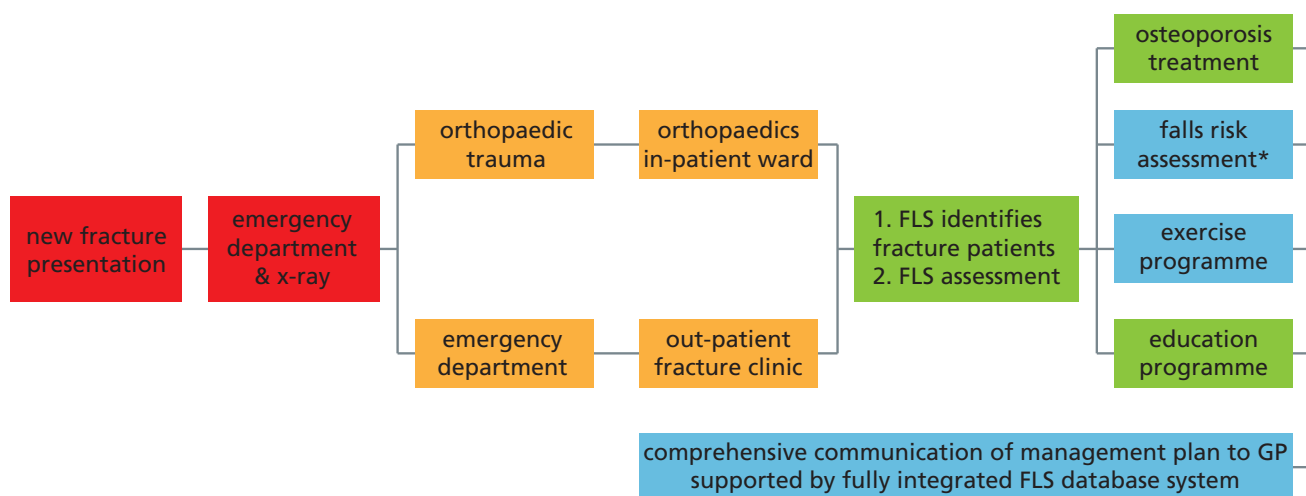


FIGURE 8 The operational structure of a UK-based Fracture Liaison Service (FLS)^{22,106}



* Older patients, where appropriate, are identified and referred for falls assessment

Australia

Concord Repatriation General Hospital, Sydney:

The Minimal Trauma Fracture Liaison (MTFL) service¹¹⁵ was established in 2005 at Concord Repatriation General Hospital, a large tertiary referral centre in Sydney. The MTFL service delivers care for non-frail patients presenting with fragility fractures (frail patients are managed by an orthogeriatrics service¹³⁰ based at the same hospital). The MTFL service consultations were delivered by a first year advanced trainee (i.e. a physician in his/her 4th-6th year of post-graduate training) which required a 0.4 full time equivalent appointment.

The impact of the MTFL service was evaluated after four years. Fracture patients who chose to decline the consultation freely offered by the service, in favour of follow-up with their primary care physician, were considered as a control group for statistical comparison. Refracture incidence for those patients managed by the MTFL service was 80% lower than the control group.

A recently published cost-effectiveness analysis¹¹³ of the MTFL service reported:

- A mean improvement in discounted quality-adjusted life expectancy per patient of 0.089 QALY gained

- Partial offset of the higher costs of the MTFL service by a decrease in subsequent fractures, which lead to an overall discounted cost increase of AU\$1486 per patient over the 10-year simulation period
- The incremental costs per QALY gained (incremental cost-effectiveness ratio - ICER) were AU \$17 291, which is well below the Australian accepted maximum willingness to pay for one QALY gained of AU \$50 000

Canada

St. Michael's Hospital, Toronto: The Osteoporosis Exemplary Care Program (OECF) was established at a large teaching and regional trauma centre in Toronto in 2002¹¹⁶. A co-ordinator was appointed to case-find fracture patients, provide instruction on calcium and vitamin D supplementation and educate patients on osteoporosis and its management. The co-ordinator would also facilitate referral for bone mineral density testing, booking of appointments at a Metabolic Bone Disease Clinic and provision of prescriptions for antiresorptive medication by orthopaedic staff. The OECF provided secondary preventive care to both in- and out-patients.

During the first year of operations, 430 fracture patients were enrolled in the OECF (276 out-patients and

154 in-patients). More than 96% of these patients received appropriate osteoporosis care. Eighty (36%) of the 221 out-patients that met study inclusion criteria had been previously treated for osteoporosis. One hundred and twenty four (56%) were referred to the Metabolic Bone Disease Clinic or to their GP for osteoporosis treatment. Amongst the 128 in-patients meeting inclusion criteria, 31% had previously been diagnosed and treated for osteoporosis, treatment was initiated for a further 24% and another 34% were referred to the Metabolic Bone Disease Clinic or their GP for post-discharge consultation on osteoporosis treatment.

Cost-effectiveness analysis¹¹⁷ showed that a tertiary care centre that hires an osteoporosis coordinator who manages 500 patients with fragility fractures annually could reduce the number of subsequent hip fractures from 34 to 31 in the first year, with a net hospital cost saving of 48 950 CAD (Canadian dollars in year 2004 values), with use of conservative assumptions. Sensitivity analysis indicated a 90% probability that hiring a coordinator costs less than 25 000 CD per hip fracture avoided. Hiring a coordinator is a cost-saving measure even when the coordinator manages as few as 350 patients annually. Greater savings are anticipated after the first year and when additional costs such as rehabilitation and dependency costs are considered.

