



ACI NSW Agency
for Clinical
Innovation

MUSCULOSKELETAL NETWORK

NSW Model of Care for
Osteoporotic Refracture Prevention



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BONE UP ON THE HOME TRUTHS

- Every **five to six minutes** someone is admitted to an Australian hospital with an osteoporotic fracture.
- Once a person has had one fracture they have two to three times' higher risk of another fracture than their age- and gender-matched peers.
- MBS and PBS have deemed it cost-effective to test and treat people over 50 years of age who have had a fracture in order to reduce this risk.
- The necessary tests and treatments are available and subsidised by Medicare and the PBS.
- Evidence also exists for falls' prevention strategies for improving quality of life and reducing the risk of falls.
- **All evidence-based guidelines** highlight the need to intervene at the time of the first fracture to prevent the next fracture.
- Yet numerous national audits show that only **20-30% of patients** are being identified at this time as needing care to prevent the next fracture.
- The big skeleton in our closet: **80%** of people coming through our health services with an osteoporotic fracture are being denied the health benefits of effective fracture prevention.
- This led Kristina Akesson, Orthopaedic Surgeon and Chair of the International Osteoporotic Fracture Line Council, to say that if you don't identify and treat these patients, "you are a bad doctor".

"Let me say it loudly ... A FRACTURE IS A SENTINAL EVENT, and coordination between those who repair fractures and those who manage the patient to prevent the next fracture is a critical need ... if you fail to do the right thing for your patient you are a BAD DOCTOR" [1]

Kristina Akesson, Professor, Lund University





FOREWORD

The Agency for Clinical Innovation (ACI), formally known as the Greater Metropolitan Clinical Taskforce (GMCT), was established by the NSW government as a board-governed statutory health corporation in January 2010. This was in direct response to the Special Commission of Inquiry into Acute Care Services in NSW Public Hospitals. The ACI drives innovation across the healthcare system by using the expertise of its networks of doctors, nurses, allied health professionals, consumers, consumer organisations, representatives from academic institutions, health managers and administrators and policy makers.

These experts design, cost and recommend innovative, evidence-based improvements to public healthcare services in NSW for implementation on a state-wide basis.

The ACI Musculoskeletal Network has developed this model of care to support the spread of successful models of care for people with, or at high risk of, osteoporosis in NSW. NSW data, clinician experience and the published evidence internationally, nationally and in NSW have revealed a poor perception of the gravity of not identifying and subsequently treating osteoporosis. People who suffer osteoporotic fractures are at risk of a much poorer quality of life including chronic pain, being less able to perform activities of daily living, losing their independence and developing other chronic diseases due to immobility. Their risk of early death is also very real. Despite the 'hall-mark' sign of osteoporosis, a 'minimal trauma fracture', many people fail to gain access to investigation, treatment and self-management support.

This project, funded by the ACI, commenced in January 2010. The Working Group is comprised of endocrinologists, rheumatologists, general practitioners, rehabilitation and pain management physicians, geriatricians, orthopaedic surgeons, nurses from specialties such as orthopaedics and rheumatology, physiotherapists and consumer representation. The Working Group has consulted members of Arthritis NSW and Osteoporosis NSW. The clinicians work in urban, regional and rural healthcare settings.

On behalf of the ACI, I would like to thank the Working Group and the ACI Musculoskeletal Network as a whole for their dedication and expertise in developing this model of care, including the needs of implementation across NSW commencing in 2011.



Hunter Watt
Chief Executive, Agency for Clinical Innovation



PREFACE

Musculoskeletal conditions affect hundreds of millions of people around the world. In people over the age of 60 years, bone and joint diseases account for more than half of their chronic conditions. In Australia, osteoporosis affects one in two women over the age of 60 years and one in three older men. These numbers are projected to increase as the Australian population ages. In 2007, Australian health system expenditure on osteoporosis was estimated to exceed \$1.5 billion; comparable to the expenditure on coronary heart disease, diabetes, depression, stroke or asthma. In economic terms, the total cost of osteoporosis in Australia attributable to the burden of disease, lost productivity costs and direct health costs is \$7 billion.

Osteoporosis is the result of the removal of 'normal' bone accompanied by decreases in replacement of bone with aging. This process leads to progressively weakened bone that fractures (breaks) when subjected to normal (minimal) levels of trauma. These fractures heal normally but signal increased risk of future fractures, lead to disability and importantly increase mortality risk across all ages and for all types of osteoporotic (fragility) fractures. As the Australian population ages and the prevalence of osteoporosis continue to increase, this will place an increasing burden on individuals, societies and health care systems.

Recognition of the growing burden of musculoskeletal conditions and their effect on growth in health care costs has precipitated action at international, national and state levels. In January 2000, the World Health Organisation launched the Bone and Joint Decade to raise awareness of the growing societal impact of musculoskeletal conditions. In 2002, the Australian Government identified arthritis and other musculoskeletal conditions as a national health priority and established the National Arthritis and Musculoskeletal Conditions Advisory Group (NAMSCAG). This Group developed a National Action Plan and a National Service Improvement Framework for osteoporosis as well as for osteoarthritis and rheumatoid arthritis. These were endorsed as key strategic documents in the Better Arthritis and Osteoporosis Care 2006-2010 initiative, which aimed to improve primary, secondary and tertiary management and prevention of these conditions. The Australian Government's Department of Health and Ageing commissioned the Royal Australasian College of General Practitioners to develop guidelines for the care of these conditions which, after development by select committees, were approved by the NHMRC. At international and national levels, projects for the more effective identification, investigation and treatment of individuals with osteoporosis were commenced in several different settings and following several different models. From this work, including individual sites in NSW, it is clear that systems-based approaches are required to achieve clinically useful improvements in care.

Data in NSW reveal that 35% of minimal trauma fracture admissions from 2002-2008 presented to hospital with a re-fracture. This accounted for 16,225 admissions, with an average length of stay of 22 days. Despite these shocking data, currently in NSW there are very few services focusing on supporting these people to gain access to diagnosis and treatment of osteoporosis. Local teams in NSW are demonstrating the need for and the benefits of a multidisciplinary team approach to gaining access for treatment of osteoporosis.

We welcome this plan for better health services for people with or at high risk of osteoporosis in NSW and thank all members of the ACI Musculoskeletal Network for sharing their expertise in the development of this plan and model of care.



John Eisman AO
Co-Chair, ACI Musculoskeletal Network



Lyn March
Co-Chair, ACI Musculoskeletal Network



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EXECUTIVE SUMMARY

Background

Osteoporosis is a chronic disease characterised by reduced bone density and strength which predispose to minimal trauma fractures. This leads to individuals living with ongoing pain and the real possibility of further fractures and the resultant reduction in quality and quantity of life. Minimal trauma fractures are seen in more than 50% of women and more than 25% of men. Each such fracture is followed by re-fracture in up to 50% of cases. A minimal trauma fracture of any and every bone site predisposes to premature mortality but is markedly so in hip fractures. Data concerning people who have hip fracture reveal that up to 25% of these patients will die prematurely. This is even more marked in men than in women. Given the frequency of such fractures and the associated reduced life expectancy, the potential life years lost are greater in people aged 60-75 years than in more elderly women and men. Importantly both the increased risk of another fracture and premature mortality are most marked in the first five to ten years after a fracture. Therefore there is an urgency to identify, assess and, as necessary, treat people with osteoporosis. The National Health and Medical Research Council (NHMRC) in 2010 approved the Royal Australian College of General Practitioners (RACGP) Osteoporosis Guidelines so we have the need, the urgency and the approved tools to deal appropriately with this major health problem and health system conundrum.

