

MODEL OF CARE

Musculoskeletal Network

Model of care for osteoporotic refracture prevention

2nd edition



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INNOVATION**

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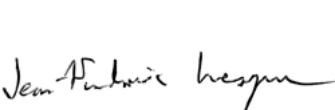
Foreword

The NSW Agency for Clinical Innovation (ACI) Musculoskeletal Network developed this model of care in 2010 to support the spread of effective services for people living in NSW who sustain fractures that primarily result from poor bone strength that accompanies osteoporosis. NSW health system data, clinician experience, and the published evidence internationally, nationally and locally, suggest that the importance of identifying and supporting the prevention of *minimal trauma fractures* is poorly recognised. Minimal trauma fractures, often referred to as *fragility fractures*, are those sustained as a result of a slip, trip or fall from standing height or less. They often have an underlying cause of osteoporosis, hence in this model of care we refer to these fractures as *osteoporotic fractures and refractures*. People who suffer osteoporotic fractures are at risk of experiencing a poor quality of life that includes chronic pain, being less able to perform their activities of daily living than they did before the fracture, losing their independence, and developing other chronic diseases due to immobility. Their risk of early death linked specifically to the fracture is also very real. Despite these fractures being a ‘hallmark’ sign of osteoporosis, many people fail to gain access to investigation, treatment and support for self-management.

Since 2011, the model of care has been successfully implemented in many areas of NSW, revealing its applicability across geographical settings. Initial evaluation of the model of care implementation efforts has provided evidence of its positive effect on prevention of fractures and improving the quality of life for people accessing the services that implement the model of care.

This version of the model of care is the first revision of the original. The evidence for refracture prevention has been updated, as have the guidelines that underpin the model of care. This version retains the main concepts of care coordination, medical therapy, self-management support, access to community-based peer support such as falls prevention groups, and follow-up over time. Additional components include more focus on patient-reported measures and ensuring medical therapy is instigated by a specialist staff, where required, before handover to the individual’s general practitioner. This new version also incorporates and records the collaboration with Aboriginal people undertaken during the development of this document to ensure all services across NSW make all efforts to give Aboriginal people every opportunity to access culturally appropriate clinical services.

The Agency for Clinical Innovation is thankful for the voluntary time of the many members of the ACI Musculoskeletal Network, including consumers and their representative organisations, for their dedication and expertise in the improvements of this model of care.



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Glossary

Fracture liaison coordinator	Dedicated coordinator of the osteoporotic refracture prevention service, and responsible for the care coordination and case management of people accessing the service.
Fracture liaison service	A dedicated secondary fracture prevention service implemented by healthcare systems. It is a service that assumes responsibility for finding fracture cases, assessing and performing diagnostic evaluations, and commencing treatment for the secondary prevention of osteoporotic fractures. Also referred to as osteoporotic refracture prevention service or fracture prevention clinic.
Index fracture	The incidence of first/previous minimal trauma fracture; may also be referred to as incident fracture.
Minimal trauma fracture	Fracture resulting from an event which would not be expected to fracture a healthy bone; for example, a trip and fall while walking (also known as fragility fracture, low-impact fracture, or osteoporotic fracture). The hip, wrist and spine are common sites for minimal trauma fractures, as are the humerus, ribs, forearm and pelvis.
Osteopenia	Low bone mineral density in which the bones are weakened, but not weak enough for the person to be diagnosed with osteoporosis. It is considered to be a precursor to osteoporosis.
Osteoporosis	Low bone mineral density and deterioration of bone tissue, leading to decreased bone strength, increased bone fragility and a consequent increase in fracture risk.