Singapore

Singapore hospitals: OPTIMAL (Osteoporosis Patient Targeted and Integrated Management for Active Living) is a Ministry of Health funded osteoporosis disease management programme implemented in various Singaporean hospitals in 2008³¹. OPTIMAL aims to prevent secondary fractures through case finding, physician and case manager follow up, medication subsidy and physiotherapy.

In 2011, a review of the patients recruited through OPTIMAL at the largest hospital in Singapore was carried out. From May 2008 to March 2012, 5608 patients were screened at the hospital. 977 out of 1434 patients with fragility fractures had been recruited into the programme based on the recruitment criteria of being older than 50 years, having had a fragility fracture after the age of 50, being agreeable to participate in the program and being able to comply with intervention and follow up. Six hundred and fifty nine patients are being currently followed up at the hospital. In December 2011, a follow-up of the 112 patients who had completed two years in the programme showed that 98% of them had baseline DXA conducted, and 64.3% had baseline and two year follow up DXA performed. Fifty nine percent of the patients were not on anti-osteoporosis treatment at baseline. Sixty five out of the 66 treatment naïve patients were started on therapy following recruitment. Eighty three percent of patients were compliant with therapy at two years, as defined by a Medication Possession Ratio of >80%. Fifty nine percent were compliant with exercise (weight bearing) at the end of the two year follow up, defined as continuing to do more than 30 minutes of such exercise, more than three times per week. There was a mean increase in BMD of the lumbar spine of 5.8% and of the total hip of 2.9%. Those who were compliant with exercise showed a significantly higher increase in BMD at the hip at the end of the two years. Though the study was not powered to detect statistically significant differences, there was a trend towards a decreased fracture rate in the patients who had

completed two year follow up when compared to a historical control. Fracture rates were 0.9%, 0.9% and 3.6% at the hip, other non-vertebral regions and vertebrae respectively in the study group, as compared to 1.9%, 3.4% and 4.3% in the same sites in the historical control group.

In the three years following inception, the OPTIMAL programme at the hospital has successfully identified and evaluated a large number of patients with fragility fractures. All components of the

Coordinator-based,
post-fracture
models of care
have successfully
closed the secondary
fracture prevention
gap in many
countries throughout
the world²⁸

highly facilitated programme appear to have contributed towards decreasing the care gap in management of fragility fractures and a high compliance rate with medications was seen. The ultimate success of the programme will be measured by the fractures prevented over long term follow up and cost effectiveness, but clear and effective steps in evaluating persons with fractures with BMD testing and offering treatment options have been initiated.

The Netherlands

Academic Hospital of Maastricht: In 2004, a secondary fracture prevention strategy was implemented for all individuals aged >50 years that presented to the Academic Hospital of Maastricht with a fracture¹²⁵. The service was primarily delivered by a trained osteoporosis nurse specialist. Patients managed in the outpatient setting were seen directly after their first visit and inpatients would be engaged during their hospital stay. Assessments included bone densitometry, osteoporosis risk factor evaluation and falls risk assessment. Patients with suspected secondary causes of osteoporosis were referred to internal medicine for further review. Advice was provided on the need for adequate calcium and vitamin D intake. Patients with osteoporosis according to bone densitometry received treatment in accordance with national guidelines. When compared to several local hospitals that did not employ a dedicated nurse specialist to deliver secondary preventive care, 71% of fracture patients at the Academic Hospital of Maastricht underwent bone density testing compared to just 6% at the other centres. A before-after analysis¹²³ of the impact of this service on subsequent fracture rates reported a 35% reduction and, notably, a 33% decrease in mortality.

United Kingdom

Glasgow, Scotland: The hospital-based Fracture Liaison Service (FLS) model was first developed in the Glasgow University teaching hospitals in 1999. The Glasgow FLS is a system to ensure fracture risk assessment, and treatment where appropriate, is delivered to all patients with fragility fractures. The FLS is a 'doctor light' service and is primarily delivered by a clinical nurse specialist, who works to pre-agreed protocols to case-find and assess fracture patients. Consultant Endocrinologists provide medical leadership for the Glasgow FLS. A critical success factor in development of the Glasgow FLS was establishment of a multi-disciplinary stakeholder group from project outset, with representation from all relevant hospital specialities, local primary care and regional health authority and administrative groups.

During the first 18 months of operations¹⁰⁶:

- More than 4600 patients with fractures of the hip, wrist, upper arm, ankle, foot, hand and other sites were seen by Fracture Liaison Nurse Specialists
- Nearly three-quarters were considered for BMD testing and treatment was recommended for approximately 20% of patients without the need for BMD testing
- 82% of patients tested were found to be osteopenic or osteoporotic at the hip or spine

During the first decade of this century in excess of 50 000 consecutive fracture patients have been assessed by the Glasgow FLS. During this period, hip fracture rates in Glasgow have reduced by 7.3% versus almost a 17% increase in England¹³², where currently only 37% of localities operate an FLS⁵³. A Scottish national audit compared case ascertainment for hip and wrist fractures in Glasgow versus five other centres operating less systematic models of care¹⁸. Ninety-

seven percent of hip fracture and 95% of wrist fracture patients were assessed by the Glasgow FLS versus less than 30% for any other service configuration. In May 2011, a formal cost-effectiveness analysis of the Glasgow FLS was published¹³³. This study concluded that 18 fractures were prevented, including 11 hip fractures, and 21 000 GBP was saved per 1000 patients managed by the Glasgow FLS versus 'usual care' in the UK.