Much evidence has been generated in the published literature, including government-sponsored reports, regarding the high incidence of osteoporosis in the Australian community. It is estimated that over 2.2 million Australians live with osteoporosis, which equates to 10.1% of the population. The Australian Institute of Health and Welfare (AIHW) reported in 2008 that more than 581,000 Australians have been diagnosed with osteoporosis, according to self-reports. However, the AIHW conceded this is a gross under-estimate as many people are not told they have osteoporosis even though it may have been diagnosed on bone mineral density scanning or the patient had a fragility fracture. Furthermore, many who have known osteoporosis are not medicated nor have an understanding of the measures required to self-manage their chronic disease. An Australian study has shown that only 28% of a large cohort were using specific medical therapy for osteoporosis after a post-menopausal minimal trauma fracture despite the huge body of evidence concerning the benefits of medications such as bisphosphonates. This would suggest that the AIHW reports underestimate the actual prevalence by a factor of three to four for women and four to five for men.

Hospital Data

Data were analysed by the Agency for Clinical Innovation (ACI) on NSW hospital admissions for re-fracture from July 2002 to June 2008. All fractures were included. If we drew out only hip fractures, the evidence informs that the following information from the NSW hospital data would be worse.

Limitations to this dataset were the under-diagnosis and recording of re-fracture and osteoporosis in medical records. Additionally, patients could only be identified as a re-fracture case if they attended the same hospital for the first and subsequent fractures. Finally, it is recognised by health teams that coding of these admissions can be problematic.

Core information from the hospital admission data included:

- 35% of those presenting for fracture presented with a further re-fracture during the study period
- Average length of stay (LOS) for re-fracture is 22 days, with re-fracture admissions totalling 16,225 bed days per annum
- From the cohort of 12,770 people, 17% died during the time under study
- 78% were female, 1,344 were aged less than 65 years (14%), 11,426 were aged more than 65 years (86%).

Due to the longitudinal nature of entry to this data set, the re-fracture proportion and associated hospital bed-days should be counted at approximately twice the figures above.

Survey of Services

Analysis of a survey undertaken in late 2009 of service provision in NSW for people with or at high risk of osteoporosis reveals:

- Responses from all Area Health Services (AHS) of NSW
- Amongst more than 40 individual sites in public health care settings in NSW, only three have a budget to support people with osteoporosis
- Five nurses, five doctors and one allied health professional are the total staff funded by the AHS across NSW at present
- Amongst more than 40 localities, only five localities have a coordinator, most of whom are funded by sources other than the AHS budget e.g. research funds, pharmaceutical industry.

Access to Care

National and international peer-reviewed journals report the fundamental need to improve early diagnosis and access to appropriate services. There is wide agreement that the best way to achieve this aim is to appoint a specific fracture prevention service coordinator. The coordination role is to guide people to appropriate services, much of which are already available in the community. While some sites in NSW will require support to provide access to specialty medical services and self-management programs, the survey revealed that most localities have services for other diagnostic/population groups that this patient cohort could link with. The key is to support early diagnosis, appropriate medical management and then linkage to community-based services for peer support and lifestyle behaviour change interventions.

Osteoporotic Re-Fracture Prevention Model of Care

The ACI Musculoskeletal Network model of care for osteoporosis is proven internationally, nationally and locally in NSW (Concord, St Vincent's, RPAH, RNC and the former NCAHS for example). Case management of patients is at the centre of the model. Case managers will be known as **Fracture Liaison Coordinators** and will provide individuals with:

- Disease management education
- Support for self-management, and
- Initiating specific treatment to reduce risk of further fractures.

Fracture Liaison Coordinators will direct participants of the service to:

- Investigation
- Medical care - both specialist and general practice
- Complementary lifestyle support services that will primarily be services already available in the community, both public and privately funded.

Linkages with chronic care and falls prevention services, primary care, community-based lifestyle services and homecare services are imperative in the model. To offset costs in the community, participants are eligible for the Medicare Chronic Disease item numbers and thus are eligible for five allied health interventions per annum.

A phased implementation is recommended to ease the monitoring of implementation and to resolve any unforeseen impediments before general system roll-out. However, for implementation across NSW, *Fracture Liaison Coordinators* and appropriate resources are required in all Local Health Networks (LHN). The ACI Musculoskeletal Network estimates *Fracture Liaison Coordinators* will be required for each LHN as noted in Table 1. The number of *Fracture Liaison Coordinators* recommended for each LHN takes into account population numbers and also the tyranny of distance for some LHNs.

Table 1 - Fracture Liaison Coordinators requirements for each Local Health Networks in NSW

LOCAL HEALTH NETWORK	COORDINATED SERVICES	FRACTURE LIAISON COORDINATORS
Central Coast	1	1 x FTE
Illawarra Shoalhaven	2	2 x FTE
Far West	2	2 x 0.5 FTE
Hunter New England	3	3 x FTE
Mid North Coast	2	2 x 0.5 FTE
Murrumbidgee	3	1 x FTE, 2 x 0.5 FTE
Nepean Blue Mountains	2	1 x FTE, 1 x 0.5 FTE
Northern	2	2 x 0.5 FTE
Northern Sydney	3	3 x FTE
South Eastern Sydney	3	3 x FTE
Southern	3	3 x 0.5 FTE
South Western Sydney	4	4 x FTE
St Vincent's and Mater Health	1	1 x FTE
Sydney	3	2 x FTE, 1 x 0.5 FTE
Western	3	1 x FTE, 2 x 0.5 FTE
Western Sydney	3	3 x FTE

AIMS, CONTEXT AND SCOPE OF THIS MODEL OF CARE

This document aims to guide the implementation of services across NSW that will accelerate the diagnosis and optimal clinical management of osteoporosis in people who are at high risk of sustaining minimal trauma fractures. It provides an outline for a range of evidence-based interventions, consistent with current guidelines that have been shown to be effective in improving the management of osteoporosis and reducing fracture risk within the Australian context. The intention is that each Local Health Network and Primary Health Care Organisation across NSW will be able to review, select and implement locally appropriate service changes to ensure that osteoporosis and fracture risk are proactively addressed for all people living in metropolitan, rural, regional or remote areas of NSW.

The guiding documents for development of this model of care are:

- NHMRC-endorsed *Clinical guidelines for the prevention and treatment of osteoporosis in postmenopausal women and older men* from the Royal Australian College of General Practitioners 2010 [3], and
- *National osteoporosis next fracture prevention program: scoping study final report* developed by Osteoporosis Australia for the Department of Health and Ageing (2009)[4].

The population group to be targeted are patients aged greater than 50 years who present with a fracture following minimal/low trauma. The main group of patients referred to participate will be those who present to hospital with a minimal trauma fracture of any type, though referral from primary care and other healthcare settings will be encouraged. Minimal trauma fracture is defined as a fracture sustained through falling, tripping or slipping from a standing height or a trauma of lesser impact.

Services will be provided in settings that best meet the local context, such as an outpatient department, community health centre, general practice or private rooms.

Future work of the ACI Musculoskeletal Network will include the needs of Osteoporosis Primary Prevention. This will include collaboration with national organisations and government departments to drive reform as required to support population awareness of bone health requirements across the lifespan.

THE NEED FOR CHANGE



Thelma

82-year-old Thelma is brought into hospital in an ambulance. Thelma is a single lady who has lived alone all her life. She has a few close neighbours who are like her family. Her sister and nieces live over 200 kilometres from her home. Thelma fell at home and lay on the floor for over 24 hours, unable to move due to pain in her right hip. She has a Vital Alert system but doesn't wear it as she worries about disturbing her neighbour, "so why wear it?"

One of Thelma's neighbours, Stan, came to check on her after she didn't call by on her usual walk to the shops. Thelma was terribly embarrassed at being found on the floor as she had wet herself and felt rather stupid. Despite her protestations, Stan phoned for an ambulance.

At the hospital Thelma was diagnosed with a fractured hip and treated accordingly. Fortunately she survived this episode but had to be admitted to a residential aged care facility on discharge from hospital, as there was no rehab unit for pensioner patients in her locality and her neighbours didn't feel able to provide her with nursing care at home. Basic home care could be provided in her town but no home nursing by government agencies.