Abbreviations

ACI	Agency for Clinical Innovation
AIHW	Australian Institute of Health and Welfare
GP	General practitioner
ICD	International Classification of Diseases
KPI	Key performance indicator
NSW	New South Wales
ORP	Osteoporotic refracture prevention
PROM	Patient reported outcome measure
PREM	Patient reported experience measure
PROMIS	Patient Reported Outcomes Measurement Information System
RACGP	Royal Australian College of General Practitioners

Aboriginal impact statement

It is widely acknowledged that Aboriginal people experience significant barriers to accessing healthcare. It is also important to recognise that Aboriginal people have suffered significant losses, including family, land, identity and language, and as a result, many Aboriginal people do not trust mainstream health services. Cultural, economic, social and historical issues affect health service access and uptake, and contribute to the poor health status of Aboriginal people.

Limited data exists on the burden of poor bone health and osteoporotic fracture in Aboriginal people. Self-reported data from the Australian Bureau of Statistics 2012–13 Australian Aboriginal and Torres Strait Islander health survey (AATSIHS) suggests that osteoporosis affects Aboriginal people at similar rates to non-Aboriginal people.¹ Sustaining a hip fracture is a significant consequence of osteoporosis, and data from the Australian Institute of Health and Welfare (AIHW) indicates that Aboriginal people are much more likely than non-Aboriginal people to be hospitalised for an osteoporotic hip fracture.² Aboriginal people are also on average much younger at the time of fracture.

Risk factors that contribute to low bone mass and the risk of fracture include cigarette smoking, poor nutrition, lack of appropriate exercise for good health, being underweight and high alcohol consumption. These are all important considerations for Aboriginal people. The interaction of these factors, higher comorbidity rates, widely variable access to health services, socioeconomic factors, and rural and remote living are also likely to affect the care of Aboriginal people.

In keeping with the principles of the *NSW Aboriginal health plan 2013–2023*, this model of care has been developed and revised to support high-quality care that is culturally supportive, responsive and accessible to Aboriginal people.³ In doing so, the model of care aims to reduce inequalities and lead to more effective health service delivery and better health outcomes for all.

The delivery of osteoporotic refracture prevention (ORP) services encompasses the essential elements of the chronic care delivery for Aboriginal people.⁴ The development and implementation of local services will promote access and engagement of Aboriginal people in the following ways.

- Ongoing partnerships and consultations with local Aboriginal Community Controlled Health Organisations; Aboriginal health practitioners, workers and liaison officers; local Aboriginal chronic care service providers; local health district staff; non-government organisations; primary care teams; and consumers will support development and review of service delivery. This will ensure that the needs of Aboriginal people are recognised and addressed, and that service environments are culturally safe. The model recommends that a steering group be formed to engage with locally relevant stakeholders, including consumer representatives.
- Identification of Aboriginal people will be the starting point for appropriate care, in line with NSW Health Policy Directives. This includes recording identification on assessment forms and providing a culturally safe and supportive environment to promote self-identification.
- The cultural competence of staff members will be developed, and opportunities to engage an Aboriginal health practitioner, worker or liaison officer as appropriate in the care of an Aboriginal person will be supported.
- Care will be provided close to home, wherever possible, and telehealth and/or outreach models will be used to support access for people living in rural and remote communities.
- Flexibility in service delivery to optimise attendance and support the development of trust with Aboriginal people and communities.
- Services for all participants of the model of care will be delivered in a way that recognises the holistic approach to health and includes the elements of person-centred care. Planning treatment and management of bone health and fracture risk will be collaborative, to ensure that interventions are suitably tailored to the individual's personal needs and preferences for care. This includes opportunities for involving a carer, family member or friend in all aspects of care delivery, including decision-making and management planning processes.
- Health education will be tailored to reflect the literacy, language and cultural needs of the individual and to build the understanding, engagement and empowerment of Aboriginal people in managing their health needs.

- Linkages will be established with appropriate health and community services and there will be referral processes that give Aboriginal people access to a network of suitable service providers and programs that support long-term management of health.
- Persistence and consistency of care will be ensured through individualised and appropriate communication and follow-up, and adequate support will be provided to Aboriginal people to effectively manage long-term health needs.
- Review processes will consider the assessment of cultural competency and identify barriers relating to access to care and ongoing self-management for Aboriginal people, and actions to address care gaps will be given priority.