United States of America

Kaiser Healthy Bones Program:

Kaiser Permanente has developed what is arguably the most comprehensive fragility fracture prevention initiative in the world. The Healthy Bones Program has its origins in Kaiser's Southern California system - the primary objective of which was to reduce the incidence of hip fracture¹¹⁹.

In the late 1990s, the Kaiser team resolved to close the secondary fracture prevention gap for patients presenting to hospital with hip fractures. Subsequently, the programme was expanded to include all older patients presenting

with fragility fractures at any site. As time and resources permitted, the Kaiser team undertook a systematic approach to delivering primary fracture prevention to patients at a high risk of suffering their first fragility fracture.

The Healthy Bones Program is underpinned by effective case-finding made possible by the state-of-the-art HealthConnect® electronic medical record¹³⁴. At the heart of the human infrastructure of the programme are Care Managers and Nurse Practitioners, who serve as co-ordinators and disease managers. By aggressively identifying and managing patients who have osteoporosis, a 37% reduction in the hip fracture rate in the Kaiser Southern California system was observed¹¹⁸. This translated to the prevention of 935 hip fractures in the year 2006 (2510 hip fractures were predicted by actuarial analysis, and 1575 fractures were actually observed). The cost of treating a hip fracture was approximately 33 000 USD. On the basis of this cost, it was estimated that the program saved more than 30.8 million USD for Kaiser Southern California in the year 2006.

SUCCESSFUL SECONDARY FRACTURE PREVENTION SERVICES OFTEN EMPLOY A DEDICATED COORDINATOR WHO ACTS AS A LINK BETWEEN THE ORTHOPAEDIC TEAM, THE OSTEOPOROSIS AND FALLS SERVICES, THE PATIENT, AND THE GP.



LOBBYING FOR CHANGE

The impact of effective multi-sector coalitions

During the first decade of this century, a consensus has emerged across the world on the need for prioritisation of secondary fracture prevention into national guidance and policy. In several countries, coalitions of interested parties have formed to develop strategies for implementation of systematic approaches to fragility fracture care and prevention at state, provincial or national levels. The examples that follow are intended to stimulate thought amongst ‘fracture prevention champions’ in countries yet to develop national strategies. Be they the leaders of national patient societies, healthcare professional organizations or government agencies with responsibility for quality improvement or productivity initiatives, common themes underpin these collaborative ventures.

Australia

In January 2011, the New South Wales Agency for Clinical Innovation (NSW ACI) published the NSW Model of Care for Osteoporotic Refracture Prevention¹³⁵. The population of New South Wales reached 7.2 million in

2010¹³⁶. From 2002 to 2008, 35% of patients admitted with minimal trauma fractures subsequently presented again to hospitals in the state with a further fracture, during the study period. This accounted for 16 225 bed days per year, with an average length of stay of 22 days. A survey of osteoporosis service provision for patients presenting with fragility fractures to the state’s 40 healthcare localities revealed that 12% had post-fracture coordinators in place. The majority of these posts were funded from research grants or as a service-to-medicine by pharmaceutical companies. Accordingly, the majority of patients presenting to hospitals across the most populous state of Australia fail to receive secondary preventive care. This represents a failure to deliver national reimbursement policy on assessment and treatment for osteoporosis. The Australian Medicare Benefits Schedule¹³⁷ and Pharmaceutical Benefits Scheme⁴⁴ both deem testing and treatment of people >50 years of age who have suffered a fragility fracture as cost-effective.