Despite a history of previous minimal trauma fractures, two falls in the past year and being an ex-smoker, Thelma had not been investigated or treated at any time in the past few years for osteoporosis. Using the Garvan risk calculator, Thelma's risk of further hip fracture is 61% within the next five years and 87% within the next 10 years. Unfortunately, Thelma never returned to her own home and died six months after her hip fracture. She had a lonely few months as her neighbours couldn't get to the regional city to visit her and her sister and nieces only got to see her twice in that time.



Susan

53-year-old Susan presented to the Emergency Department following a first-time fall while walking her dog. She reports being fit and healthy, works as a nurse full-time and is married with three children. Her mother was diagnosed with osteoporosis at a similar age. Other risk factors included body mass index (BMI) of 19, she is a smoker and likes to share a bottle of wine (or two) with her husband after work.

X-ray revealed an ankle fracture. This was immobilised with plaster and she was booked for follow up through the Fracture Clinic. A discharge letter was faxed to her general practitioner (GP) advising that Susan was being followed up in the Fracture Clinic. A week after her fracture occurred, Susan attended the Fracture Clinic for assessment and was told her plaster was well positioned and that she need not return for six weeks when it was hoped to remove the plaster. She was managing the pain of her fracture with Panadeine 1G three times a day.

Susan could not return to work until her ankle was healed and she was mobilising without restriction. Therefore Susan was rather housebound and at a loss for activities to fill her days. While her husband and children did some of the house chores and shopping, she became increasingly agitated as these activities of her usual daily life were not performed as she would have done them. Her smoking habit increased to alleviate the boredom and relieve her agitation.

Three months later Susan returned to work on restricted duties but eventually her regular routines and life normalised. Unfortunately she had not received any investigations or treatment for osteoporosis, as none of her treating health team considered that at 53 years of age she would need investigation of this chronic condition.

At age 58, Susan tripped on the vacuum cleaner cord while doing her house chores in the lounge room and fractured her right hip. She was hospitalised for treatment of this fracture. All staff she came across during this admission could not believe she had the bad luck to experience a second fracture, and especially a hip fracture this time.

BACKGROUND TO THE MODEL

Osteoporosis is a chronic disease characterised by reduced bone density and strength which predisposes to minimal trauma fractures. This leads to individuals living with ongoing pain and the real possibility of further fractures and the resultant reduction in quality and quantity of life. [5] Minimal trauma fractures are seen in more than 50% of women and more than 25% of men at some time of their life. Each such fracture is followed by re-fracture in up to 50% of cases. A minimal trauma fracture of any bone site predisposes to premature mortality but is markedly so in hip fractures. Data concerning people who have hip fracture reveal that up to 20% of these patients will die prematurely within twelve months. [6] This outcome is even more marked in men than in women. Given the frequency of such fractures and reduced life expectancy following them, the potential life years lost are greater in people aged 60-75 years than in more elderly women and men. Importantly both the increased risk of another fracture and premature mortality are most marked in the first 5 -10 years after a fracture. Therefore there is an urgency to identify, assess and, as necessary, treat these people. The NHMRC approved in 2010 the RACGP Osteoporosis Guidelines [3] so we have the need, the urgency and the approved tools to deal appropriately with this major health care cost and problem.

Much evidence has been generated in the published literature, including government-sponsored reports, regarding the high incidence of osteoporosis in the Australian community. It is estimated that over 2.2 million Australians live with osteoporosis, which equates to 10.1% of the population[4]. The Australian Institute of Health and Welfare (AIHW) reported in 2008 that more than 581,000 Australians have been diagnosed with osteoporosis, according to self-reports. However, the AIHW conceded this is a gross under-estimate as many people are not told they have osteoporosis even though it may have been diagnosed on bone mineral density scanning, or the patient had a fragility fracture. Furthermore, many who have known osteoporosis are not medicated nor have an understanding of the measures required to self-manage their chronic disease [7-11]. An Australian study has shown that only 28% of a large cohort were using specific medical therapy for osteoporosis after a post-menopausal minimal trauma fracture despite the huge body of evidence concerning the benefits of medications such as bisphosphonates. This would suggest that the AIHW reports underestimate the actual prevalence by a factor of 3-4 for women and 4-5 for men.

In 2002 the Australian Government identified osteoporosis as one of the seven *National Health Priority Areas*. Despite this identification of the huge burden osteoporosis has on society, it remains a largely under-treated chronic disease [7, 10, 12-14]. Reasons for this lack of action are numerous. In the first instance osteoporosis is a 'silent' disease that requires a systematic screening program for early detection. To date this has been largely ignored in Australia both in the primary and secondary care settings [7, 10]. Medicare perpetuates this through lack of financial support for bone density scanning, with users only able to claim reimbursement for the resultant fees after the age of 70 years, except in special circumstances. Secondly, many patients admitted to hospital with minimal trauma fracture are treated for the fracture without responsibility for investigating the causative factor being accepted by many treating teams [15]. Thirdly, health service planning does not include funding of osteoporosis treatment in chronic care or general outpatient and community allocations [16].

Increasing the Risk of Osteoporosis

The following lists some of the known causes of osteoporosis. Some are non-modifiable, others can be rectified with lifestyle changes, and others are related to disease states and their treatment.

- Female gender
- Older age in both men and women
- Family history of osteoporosis/low trauma fracture
- Previous low trauma fracture
- Late menarche
- Cessation of menstruation for periods of six months or more but not pregnant
- Early menopause
- Caucasian or Asian race
- Low body mass index
- History of smoking
- Excessive alcohol intake
- Insufficient calcium in the diet
- Inadequate sunlight leading to vitamin D deficiency
- Sedentary lifestyle including lack of weight bearing exercise
- Metabolic bone disease
- Inflammatory conditions e.g. rheumatoid arthritis, inflammatory bowel disease
- Cystic fibrosis
- Malabsorption syndromes e.g. coeliac disease, bowel resection
- Chronic liver or kidney disease
- Endocrine disorders e.g. deficiency sex hormones men and women, hyperthyroidism, hyperparathyroidism, Cushing syndrome
- Glucocorticosteroids used for > 3 months
- Excessive thyroid hormone
- Long term heparin
- Anti-anxiety and antidepressants
- Anticonvulsants and neuroleptic drugs
- Aromatase inhibitors for breast cancer
- Glitazones for diabetes [2, 3]

International Models of Care

There is high quality evidence in the international literature that confirms implementation of appropriate models of care for people with, or suspected of having, osteoporosis can reduce bed days in hospital, improve quality of life of individuals and their families and reduce other health system usage [8, 9, 11, 17-23]. Interventions found to improve the health of people with osteoporosis include:

- Dedicated fracture liaison service that includes:
 - Routine case-finding
 - Case or care coordination
 - Access to multidisciplinary health professionals
 - Bone density scanning and monitoring of serum levels for Vitamin D, calcium, thyroid function
 - Medication such as bisphosphonates, selective oestrogen receptor modulators and parathyroid hormone
 - Falls risk assessment
 - Self-management education program and support
 - Exercise and improved nutrition to reduce falls and increase quality of life
 - Liaison between primary care and hospital based teams
 - Electronic systems to monitor clinical progress and to ensure connection of care
 - Integration with falls and fracture liaison services.

Models of Care in Australia

Many teams across Australia have tested models of care required for people with, or at high risk of, osteoporosis as described in the international literature inclusive of applicability across rural and urban settings [8, 24-27]. The key factor in all of these models has been the presence of a care coordinator in order to direct patients to the appropriate investigations, diagnosis and treatment.

Cost-effectiveness

Disease management of osteoporosis

The published evidence has a growing body of literature that reveals the cost-benefit of implementing structured programs of care for people with osteoporosis [28, 29]. However, the evidence also reveals substantial increases in cost-benefit through the use of multifactorial methods to gain access to investigations, treatment and ongoing support to maintain adherence to treatment [30, 31]. Single methods such as telephone calls or postal delivered information do not bring the same level of outcomes [32-34].