Previous consultation across all ACI musculoskeletal models of care included linking with Aboriginal health services at Kempsey and Maari Ma in Broken Hill. In developing locally appropriate services, teams in various sites across NSW have collaborated with local Aboriginal Community Controlled Health Organisations and/or Aboriginal chronic care service providers. Advice was sought from the NSW directors and managers of the Aboriginal Health Strategic Leadership Group regarding the development of the Aboriginal health impact statement for the revision of this model of care. Further consultation with the Aboriginal community is planned as part of the review process and statewide implementation of osteoporotic refracture prevention services as part of the Leading Better Value Care Program.

The ACI Musculoskeletal Network acknowledges that cultural service gaps may remain, and will continue to work proactively in partnership with local health districts, Aboriginal Community Controlled Health Organisations and primary health networks in all efforts to implement accessible, high-quality and culturally safe services across NSW.

Contents

Foreword	ii
Acknowledgements	iii
Glossary	v
Abbreviations	v
Aboriginal impact statement	vi
Bone truths at a glance	1
Executive summary	2
Background	2
Model of care	2
Formative evaluation	3
Implementation	3
Case for change – personal and common patient experience in NSW	5
Aims and objectives	7
Context and scope	8
Background	9
Burden of disease	9
Access to care in Australia	10
The NSW burden	11
International models of care	12
Australian models of care	13
Formative evaluation of the model of care 2011–2012	14
Implementation	14
The NSW Model of care for osteoporotic refracture prevention	15
Overview	15
Chronic care	15
Fracture liaison coordinators	15
Lead fracture liaison coordinators	16
Key elements of the model of care	17
Ideal patient experience	19
Implementation	20
Implementing the NSW <i>Model of care for osteoporotic refracture prevention</i>	20
Evaluation and monitoring	21
Evaluation framework	21
Key performance indicators	21
Clinical indicators	21
Communication strategy	22
References	23

Bone truths at a glance

Burden



**4.74 million
Australians**

over 50 years
of age live with
osteoporosis,
osteopenia and poor
bone health;
this equates to 19%
of the population



70%

of people in NSW
and the ACT who
are 50 or older have
osteoporosis or
osteopenia in 2017



As many as
**50,000
fractures**
occur every year in
NSW and the ACT



\$740 million
is the annual cost of
treating fractures in
NSW and the ACT

Issues



Despite the burden osteoporosis and fractures have on society, osteoporosis remains a largely **undertreated chronic disease**

Prevention



**Evidence
supports
intervening**
at the time of the
first fracture to
prevent the next
fracture



**Coordinator-
based** models
of care following a
fracture are effective



**Evidence-
based**
treatment
**tailored
to the
individual**

Outcomes



**Improved
identification**
of people
requiring refracture
prevention services



**Better
outcomes**



Reduced
incidence of
repeat fractures



**Significant
cost savings**

Background

Osteoporosis is a chronic disease characterised by reduced bone density and strength, which predispose to minimal trauma fractures. These fractures lead to people living with ongoing pain, reduced mobility, loss of function and associated loss of quality of life, and the real possibility of further fractures. The Dubbo Osteoporosis Epidemiology Study found that 24% of women and 20% of men sustained a refracture within five years of their initial fracture.

Much evidence has been published in the literature, including government-sponsored reports, regarding the high incidence of osteoporosis in the Australian community. The AIHW found that in 2014–15 more than 720,000 Australians self-reported a diagnosis of osteoporosis or osteopenia. However, the AIHW conceded this is a gross underestimate of the incidence, as people are not necessarily told they have osteoporosis, even if it has been diagnosed on bone mineral density scanning or they may have already sustained a minimal trauma fracture. It has been estimated that over 4.74 million Australians over 50 years of age live with osteoporosis, osteopenia and poor bone health; this equates to 19% of the population.