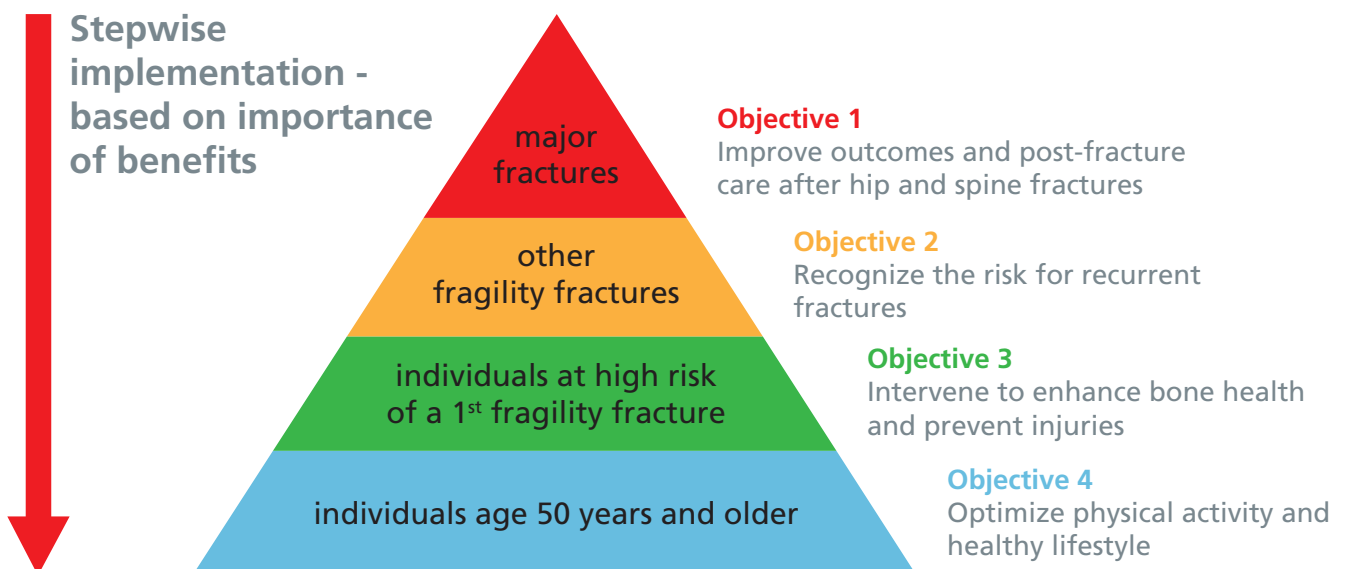
The NSW ACI model identifies

appointment of ‘Fracture Liaison Coordinators’ as the key step to close the current care gap. The state-wide survey has determined the precise number of coordinators required based upon case-load in each hospital. The strategic approach developed by the Department of Health in England¹³⁸ (see figure 10) is endorsed and adopted within the NSW ACI model. An established model of orthogeriatric care¹³⁰ will provide complementary support to hip fracture patients and the strategy interfaces with the NSW Government’s mandatory policy directive on falls prevention¹³⁹.

Canada

Secondary fracture prevention is a central component of the Ontario Osteoporosis Strategy¹⁴⁰, which was launched in February 2005 by the Ontario Ministry of Health and Long-Term Care. Based on Ontario’s Chronic Disease Prevention and Management model, the goal of this strategy is to reduce fractures, morbidity, mortality and costs from osteoporosis through an integrated and comprehensive approach aimed at health promotion

FIGURE 9 Osteoporosis Canada strategy: ‘Chipping Away at the Fracture Pyramid’⁹⁵



and disease management. The strategy is made up of five components being implemented at a population-based level:

1. **Health Promotion:** Education and risk reduction programmes about osteoporosis and bone health, targeting Public Health Units, Grade 5 school students and teachers, men and women over the age of 50.
2. **Screening:** Enhance early detection and diagnosis of osteoporosis by developing quality assurance protocols, accuracy and standardisation in the use of bone density testing.
3. **Post-Fracture Care:** Integrate services to provide enhanced treatment, including the creation of a province-wide osteoporosis screening programme in fracture clinics to improve diagnosis and prevention of future fractures. The programme focuses on improved linkages between fracture clinics, primary care professionals, orthopaedic wards, rehabilitation and long-term facilities.
4. **Professional Education:** Enhance use of best practice in osteoporosis care by healthcare professionals through the development of tools for physicians and education material for dissemination by health units.

5. **Research and Education:** Encourage ongoing research of osteoporosis and monitoring and evaluation of the strategy.

In March 2011, Osteoporosis Canada published a White Paper titled 'Osteoporosis: Towards a fracture free future'⁹⁵. The White Paper is completely focused on the need to close the secondary prevention care gap across Canada and is founded on four key components:

- A systematic top-down approach to fragility fracture prevention (*illustrated in figure 9*)
- An Osteoporosis Patient Bill of Rights demands that the post fracture care gap be addressed
- Multidisciplinary Clinical Practice Guidelines which address the post-fracture care gap and make recommendations on cost-effective solutions³⁹
- Coordinated post-fracture care programmes using Case Management are recommended as the most cost effective programmes to reduce fractures rates, including hip fracture rates

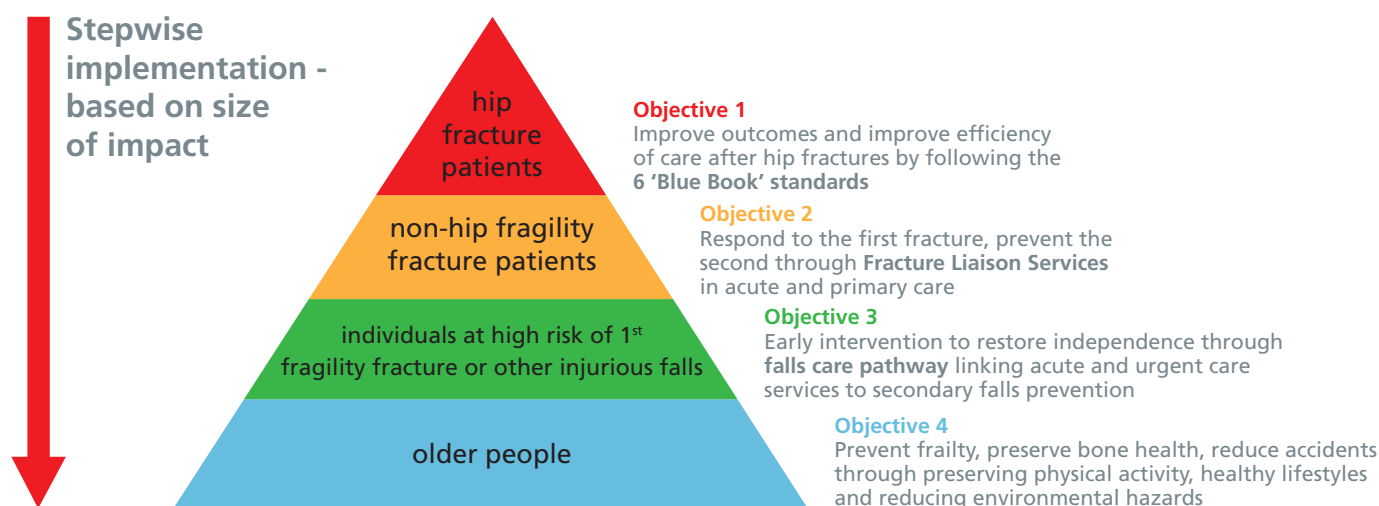
In November 2011, Osteoporosis Canada hosted its Inaugural FOCUS on Advocacy Forum in Toronto. The FOCUS Forum was attended by a multidisciplinary