Coordination of Care

The cost-effectiveness of providing care coordination or case management has been determined by many international organisations and specific research teams [4, 18, 35] Majumdar and colleagues in Canada conducted a randomised trial of patients with hip fracture in 2006 [9]. They costed the care of 220 people, with half receiving usual care and the other 110 people receiving case management, with follow up for one year. Compared with usual care, the case-managed group had higher levels of osteoporotic treatment, and the analysis suggests that systems implementing a similar intervention should see reductions in fractures, gains in life expectancy, and substantial cost savings. In their follow-up work, Majumdar et al reported the cost of each patient for care coordination by a registered nurse at the mid-scale of years of experience, and adding on substantial amount for benefits and overhead costs, to be US\$50 [36].

Medical Therapy

Pharmaceutical interventions recommended for the management of osteoporosis, including calcium and vitamin D supplements, a category of medications known as bisphosphonates, hormone therapy, selective oestrogen receptor modulators, strontium ranelate and parathyroid hormone, are supported by high level evidence of efficacy and safety and are approved by, and available under, the Pharmaceutical Benefits Scheme (PBS). Approval by the PBS follows after a full evaluation of efficacy, safety and cost effectiveness by the Pharmaceutical Benefits Advisory Committee[3].

The Current Status in NSW

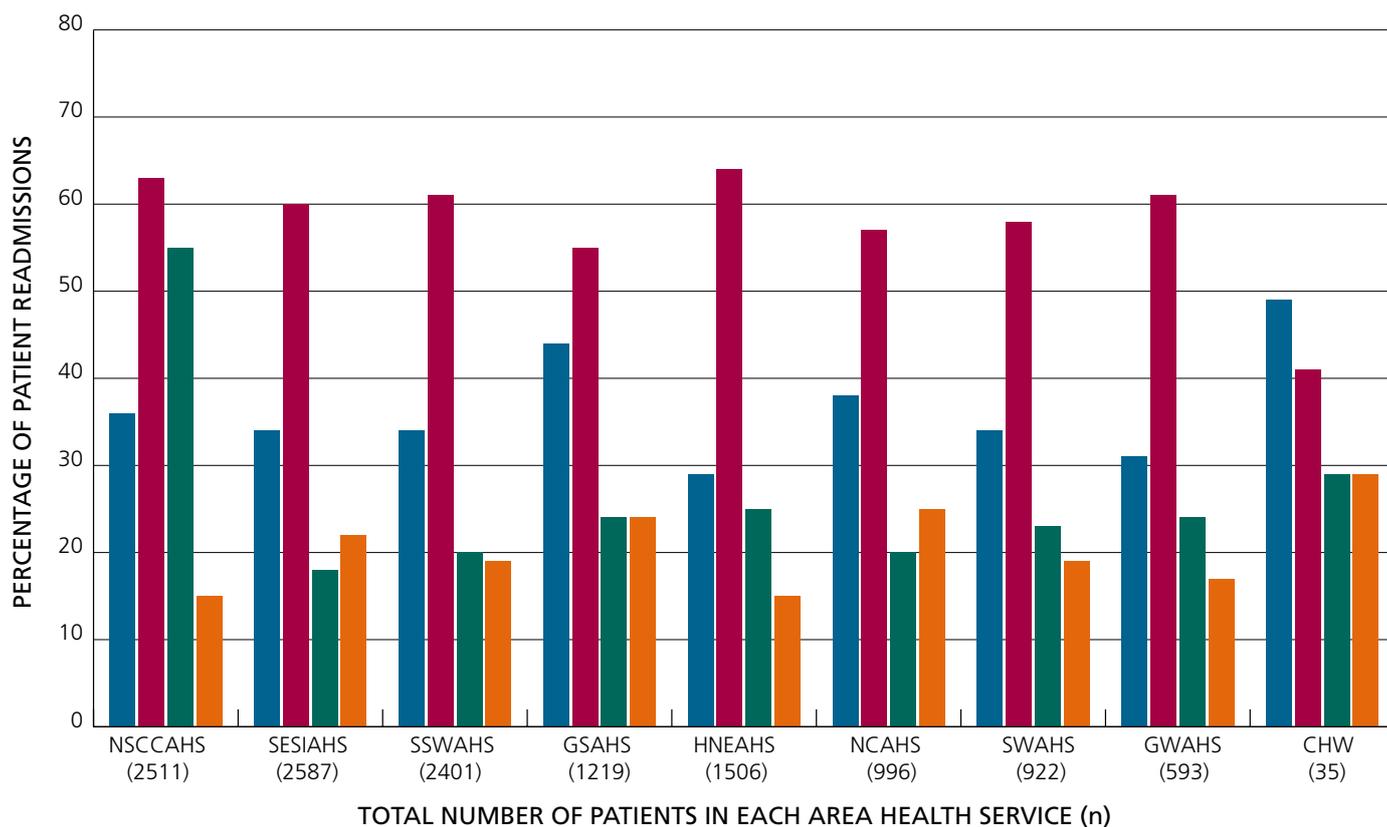
To date there is no state-wide plan or budget in NSW for implementation of appropriate services for people with or suspected of having osteoporosis. Health service settings continue to miss the need for investigation, diagnosis and treatment of this chronic disease [7, 12, 15, 37, 38]. A small number of health service clinicians across NSW have set up systems of care but none has sufficient resources to meet the needs of their local population due to no allocated funding. The services are set up through the diligence of the clinicians who recognise the need for management of this chronic condition and use research or pharmaceutical company funding.

In order to understand the current status in NSW, the NSW ACI Musculoskeletal Network undertook two projects in 2009. These centred on hospital admissions and on seeking information from health services concerning their ability to support access to appropriate care. The following is an appraisal of each project.

Minimal trauma fracture admissions in NSW

An analysis of admissions for minimal trauma fracture and re-fracture from July 2002 to June 2008 was conducted [16]. This analysis revealed that 35% of people who were admitted with a minimal trauma fracture presented again at the same hospital within the study period with another fracture. Furthermore, the average length of stay in hospital for these re-admissions was 22 days, and 17% of the cohort died during the study period. Graph 1 depicts the data regarding re-admissions across NSW that form this data-set.

Graph 1: Readmissions to NSW hospitals for re-fracture 2002 - 2008



	NSCCAHS	SESAHS	SSWAHS	GSAHS	HNEAHS	NCAHS	SWAHS	GWAHS	CHW
Total of readmitted patients	909	860	787	527	440	379	308	186	17
Patients who experience 1 readmission	572	516	483	285	275	215	179	113	7
Patients who experience 2 readmissions	198	151	154	121	104	74	69	42	5
Patients who experience 3+ readmissions	139	193	150	121	61	90	60	31	5

Alarming, this data is known to be an under-reflection of the real problem as the analysis is limited to those re-admitted at the same hospital and to those where clinical coders could identify the possibility of a minimal trauma fracture versus high trauma fractures. Once this is identified, lower levels of coding could be made. Minimal trauma fracture is not a primary diagnosis ICD-10 code. ACI Musculoskeletal Network members confirm the NSW hospital admission data is grossly under-reported for people admitted with minimal trauma fracture. Network members report their own efforts to track the appropriate patients have revealed that there is a greater number of people requiring fracture prevention interventions than those identified through the aggregated NSW Department of Health data.

With no ICD-10 code it is difficult to retrospectively identify these patients as a collective group within hospital patient administration systems. Hence the increasing incidence of minimal trauma fractures and their significant impact on hospital utilisation are rarely demonstrated. A comparison between minimal trauma fracture admissions, verified by documentation of mechanism of injury within patient file, and COPD and chronic heart failure (CHF) primary diagnosis separations in a regional base hospital highlights the under-reflection of the scale of this clinical problem – see Table 2.

Table 2: Comparison of COPD, CHF and minimal trauma fracture admissions

HEALTH SERVICE SITE	COPD – PTS (YEAR)	CHF – PTS (YEAR)	*MINIMAL TRAUMA FRACTURE – PTS (YEAR)
Regional base hospital 1	156 (2007)	143 (2007)	243 (07/08)
Regional base hospital 2	264 (2007)	177 (2007)	270 (07/08)

**Minimal trauma fractures of femur, pelvis, tibia, humerus, radius were verified by documentation of mechanism of injury within medical notes of patient file.*

Despite the alarming data generated to support the need for improved systems of care for people presenting to hospitals in NSW with signs and symptoms of osteoporosis, to date very little funding has been provided for the chronic care of people in NSW who require secondary prevention of osteoporosis and fracture risk reduction. The past decade has seen considerable designated funding for clinical roles to address secondary prevention in COPD and CHF but no funding has been provided to target secondary prevention of osteoporosis and fracture risk.