Minimal trauma fractures are relatively common in people aged 50 and over: it is estimated that one in four men and two in five women in this category will experience a minimal trauma fracture in the future. In both men and women, the main cause of minimal trauma fracture is osteoporosis or osteopenia, a precursor to osteoporosis. People who sustain a minimal trauma fracture have a high risk for subsequent fractures. A minimal trauma fracture of any bone site predisposes to premature mortality, and markedly so with hip fractures. Data from the Dubbo Osteoporosis Epidemiology Study, a longitudinal population study in Dubbo, NSW, conducted by the Garvan Institute, confirms that up to 20% of people who sustain a hip fracture will die prematurely within 12 months. Further published data reports that any type of minimal trauma fracture can be a directly attributable factor in premature death.

Despite the burden osteoporosis and fractures have on society, osteoporosis remains a largely undertreated chronic disease. It is largely ignored in Australia, both in the primary and secondary care settings. Given the frequency of such fractures and the associated reduced life expectancy, there is an urgent need to identify those with minimal trauma fracture, and to assess and, as necessary, treat people with osteoporosis.

Model of care

The *NSW Model of care for osteoporotic refracture prevention* was developed and launched in 2011 following a review of hospital data on presentations for minimal trauma fractures and refractures from 2002 to 2008, as well as information gathered on the availability of refracture prevention services in NSW. This information revealed a compelling need for a model of care to outline evidenced-based care practices and support the implementation of a consistent approach to identifying and managing minimal trauma fractures.

This revised version of the *NSW Model of care for osteoporotic refracture prevention* includes evidence determined since 2011 and additional concepts that support best practice care for people living with chronic conditions. It is aligned with the latest guidelines from colleges and professional organisations, such as the Royal Australian College of General Practitioners and Osteoporosis Australia.

The model of care is based on national and international published evidence, and advice from clinical, research and management experts across NSW. These sources agree that the best approach to improve early diagnosis and access to appropriate services is through the appointment of dedicated fracture liaison coordinators.

Fracture liaison coordinators

- Provide overall coordination of the osteoporotic refracture prevention service, undertaking duties such as (but not limited to) coordinating health professionals and services required by people accessing the service; managing the data and assessment recordings of the service interventions; and ensuring equipment and other resources are available and ready for use by the team members.

- Provide coordination of care for people accessing the osteoporotic refracture prevention service at their healthcare setting.
- Find the people who require the service.
- Initiate access to investigation of people's bone health as required, including bone density screening and blood testing.
- Facilitate access to comprehensive disease and psychological assessment and appropriate medical management as required.
- Provide disease management education to help people understand the need for managing and improving their bone health.
- Support self-management and behaviour change interventions through multidisciplinary team care.
- Link people to community-based, complementary lifestyle support services.
- Provide follow-up over time to ensure the planned interventions are carried out and the person's needs are addressed.

Formative evaluation

A formative evaluation of the *NSW Model of care for osteoporotic refracture prevention* was undertaken in 2011 and 2012 to ascertain its impact and applicability across the various service sites in NSW.

- Osteoporotic refracture prevention services had a substantial impact on treatment rates. Following interventions, the majority of patients receive appropriate medications for osteoporosis.
- People increased their exercise and calcium intake following involvement in osteoporotic refracture prevention.
- Health-related quality of life significantly improved after the first three months of osteoporotic refracture prevention interventions.
- Osteoporotic refracture prevention models of care were associated with a significant reduction in hospital re-admissions for care of fractures within 28 days of hospital discharge.
- A 10% average reduction in the number of potentially preventable re-admissions for fracture was observed by the third year of implementation.