group of health professionals and Osteoporosis Canada volunteers from across Canada. The FOCUS Forum participants discussed the individual needs of each province and systematically developed specific mechanisms to address the problem of the osteoporosis care gap region by region. These plans will be introduced to each provincial government for the purpose of influencing policy makers to make the necessary health system changes with the intention of significantly reducing fracture risk among Canadians.

United Kingdom

In 2007, the British Orthopaedic Association and British Geriatrics Society published the 'Blue Book' on the care of patients with fragility fractures²² in combination with the launch of the UK National Hip Fracture Database¹⁴¹ (NHFD). The Blue Book made the case for implementation of a nationwide systematic approach to hip fracture care and prevention through effective orthogeriatric care of hip fracture patients (monitored by the NHFD) and universal access to Fracture Liaison Services. The authorship group of the Blue Book included representatives from all relevant national professional and patient societies; all of these societies endorsed the Blue Book. Subsequently, the National Osteoporosis Society developed a highly focused 'Manifesto' which

FIGURE 10 Department of Health for England: systematic approach to falls and fracture prevention¹³⁸ (reproduced with permission of the Department of Health in England)



first and foremost called for universal access to FLS¹⁴².

The professional organizations and patient societies persuaded¹⁴³ the Secretary of State for Health to establish a working group within the Department of Health to develop

From April 1, 2010, an innovative Best Practice Tariff (BPT) for hip fracture¹⁴⁵ was introduced into the 'Payment by Results' system to incentivise hospitals to deliver care based on the clinical standards proposed in the Blue Book. The BPT offers an incentive (of 445 GBP per patient

risk and bone health assessments are undertaken for all hip fracture patients, aiming to prevent secondary fractures.

From April 1, 2012, new indicators on secondary fracture prevention have been included in the 2012-13 Quality and Outcomes Framework of UK GPs' Contract¹⁴⁶. The indicators are:

Multi-sector coalitions *have developed effective national and regional strategies* to close the secondary fracture prevention care gap in a growing number of countries

specific policy on the commissioning of services for falls and fracture prevention. The 'Prevention Package for Older People' was published in July 2009 and, as recommended in the Blue Book, made the case for improved hip fracture care and universal access to FLS as illustrated in *figure 10*^{138,144}.

in 2010/11, rising to 890 GBP per patient in 2011/12 and 1335 GBP in 2012/13) when surgery is conducted within 36 hours of admission in combination with provision of effective ortho-geriatrician led medical care of the acute phase. BPT also requires hospitals to ensure that falls

- **OST1** The practice can produce a register of patients:
 - Aged 50-74 years with a record of a fragility fracture after April 1, 2012 and a diagnosis of osteoporosis confirmed on DXA scan
 - Aged 75 years and over with a record of a fragility fracture after April 1, 2012
- **OST2** The percentage of patients aged between 50 and 74 years, with a fragility fracture, in whom osteoporosis is confirmed on DXA scan, who are currently treated with an appropriate bone-sparing agent
- **OST3** The percentage of patients aged 75 years and over with a fragility fracture, who are currently treated with an appropriate bone-sparing agent

IMPORTANT COMPONENTS OF FRACTURE AND FALLS PREVENTION INCLUDE THE IMPROVEMENT OF MUSCULAR STRENGTH AND BALANCE, AS WELL AS THE REDUCTION OF ENVIRONMENTAL HAZARDS.





THE 12-FOOT TALL BY 12-FOOT WIDE 'CAST MOUNTAIN' PRODUCED FOR THE NBHA'S 2MILLION2MANY CAMPAIGN IS A SYMBOLIC REPRESENTATION OF THE 5500 BONE BREAKS DUE TO OSTEOPOROSIS THAT OCCUR IN THE USA EVERY DAY.

Based on previous experience of the introduction of new indicators for other disease states, this step is likely to transform the long-term management of secondary preventive care in the UK. In February 2012, the UK National Osteoporosis Society and the Royal College of General Practitioners launched a website¹⁴⁷ - www.osteoporosis-resources.org.uk - intended to support UK GPs to deliver the new quality measures.

In October 2011, a Ministerial Summit was convened by the National Osteoporosis Society, Age UK and the Department of Health. The report and action plan that came from this meeting were published in February 2012¹⁴⁸. All stakeholder organizations identified the key steps required for universal implementation of Department of Health policy on falls

and fracture prevention. A national Falls and Fractures Declaration will be published in October 2012. Signatory organizations will agree to specific actions intended to significantly reduce the incidence of hip fractures by 2017.