In addition, the published literature reports the ever-increasing identification that ‘back pain’ can often be attributable to osteoporosis [39, 40]. However, diagnosis of this condition is poor[39]. Conversely, the analgesia often prescribed for back pain can add to the presence and severity of osteoporosis[41,42], as opiates can reduce the levels of testosterone produced leading to hormone deficiency and thus bone formation[41]. Clinical teams report this is a common scenario in the management of people with back pain and pain management overall, adding to the burden on NSW hospitals as well as sentencing such patients to poor quality of life, and yet their admissions won’t be revealed in any hospital data analysis undertaken concerning osteoporosis. They are a hidden and costly entity.

Service availability in NSW

The ACI Musculoskeletal Network undertook a state-wide survey in late 2009 seeking to understand the availability of osteoporotic services across NSW. The ACI initially sent the survey to those services in NSW that are known by the ACI to provide musculoskeletal healthcare and requested they respond to the survey, and to pass it on to other services in their localities as appropriate. While it is not known if the survey reached all clinical sites across NSW, the results revealed it did reach all Area Health Services across NSW and also some private healthcare settings. Only three public health sites reported having a budget to address osteoporosis care needs and a further four receive funding from a private source. While many clinicians undertake this work as a part of their overall role, only five nurses and three medical officers are funded for a specific role in supporting people with, or suspected to have, osteoporosis. One allied health position was identified that has responsibilities to support this patient group, but this position is not funded by the Area Health Service.

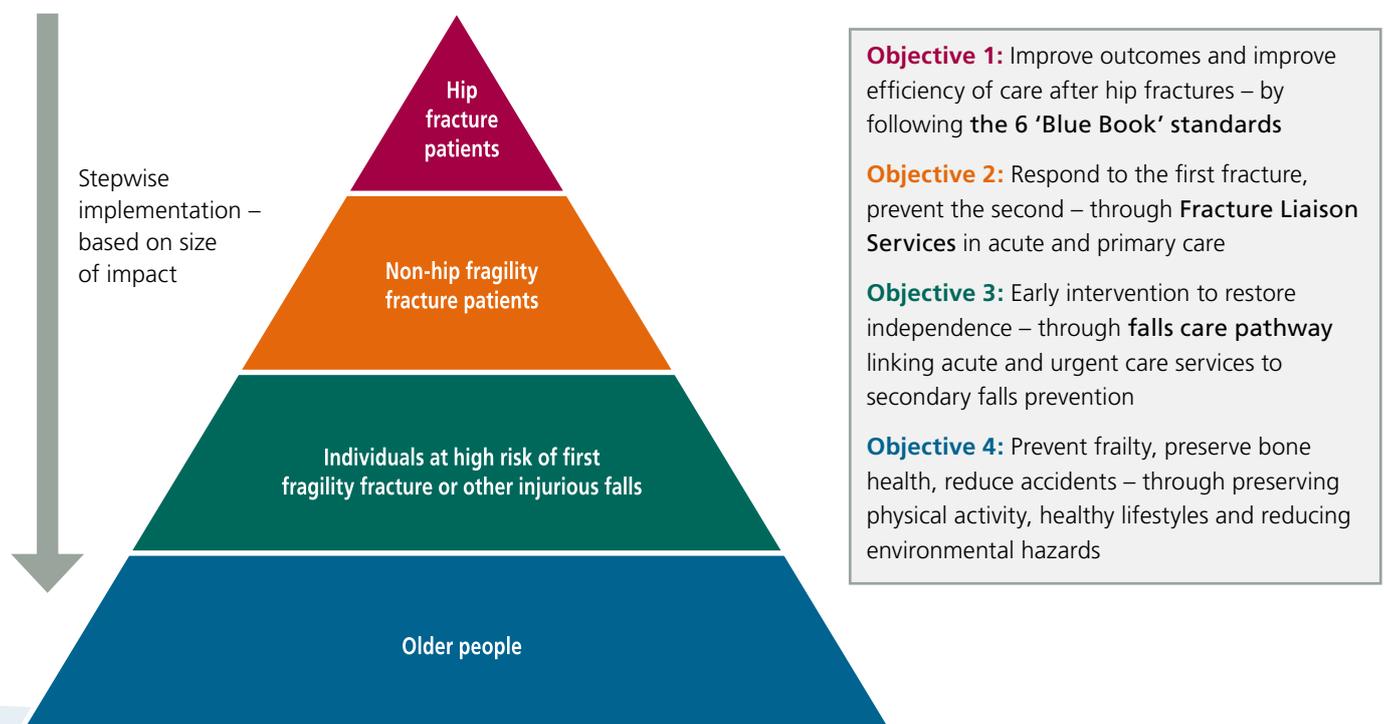
Interestingly, the survey revealed many opportunities for diagnostics and ongoing care in the community that could be accessed if patients knew of the need for these services and also how to access them.

A SYSTEMATIC APPROACH TO FALLS AND FRACTURE PREVENTION

In the UK, one Health Trust has developed a systematic model to service implementation for people at risk of falls and low trauma fractures. Diagram 1 depicts this approach. This is consistent with the NSW approach with the development of:

- NSW Falls Prevention Program coordinated through the Clinical Excellence Commission [43] (Objective 3 & 4)
- The Orthogeriatric Model of Care coordinated through the ACI [44] which is consistent with best practice guidelines for the management of hip fractures[24] with the addition of incorporating older people care in conjunction with orthopaedic teams (Objective 2)
- This current Model of Care for the chronic care needs of people with or at high risk of osteoporosis and fragility fracture (Objective 1, 2 & 4).

Diagram 1 – A step-wise approach to Falls and Fracture management model of care [45]



KEY ELEMENTS OF THE NSW MODEL OF CARE

The Chronic Care Model

The model of care to be implemented across NSW must include all the key principles of the Chronic Care Model [46]. These include:

- organising patient and population data to facilitate efficient and effective care
- promoting care that is consistent with research evidence and patient preferences
- empowering and preparing people to manage their health and healthcare
- delivering effective, efficient care and self-management support
- creating a culture, organisation, and mechanisms that promote safe, high quality care
- mobilising community resources to meet the needs of people with long-term conditions.

The NSW Model of Care for Osteoporotic Fracture Prevention

The services will be known across NSW as Osteoporotic Fracture Prevention Services. Considering the elements of the Chronic Care Model, the ACI Musculoskeletal Network model of care for osteoporotic fracture prevention will have at its core a dedicated Fracture Liaison Coordinator at each site to ensure that the following will be provided for all at-risk people identified for the service. In brackets after each item there is notation of who is responsible for the item.

- Active case identification by healthcare professionals of all specialties and disciplines across acute, outpatient, community and primary healthcare settings (Local Health Networks, Medicare Locals)
- Care coordination/case management through *Fracture Liaison Coordinators* to support individuals to access appropriate care (Local Health Networks)
- Development, implementation and regular evaluation of care pathways (ACI and Local Health Networks)
- Development of Service Dictionaries in local areas (Local Health Networks, Medicare Locals)
- Recruiting and engaging community resources in order to have multiple opportunities for appropriate interventions for those requiring care (Local Health Networks)
- Reporting of key performance indicators (KPI) and a core set of clinical indicators (CI) (Local Health Networks)
- Development and implementation of an electronic data system to record the KPIs and CIs that can be viewed and analysed both locally and centrally at the ACI (ACI).