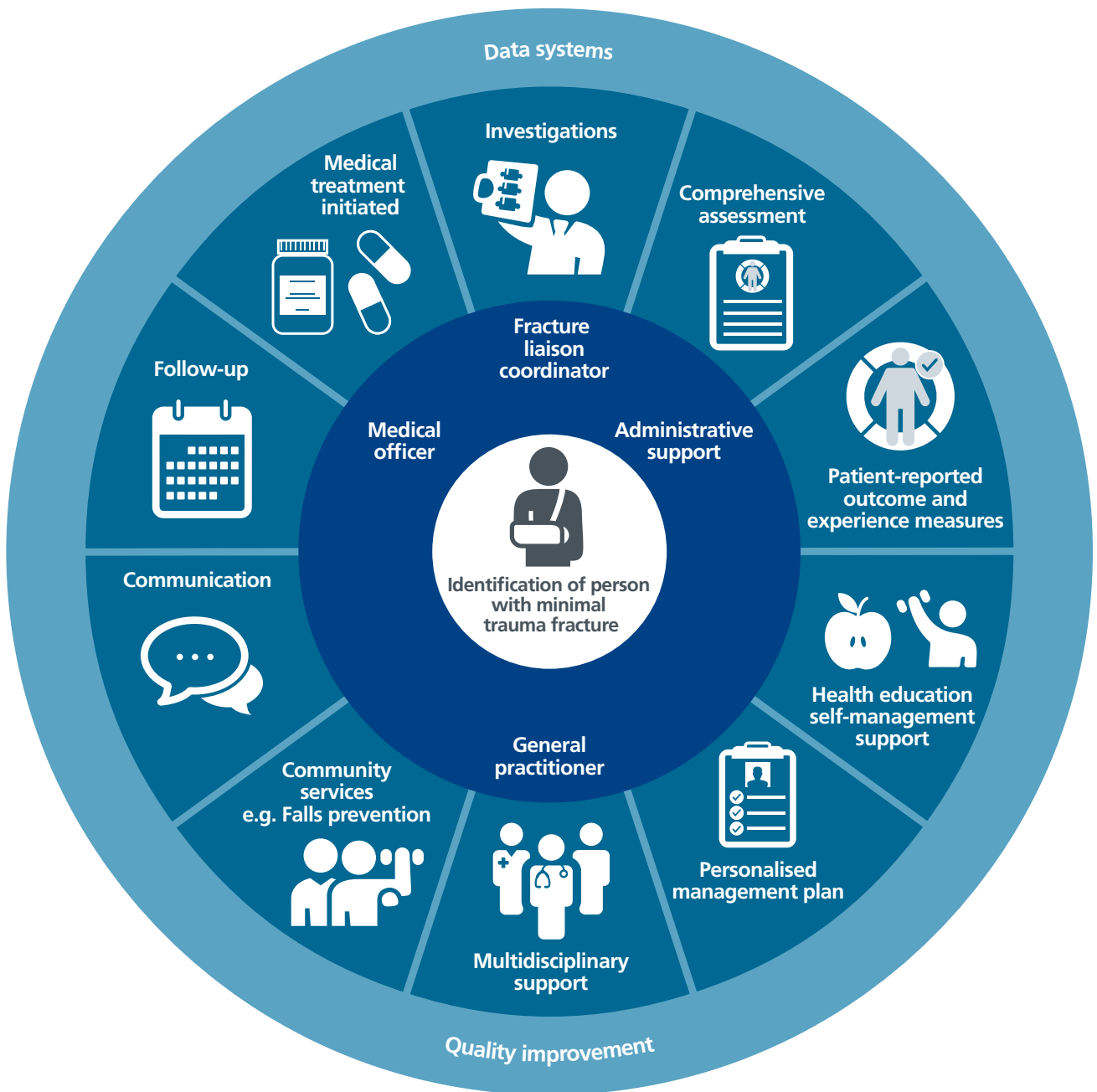
Analysis of long-term data in Australia (1989–2005) found that around 41% of refractures in women and 52% of refractures in men occurred in the first two years after the initial fracture.