United States of America

The National Bone Health Alliance (NBHA)¹⁴⁹ is a public-private partnership that brings together the expertise and resources of its 46 members (as well as liaisons representing the Centers for Disease Control and Prevention, National Institutes of Health, U.S. Food and Drug Administration and National Aeronautics and Space Administration) from the public, private and non-profit sectors to collectively promote bone health and prevent disease; improve diagnosis and treatment of bone

disease; and enhance bone research, surveillance and evaluation.

In November 2011 in Washington D.C., NBHA and Kaiser Permanente unveiled their '20/20 Vision' for reducing hip and other fractures by 20% by 2020¹⁵⁰. A key element to achieve this vision is the NBHA proposal to establish a Fracture Liaison Service (FLS) within Medicare and other health systems. This programme will be modelled on successful programmes in the U.S. at Kaiser Permanente, Geisinger Health System, the American Orthopaedic Association and the Department of Veterans Affairs as well as internationally in the United Kingdom, Canada and elsewhere. This FLS would assess patients who suffer an osteoporotic fracture and provide them with appropriate treatment (if warranted) and follow-up to prevent repeat fractures.

IMPLEMENTATION GUIDELINES & RESOURCES

For healthcare professionals, national patient societies and policy makers

This section provides guidance and links to resources on developing effective case-finding systems for secondary fracture prevention. This includes a summary of critical success factors and steps in the process of establishing a service at a local level. Strategic approaches that might be undertaken by national patient societies, professional organizations or policy makers and their department/ministry of health teams are also considered.

STEPS TO ESTABLISH A COORDINATOR-BASED, POST-FRACTURE MODEL OF CARE

The factors common to setting-up a successful coordinator-based, post-fracture model of care are^{28,151}:

- Establishment of a multi-disciplinary strategy group from the project outset
- Adequate local access to axial bone densitometry
- Appointment of a member of staff to coordinate post-fracture care (often a specialist nurse)
- Protected time for input from the medical lead for the service (a hospital doctor or a primary care doctor with a specialist interest in osteoporosis)
- Agreement of assessment and management protocols with all stakeholders
- Acquisition of a database to underpin communication and audit
- Agreement of specifics of the communication mechanism with local primary care or family physicians
- Establishment of referral mechanism from the service to the local Falls Prevention Team, if available

- Monitoring of adherence to management recommendations issued by the service

Whatever service design is deemed most appropriate for a particular locality, it is crucial that a multi-disciplinary stakeholder group be established at project outset. This group will likely include:

- The hospital's 'Lead Clinician in Osteoporosis' (usually an endocrinologist, rheumatologist, geriatrician or orthopaedic surgeon)
- Senior orthopaedic surgeon with an interest in hip and fragility fracture surgery
- Senior geriatrician or orthogeriatrician with an interest in acute care of fragility fracture patients
- Relevant specialist nurses, physiotherapists and other Allied Health Professionals
- IT Personnel responsible for development and installation of the database
- Representatives from hospital and primary care prescribing and pharmacy management groups
- Representative from local general practice and/or primary care organizations
- Representative from local public health organizations

APPLICATION OF PLAN-DO-STUDY-ACT METHODOLOGY TO SERVICE DEVELOPMENT

Rapid cycle process improvement methods have been central to the development of successful new approaches to delivery of secondary fracture prevention throughout the world. Rapid cycle process improvement methods are widely

applied in the industrial sector. The method involves execution of sequential Plan-Do-Study-Act (PDSA) cycles. This approach has been applied specifically to the redesign of osteoporosis care of fragility fracture patients¹²¹. The steps of the PDSA cycle in the context of secondary fracture prevention are illustrated below:

Plan

- Conduct baseline audit to establish care gap
 - Number of patients >50 years attending with fragility fracture
 - Proportion of patients >50 years receiving secondary preventive care post-fracture
 - Review previous local audit data if available
- Design prototype service to close the management gap
 - Write aims and objectives
 - Identify how you will capture fracture patients
 - Write protocols for wards and fracture clinics
- Ensure algorithms and protocols are agreed before post-fracture coordinator clinics are in place
- Agree all documentation and communication mechanisms
- Develop business case
- Engage hospital management and/or local healthcare commissioners to fund pilot phase

Do

- Implement prototype service model
- Collect audit data throughout pilot phase

Study

- Analyse improvement in provision of care from audit



EFFECTIVE PATIENT CASE-FINDING MECHANISMS ARE ESSENTIAL.

- Refine prototype service model to improve performance

Act

- Implement changes and monitor performance improvement
- Repeat PDSA cycle through continuous ongoing audit and review

FRACTURE PATIENT CASE-FINDING SYSTEMS

Effective patient case-finding mechanisms are essential. However, this element of operations can be labour intensive unless information technology systems are leveraged. In the absence of automated solutions, case-finding can be achieved by:

- Regular visits by the post-fracture coordinator to the orthopaedic wards with orthopaedic ward staff

maintaining a list of fracture admissions in-between visits

- Attendance by the post-fracture coordinator at daily trauma team meetings
- Routine attendance by the post-fracture coordinator at fracture clinics
- 'Link nurses' – Fracture clinic personnel acting as a link to the service by creating a daily register of new fracture patients

Examples of automated approaches to patient case-finding include:

- Use of an integrated Electronic Medical Record such as the Kaiser Permanente HealthConnect® system¹³⁴. This enables real time/daily/weekly generation of lists of patients that have presented to urgent care services with fragility fractures