Case identification

The identification of participants for this model of care is the responsibility of all health settings and professionals along the health care trajectory. This includes from the primary healthcare setting through to the emergency department, radiology, orthopaedic services, rheumatology services, endocrine and aged care. General practitioners, specialist doctors including medical and surgical, nurses of all designations and all allied health professionals have a duty of care to consider osteoporosis in patients at potential risk. Scientific evidence supporting this model of care is compelling [4, 6, 8-10, 19, 20, 22, 24, 25, 37] so initiation and referral for care coordination is everyone's responsibility.

Over time, the ACI Musculoskeletal Network Osteoporotic Re-fracture Prevention Working Group will refine methods and tools to support participant identification. This will be inclusive of but not limited to electronic ‘flagging’ of potential participants, and notations on medical record documents such as the radiology reports for fractures in people over the age of 50 that will alert whoever reads the report to consider minimal trauma fracture and further investigation of the cause. A suggested notation could be:

“This patient who is over 50 years of age has sustained a fracture. In this age group if this has occurred due to minimal trauma such as falling, tripping, slipping from a standing height or trauma of a lesser impact, then underlying osteoporosis may be the cause, and referral to the osteoporosis fracture prevention clinic (or other nominated clinic) is recommended. This is in addition to any required orthopaedic referral.”

Care coordination and case management - Fracture Liaison Coordinators

Care coordination and case management is proven internationally, nationally and locally in NSW (St Vincent’s, RPAH, Concord, RNC & NSAHS for example). The role is at the centre of the ACI Musculoskeletal Network model with a core aim of seeking out the participants of the model and to provide them with:

- Disease process and management education
- Support of self management, and
- Initiating specific treatment to reduce risk of further fractures.

With understanding of the disease the participant is more likely to agree to ongoing management of osteoporosis and fracture prevention through:

- Investigation
- Medical care - both specialist and general practice
- Complementary lifestyle support services that will primarily be provided through existing services in the community, both public and privately funded.

In each Local Health Network, there will be a lead care coordinator to be known as *Fracture Liaison Coordinator* and two or three other *Fracture Liaison Coordinators* who will report to the lead *Fracture Liaison Coordinator* in collaboration with medical leads at each site. The *Fracture Liaison Coordinators* will be located at strategic sites across their LHN in order to ensure coverage across NSW. All *Fracture Liaison Coordinators* will have patient care responsibilities. The lead *Fracture Liaison Coordinator* will have the responsibility of supporting the other *Fracture Liaison Coordinators* in the daily running of the model including ensuring processes are followed to enable capture of data as required. The lead *Fracture Liaison Coordinators* will also have the responsibility of ensuring each site is able to collaborate effectively with services the participants need to access.

Linkages with chronic care and falls prevention services, primary care and community-based lifestyle services are imperative in the model, with some of the responsibilities of the lead *Fracture Liaison Coordinators* shared with one of these services after the first 12-18 months of the *Osteoporotic Re-fracture Prevention* service set-up. An example could be that the falls coordinator may assume the lead responsibilities after the initial 12-18 months. This would allow for more patient access. with the lead *Fracture Liaison Coordinators* assuming an almost full patient load.

To offset costs in the community, use of the Medicare Chronic Disease item numbers will be encouraged, thus enabling the engagement of five allied health interventions per annum.

Access to bone density scanning

All people who have a minimal trauma fracture must be assessed for appropriate medical therapy to decrease the incidence of further minimal trauma fracture. While Bone Density Scanning is the optimal investigation for diagnosing osteoporosis, it is accepted that many people in NSW will not have access to this service. Therefore the ACI Musculoskeletal Network is considering options to address this inequity of access. Outcomes of these investigations will be added to this document once a solution is determined.

Bone Density Scanning services using a dual energy X-ray absorptiometry (DXA) machine is the key to helping people understand the need for continued therapy by visualising the results on the reports. The reports use a 'traffic light' approach to visualise bone density and where individual levels cross from no osteoporosis (green area), at high risk of osteoporosis (yellow area) and osteoporotic (red area).

Bone mineral density scanning is also critical in managing people who are at risk of osteoporosis due to other disease or treatments e.g. those medicating with corticosteroids; evaluating those with malabsorption syndromes; and those with hyperparathyroidism.

Care pathways

The ACI Musculoskeletal Network will provide an overarching care pathway that will be adjusted by Local Health Networks to suit their local situations for people presenting with what is known or thought to be a minimal trauma fracture. Care pathways need to address identification of patients at various sites of a hospital, outpatient and community settings. Consideration of access to the Fracture Liaison Coordinator is the ideal with individual care needs addressed from this position within all health settings across NSW.

Service Directories

The ACI Musculoskeletal Network will support the *Fracture Liaison Coordinators* to develop local Service Directories so that opportunities identified in the Osteoporosis Survey in late 2009 can be accessed by participants. A process will be included in the local Policy and Procedure manuals for the Osteoporotic Fracture Prevention services that ensure regular and timely updates of the Service Directories are undertaken.

Key Performance Indicators

Following agreement by clinicians and NSW Department of Health that this model of care is the appropriate guide for the chronic care of people in NSW who have or are at high risk of osteoporotic fractures, key performance indicators (KPIs) will be routinely collected across NSW. Initially, the health services that currently provide this model of care will commence reporting and as funding is allocated for additional services, each new site will commence KPI data reporting.

The data will be reported on a monthly basis. Reports will be generated on a quarterly basis and provided to the NSW Department of Health (probably the NSW Chronic Care Program), AHS/LHN chief executives, local services included in the data collection, as well as being posted on the ACI Musculoskeletal Network web pages.

The KPI to be collated in the first instance is:

- The number of admissions to NSW public hospitals with minimal trauma re-fractures in relation to total number of minimal trauma fractures registered with fracture prevention services.

'Registration with *fracture prevention services*' means the person has been identified by the fracture prevention service and has been advised of their risk of further fracture and offered intervention options e.g. through attendance at the fracture prevention service clinic or by consultation with their GP or other medical practitioner to assess and manage their risk as appropriate.

Ongoing work of the ACI Musculoskeletal Network aims to determine a way to identify admissions for 'minimal trauma fracture' as versus 'fracture' in general.