- Incorporation of a question relating to fragility fractures in the Emergency Department (ED) clerking questionnaire. In Cardiff, UK a very simple yet effective system to generate a work list for the falls prevention service was created by incorporation of the question 'Did you fall?' into the questions asked by the ED receptionists¹⁵²
- Use of text recognition software on letters typed by orthopaedic secretaries to identify patients who have attended fracture clinic with fragility fractures¹⁵³

Vertebral fractures, whilst the most common osteoporosis-related fracture, often do not come to clinical attention^{101,102,154}. Strategies have been developed by UK-based Fracture Liaison Services to proactively improve identification of unrecognised vertebral fractures^{155,156}. Use of vertebral fracture assessment (VFA) equipment, which is commonly available on modern axial bone densitometers, provides a low radiation exposure alternative to standard X-Ray that could be conducted when patients attend for DXA scan. Amongst patients presenting with non-vertebral fractures that were assessed by an FLS, the overall prevalence of vertebral deformity was of the order of a quarter to a fifth (25%¹⁵⁵ and 20%¹⁵⁶). VFA identified a substantial burden of prevalent vertebral fractures that had not been previously documented. These findings are significant because assessment of patients by the combination of bone density measurement with ascertainment of vertebral fracture status has been shown to improve fracture risk prediction¹⁵⁷:

For any given BMD T-score, the risk of an incident vertebral, non-vertebral fragility, and any fracture differs by up to 12 times, two times, and seven times, respectively, when information regarding spine fracture burden is considered. In the absence of knowledge about the prevalent vertebral fracture status, assessments based solely on BMD may under- or over-estimate the true risk of a patient experiencing an incident fracture.'

STRATEGIC APPROACHES

For national patient societies, professional organizations and policy makers

AUDIT OF SERVICES FOR SECONDARY FRACTURE PREVENTION

Publication of audits of secondary preventive care can provide a catalyst for the development of coordinator-based, post-fracture models of care. National organizations engaged in lobbying for improved secondary preventive care, or that are trying to implement such strategies, need to determine what proportion of localities have effective systems in place and what proportion of fracture patients receive optimal care. The numerous published audits cited in the section of this report concerned with the current care gap provide illustrations of how audits could be undertaken at a national⁴⁸⁻⁵⁹, regional^{18,60-66} and local^{17,19,67-94} level. The following questions might be included in audits of individual institutions⁶³:

- How many men and women >50 years of age present with fractures to the particular institution per year?
- What proportion of patients admitted to hospital after suffering a fragility fracture receive osteoporosis assessment and/or treatment, and referral for falls assessment where appropriate?
- What proportion of patients managed as out-patients (or in community-based fracture clinics) after suffering a fragility fracture receive osteoporosis assessment and/or treatment, and referral for falls assessment where appropriate?
- Where in the care pathway does the identification of fragility fracture patients take place?
- Who is responsible for conducting post-fracture assessment of osteoporosis and falls risk?



COMMUNICATION AND MANAGEMENT PROTOCOLS MUST BE PUT IN PLACE.

- Is bone densitometry routinely available for fragility fracture patients?
- Has a communication and management protocol been established between the institution that provides surgical care for fracture patients and local primary care/family physicians?
- Does the institution have an information technology system in place that facilitates audit of delivery of secondary fracture prevention?

DEVELOPING CONSENSUS GUIDELINES

Achieving consensus across all relevant stakeholder groups regarding how effective secondary preventive care should be delivered is important, whether at the national or local level. At a national level, the relevant professional organizations (including Bone and Mineral Societies, those representing endocrinologists, rheumatologists, geriatricians,

orthopaedic surgeons, public health physicians, general practitioners and nurses) and national osteoporosis societies are well placed to draft evidence-based guidance within the context of the particular national healthcare system. Examples of such guidelines include:

- The British Orthopaedic Association – British Geriatrics Society 'Blue Book' on the care of patients with fragility fracture²²
- The 2010 clinical practice guidelines for the diagnosis and management of osteoporosis in Canada from the Scientific Advisory Council of Osteoporosis Canada³⁹
- The US Guide to improving the care of patients with fragility fractures¹⁵⁸
- IOF Fracture Working Group – Coordinator-based systems for secondary prevention in fragility fracture patients²⁸

KEY FACTS FOR POLICY MAKERS

Coordinator-based, post-fracture models of care have *successfully closed the secondary fracture prevention care gap* in many countries throughout the world and are highly cost-effective²⁸ — governments and associated agencies have endorsed coordinator-based, post-fracture models of care in national and regional healthcare policy^{135,138,140,143,144}



THE PROBLEM

Fragility fractures exert a tremendous burden on older people and healthcare budgets. Fragility fractures are common; 1 in 2 women over 50 years of age will suffer one, as will 1 in 5 men³⁻⁵. Globally, during year 2000, there were an estimated 9 million new fragility fractures, of which 1.6 million were at the hip, 1.7 million at the wrist, 0.7 million at the humerus and 1.4 million symptomatic vertebral fractures⁶. Worldwide, osteoporotic fractures accounted for 0.83% of the global burden of non-communicable disease. In 2005, the International Osteoporosis Foundation (IOF) estimated the total direct cost of osteoporotic fractures in Europe to be 32 billion EUR per year¹¹, a figure which is projected to rise to 38.5 billion EUR by 2025¹². In 2002, the combined cost of all osteoporotic fractures in the United States was estimated to be 20 billion USD per year¹³.