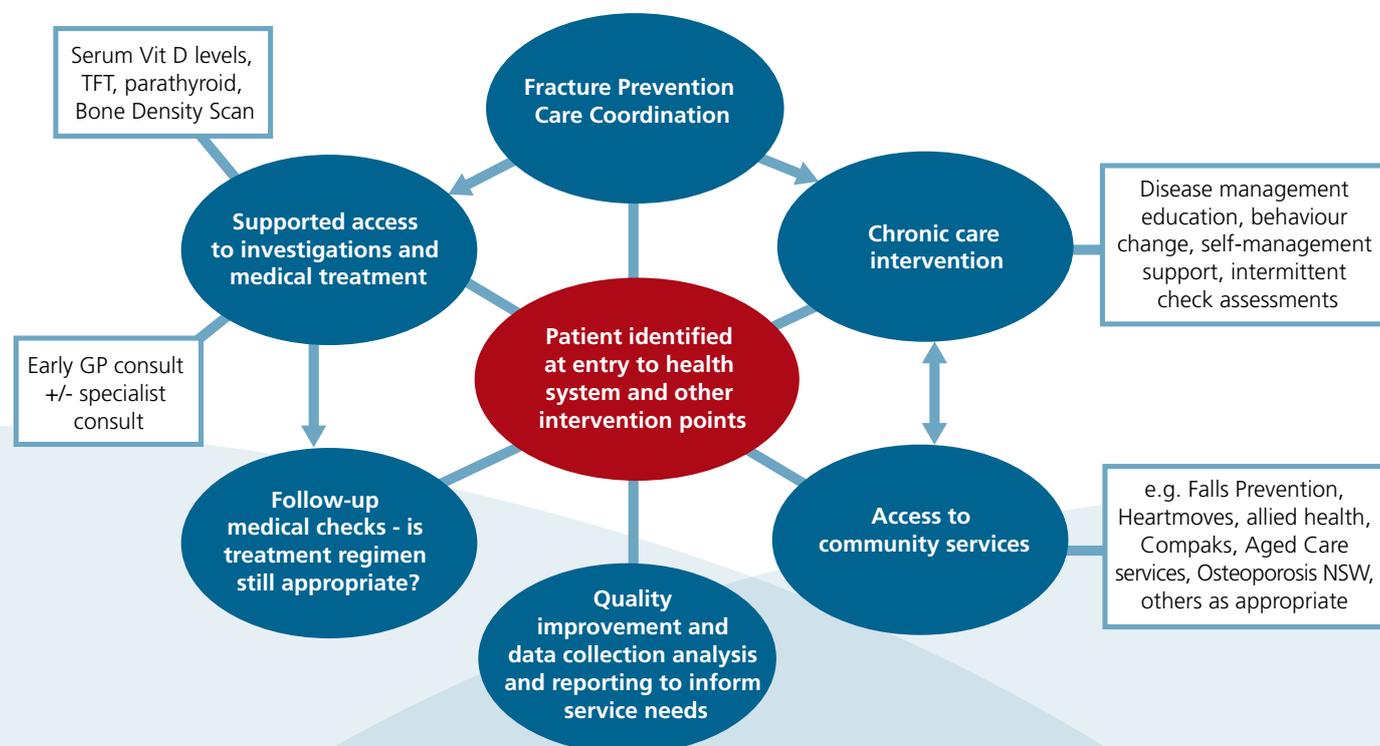
Clinical Indicators

In order to monitor clinical interventions, all services providing this model of care will report on a monthly basis on:

- Number of clinic visits or patients attending GP for management of osteoporosis – occasions of service (OOS)
- Number of patients undergoing Bone Mineral Density (BMD) scans
- Number of patients tested for Vitamin D deficiency
- Number of patients for whom treatment was initiated
- Adherence to therapy at 6 and 12 months post initiation.

The ACI Musculoskeletal Network will refine the clinical indicators over time according to clinical practice needs and will identify and supply the methods of collating these data. Ideally they will be reported via a web-based program that is password-protected and can be accessed by clinicians at their own local level, with the ACI having state-wide access.

Diagram 2: Model of Care



IDEAL PATIENT EXPERIENCE



53-year-old Susan presented to the Emergency Department following a first-time fall while walking her dog. She reports being fit and healthy, works as a nurse full-time and is married with three children. Her mother had osteoporosis at a similar age. Other risk factors include low body mass index (BMI) and she is a smoker.

X-ray revealed an ankle fracture. This was immobilised with plaster and she was booked for follow up through the fracture clinic. Susan was also referred to the osteoporosis Fracture Prevention clinic, where an assessment of risk factors, including blood tests for thyroid function and Vitamin D levels, was done, and she had a Bone Mineral Density scan. The staff provided Susan with an understanding of lifestyle factors that can contribute to osteoporosis and the management of osteoporosis was explained. The staff also gave Susan some reading material to take away with her. A letter concerning Susan's progress was faxed to her GP who would be monitoring Susan's progress.

At her next visit to the Fracture Prevention clinic Susan was advised her investigations had shown she is osteopenic with a low vitamin D. She was commenced on bisphosphonates, calcium and Vitamin D supplements. Once again a letter of communication regarding this visit was faxed to her GP.

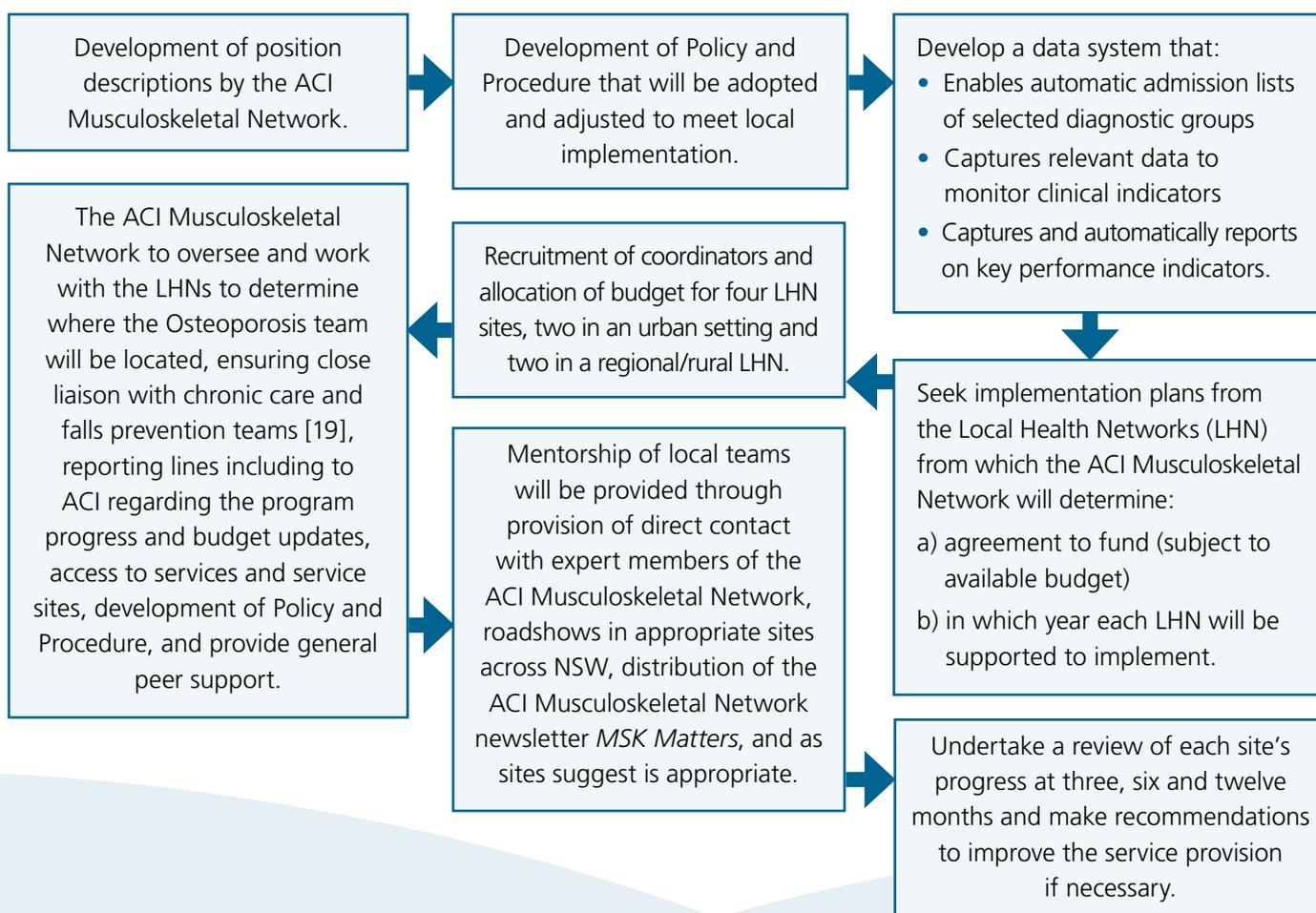
A follow-up phone call by the fracture liaison coordinator at three months checked on Susan's progress following her treatment regimen including her medication and improved lifestyle behaviour. Susan had given up smoking and was undertaking regular exercise. She has gained access to the services of Osteoporosis NSW and is communicating with a group of people who have also been diagnosed with osteoporosis. She had no further fractures at 12-month follow-up.

Susan returned to work four months after fracturing her ankle. Her return was supported with a gradual phase-back to her usual duties and at 12 months she was back to her normal role at work and at home.