OPPORTUNITIES FOR SECONDARY PREVENTIVE INTERVENTION

Amongst individuals aged >50 years, approximately one sixth of women and a smaller proportion of men have suffered a fragility fracture^{28,29}. Half of all individuals that will suffer hip fractures in the future bring themselves to clinical attention before breaking their hip, by suffering a prior fragility fracture¹⁶⁻¹⁹. This might have been a wrist fracture during their fifties, a humerus fracture during their sixties or a fracture of the spine in their seventies. This group represents a comparatively small proportion^{24,28} of the entire population that could be readily targeted for intervention to reduce future fracture risk. Osteoporosis treatment of fracture patients can reduce the overall incidence of hip fracture by 20-25%¹¹⁸.

THE CURRENT CARE GAP

National⁴⁸⁻⁵⁹, regional^{18,60-66} and local^{17,19,67-94} audits conducted across the world have shown standards of secondary preventive care to be appallingly low. The usual standard of care results in 80% of fragility fracture patients neither being assessed nor treated for osteoporosis or falls risk to reduce future fracture incidence. The consequence of this care gap is countless avoidable fragility fractures afflicting our older people at a cost of many billions of dollars worldwide.

THE SOLUTION: COORDINATOR-BASED POST-FRACTURE MODELS OF CARE

In 2011, the Fracture Working Group of the Committee of Scientific Advisors of the International Osteoporosis Foundation (IOF) published a position paper²⁸ on coordinator-based systems for secondary prevention in fragility fracture patients. A systematic literature review¹⁰⁵ found that the majority of successful systems for secondary fracture prevention employed a dedicated coordinator. The coordinator acts as the link between the orthopaedic team, the osteoporosis and falls services, the patient and the primary care physician. Exemplar service models have been referred to as 'Fracture Liaison Services' (UK¹⁰⁶⁻¹¹⁰, Europe^{111,112} and Australia¹¹³⁻¹¹⁵), 'Osteoporosis Coordinator Programs' (Canada^{116,117}) or 'Care Manager Programs' (USA^{118,119}). A range of other terms have been used to describe other published models with similar characteristics¹²⁰⁻¹²⁹.

THE IOF ‘CAPTURE THE FRACTURE’ CAMPAIGN



Capture the Fracture is a global campaign developed to facilitate the implementation of coordinator-based, post-fracture models of care for secondary fracture prevention. The International Osteoporosis Foundation (IOF) believes this is the single most important thing that can be done to directly improve patient care and reduce spiralling fracture related healthcare costs worldwide.

IOF's members are united in a common vision of a world without osteoporotic fractures. Fragility fractures are estimated to occur every 3 seconds worldwide⁶. We now know that a prior fracture doubles a patient's future fracture risk^{20,21}. Furthermore, studies from a number of countries have reported that 45% or more of today's hip fracture patients have a prior fracture history¹⁷⁻¹⁹, and data indicate that almost half of all women and

one third of men with a hip fracture will suffer a new fragility fracture during their remaining lifetime^{159,160}. Healthcare systems are evidently failing to respond to the first fracture to prevent the second – this is, tragically, a missed opportunity for intervention.

The Capture the Fracture Campaign has developed a best practice framework, and will promote and facilitate its implementation for the management of fragility fractures. A review of the literature has shown that establishing a coordinator-based multidisciplinary approach to patient care is the most cost-effective in preventing the second fracture¹⁰⁵. The programme will be communicated through a dedicated and sustainable website that will include, in part, a map of existing best practices worldwide, country-specific tool-kits for implementation of coordinator-based systems, a repository for related research publications and a list of supportive partners. The website aims to promote local and national initiatives as well as become a platform for organizations or hospitals to share their programmes, information and local implementation strategies.

In addition, IOF is seeking participation from an international coalition of multidisciplinary partners concerned about the treatment of fragility fractures. We have invited a significant representation from the world of Orthopaedics, Geriatrics, Rheumatology, Endocrinology, General Bone Health Groups, and other Physician and Hospital organizations. We also endeavour to include representation from government organizations.

IOF hopes that members of the IOF Committee of National Societies will be interested in taking part in Capture the Fracture, as we view a broad coalition to be critical to assuring the proper management of fragility fractures worldwide. We know that with the support of National Societies that the campaign will make a difference to patients as well as provide enormous cost savings to our healthcare systems around the world.

Further information about the Capture the Fracture Campaign is available at www.capture-the-fracture.org

ABOUT IOF



The International Osteoporosis Foundation (IOF) is a not for profit, nongovernmental umbrella organization dedicated to the worldwide fight against osteoporosis, the disease known as 'the silent epidemic', and related musculoskeletal diseases. IOF's members – committees of scientific researchers, patient, medical and research societies and industry representatives from around the world – share a common vision of a world without osteoporotic fractures and musculoskeletal diseases. IOF now represents 202 societies in 94 locations around the world.

For more information visit www.iofbonehealth.org

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Approximately 50% of people with one osteoporotic fracture will have another, with the risk of new fractures rising exponentially with each fracture. The majority of fragility fracture patients never learn what caused their fracture to happen, or receive treatment to prevent it from happening again. Evidently, this is a missed opportunity to identify and treat those at greatest risk of disabling and costly secondary fractures.

'Capture the Fracture' is a global campaign developed to facilitate the implementation of coordinator-based, post-fracture models of care for secondary fracture prevention.

IOF believes this is the single most important thing that can be done to directly improve patient care and reduce spiraling fracture related healthcare costs worldwide.

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