IMPLEMENTING THE NSW MODEL OF CARE FOR OSTEOPOROTIC REFRACTURE PREVENTION

In order to monitor roll-out of this new service delivery model, it is recommended that a phased, step-wise approach be taken for implementation. Sites across NSW have vast differences in resources available and cultures of local teams. Therefore the following implementation plan is recommended and will be monitored by the ACI Musculoskeletal Network:

Year 1



Year 2

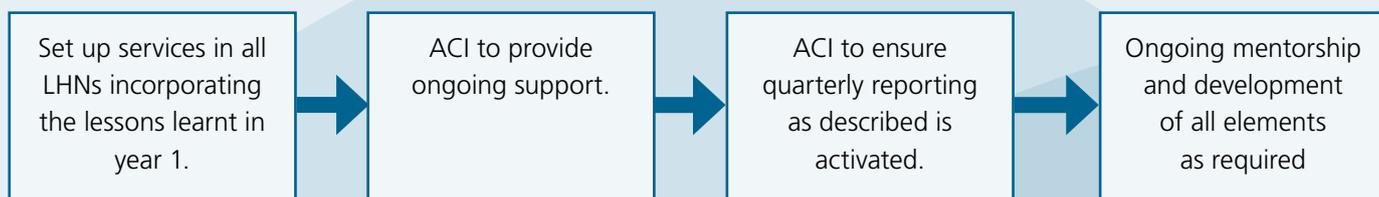


Table 3 - Suggested services required for each Local Health Network in NSW

LOCAL HEALTH NETWORK	COORDINATED SERVICES	FRACTURE LIAISON COORDINATORS
Central Coast	1	1 x FTE
Illawarra Shoalhaven	2	2 x FTE
Far West	2	2 x 0.5 FTE
Hunter New England	3	3 x FTE
Mid North Coast	2	2 x 0.5 FTE
Murrumbidgee	3	1 x FTE, 2 x 0.5 FTE
Nepean Blue Mountains	2	1 x FTE, 1 x 0.5 FTE
Northern	2	2 x 0.5 FTE
Northern Sydney	3	3 x FTE
South Eastern Sydney	3	3 x FTE
Southern	3	3 x 0.5 FTE
South Western Sydney	4	4 x FTE
St Vincent's and Mater Health	1	1 x FTE
Sydney	3	2 x FTE, 1 x 0.5 FTE
Western	3	1 x FTE, 2 x 0.5 FTE
Western Sydney	3	3 x FTE

The numbers of *Fracture Liaison Coordinators* for each LHN has considered population numbers and also the tyranny of distance for some LHNs.

In order to ensure maximum clinical time, communication with general practitioners and data collation, some dedicated clinical support officer time will need to be allocated for each service. The *Fracture Liaison Coordinators* will also need to develop relationships and access to services such as chronic care, falls prevention, allied health and others as is available locally to ensure opportunities are available according to individual patient needs.

EVALUATION, MONITORING AND DATA SYSTEM

The NSW Model of Care for Osteoporotic Refracture Prevention will be incorporated into the ACI Musculoskeletal Network evaluation framework. Thus a system will be in place not only to monitor and report at least quarterly on clinical outcomes for NSW residents accessing the Osteoporotic Re-fracture Prevention programs, but also the satisfaction of consumers and clinicians, and to monitor progress on developing a vibrant musculoskeletal health community.

The evaluation framework includes identifying change management needs for the implementation of all models of care being developed by the ACI Musculoskeletal Network. Key network members from urban, regional and rural settings will lead the initial change management workshops and ongoing supportive strategies. The network evaluation will inform this work overtime.

The Centre for Clinical Governance Research in Health at the University of NSW will undertake the formal evaluation, in collaboration with the ACI, under the leadership of Jeffrey Braithwaite, Professor and Director, and Frances Cunningham, Senior Research Fellow, funded through a grant from the Australian Research Council Discovery Grant scheme.

The monitoring and data system will be developed as a part of the ACI networks' monitoring system that is currently being sourced. The aim is for the system to have the capabilities to provide automatic reporting as determined by the ACI Musculoskeletal Network.



INFORMING THE COMMUNITY

A formal communication strategy is being developed by a Working Group of the ACI Musculoskeletal Network. This model of care and associated clinical updates will be a core part of the communication strategy. The aim will be to ensure that as many stakeholders as possible are contacted and are familiar with this model of care, progress on its implementation, and any adjustments deemed necessary over time. Advance notification and additional guidance to support implementation of the model of care will be provided to Chief Executives, managers and lead clinicians of Local Health Networks, Primary Health Care Organisations and Clinical Support Clusters. Newsletters will be disseminated through the ACI Musculoskeletal Network targeting a wide range of stakeholders including, but not limited to:

ACI Musculoskeletal Network
Aboriginal Health and Medical Research Council
Allied Health Networks and Associations
Arthritis NSW
Australian and New Zealand Bone and Mineral Society
Australian Orthopaedic Association
Australian Orthopaedic Nurses Association
Australian Physiotherapy Association
Australian Rheumatology Association
Carers NSW
Falls Prevention Networks
General Practitioners – individuals and via GP NSW Networks
Local Health Networks
Multicultural Health Communication Service
Osteoporosis NSW
Primary Health Care Organisations
Rheumatology Health Professionals Association

BUDGET

The budget for roll-out across NSW of the model of care described in this document has been developed and is currently under evaluation by the ACI/Clinical Excellence Commission Policy and Technical Support Unit.

Inclusions in the budget

Fracture Liaison Coordinators will have extensive experience in the public health system, have tertiary qualifications and can demonstrate understanding of the clinical, social and psychological care needs of this population group with a chronic disease. *Fracture Liaison Coordinators* must demonstrate an understanding of supporting a person with a chronic disease living within the community. This includes having an in-depth understanding of the appropriate disease management (in order to support adherence to regimens, with an in-depth understanding of the consequences of non-adherence), behaviour change theory and application, and how and where to gain access to the required day-to-day needs of the population group in order to maintain independence within their chosen place of residence in the community.

Other **multidisciplinary team members** will be required and may be sourced from public health service allied health and nursing teams. However, much of the requirements from allied health team members could be sourced using Medicare chronic disease management items. Others will be sourced through existing community services such as *Heartmoves* and *Stepping On* programs.

Clinical Support Officers will be required at each site. These support team members will have dedicated hours allocated to the Fracture Prevention Service in order to fulfil duties such as booking patients for appointments, ensuring communication to and from general practitioners regarding individual patients' activity with the Fracture Prevention Service, data collation and general support activities as required.

A **Goods and Services Budget** will make provision for needs such as mobile phones, laptop computers, other office equipment and consumable items, as well as patient educational materials. Individual LHNs may wish to allocate some of their budget for staff professional development.

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APPENDIX 1 - ABBREVIATIONS

ACI	Agency for Clinical Innovation
AHS	Area Health Service (used prior to January 2011, and the introduction of Local Health Networks)
AIHW	Australian Institute of Health & Welfare
BMI	Body Mass Index
CEO	Chief Executive Officer
CHF	Chronic Heart Failure
CHW	Children's Hospital Westmead
CI	Clinical Indicator
CNC	Clinical Nurse Consultant
CNS	Clinical Nurse Specialist
COPD	Chronic Obstructive Pulmonary Disease
DXA	Dual energy X-ray absorptiometry (Bone Density Scan)
ED	Emergency Department
FTE	Full-time Equivalent
GP	General Practitioner
GSAHS	Greater Southern Area Health Service
GWAHS	Greater Western Area Health Service
HNEAHS	Hunter New England Area Health Service
ICD	International Classification of Diseases
KPI	Key Performance Indicator
LHN	Local Health Network
LOS	Length of Stay in Hospital
MBS	Medical Benefits Scheme
MOC	Model of Care
NCAHS	North Coast Area Health Service
NHMRC	National Health and Medical Research Council
NSCCAHS	Northern Sydney Central Coast Area Health Service
NSW	New South Wales
OA	Officer of the Order of Australia
OAM	Medal of the Order of Australia
OOS	Occasion of Service
PBS	Pharmaceutical Benefit Scheme
Pts	Patients
RACGP	Royal Australian College of General Practitioners
RNC	Royal Newcastle Centre
RPAH	Royal Prince Alfred Hospital
SESAHS	South East Sydney Illawarra Area Health Service
SWAHS	Sydney West Area Health Service
SSWAHS	Sydney South West Area Health Service
TFT	Thyroid Function Test

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