If the model of care is implemented in its entirety across NSW, and if this refracture rate is reduced by 10%, highly positive outcomes would be achieved for patients and health services in NSW over a 10-year period, including:

- avoiding 10,000 refractures in previously admitted patients
- making 100,000 bed days available for use by other patients.

Implementation

Many services across NSW have implemented the model of care since its launch in 2011. The formative evaluation and similar findings in published literature provide strong evidence that the osteoporotic refracture prevention model of care needs no further justification, but it can be refined over time as new evidence emerges and feedback is obtained from implementation across NSW. The focus in 2017 is on widespread implementation, which is expected to improve outcomes for people in NSW who sustain minimal trauma fractures, and improved use of NSW health system resources.



Case study 1: Thelma

82-year-old Thelma was brought into hospital in an ambulance. Thelma was a single lady who had lived alone all her life. She had a few close neighbours who were like her family. Her sister and nieces lived 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 had a Vital Alert system but didn't wear it as she would not want to disturb her neighbour, so thought: 'Why wear it?'

One of Thelma's neighbours, Stan, came to check on her after she didn't call by on her usual daily 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 she had to be admitted to a residential aged care facility on discharge from hospital, as her neighbours didn't feel able to provide her with nursing care at home. Basic home care could be provided in her town, but home nursing could not. The residential aged care facility she was admitted to is located in the local regional city, 40 kilometres from her home town.

Despite a history of previous minimal trauma fractures, having two falls in the past year and being an ex-smoker, Thelma had not been investigated or treated at any time for osteoporosis. Using the Garvan risk calculator, Thelma's risk of further hip fracture was 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.



Case study 2: Susan

53-year-old Susan presented to the emergency department following a first-time fall while walking her dog. She reported being fit and healthy, working full-time as a nurse and being married with three children. Her mother had been diagnosed with osteoporosis at a similar age. Susan was a smoker and liked to share a bottle of wine (or two) with her husband after work.

X-ray revealed an ankle fracture. The fracture 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 over-the-counter slow-acting paracetamol three times a day.

Susan could not return to work until her fracture healed and she was mobilising without restriction. Susan was primarily 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'd had the bad luck to experience a second fracture, and especially a hip fracture this time.

Aims and objectives

The *NSW Model of care for osteoporotic refracture prevention* aims to support evidenced-based care for the prevention of refracture in people sustaining minimal trauma fractures and presenting to NSW health services in public or private care settings.

It outlines the implementation of appropriate care that is consistent with current guidelines and has been shown to be effective in reducing the risk of refracture and improving the management of osteoporosis within the Australian context.

It is intended that local health districts, primary health networks and Aboriginal Community Controlled Health Services across NSW will work together proactively to review, select and implement locally appropriate services to address refracture prevention strategies that improve patient outcomes, experience and satisfaction with care.

Context and scope

This model of care has been developed using the following guiding principles from these (and other) publications.

- The clinical guideline, *Osteoporosis prevention, diagnosis and management in postmenopausal women and men over 50 years of age*, published by the Royal Australian College of General Practitioners in 2017, recognises the need to identify, diagnose, treat and manage, in a timely and accurate manner, men and women who have been diagnosed with at least one minimal trauma fracture, to reduce the progression of people to the second fracture.⁵
- A recently published systematic review and meta-analysis of models of care for the secondary prevention of osteoporotic fractures details recommendations concerning best practice approaches for identifying, assessing and treating this target population.⁶
- The International Osteoporosis Federation's Capture the Fracture best practice framework sets an international benchmark for secondary prevention fracture care, and defines essential and aspirational elements of service delivery.⁷
- The UK *Clinical guideline for the prevention and treatment of osteoporosis* gives a comprehensive overview of the assessment and management of osteoporosis for all healthcare professionals involved in its management.⁸
- The Australian Commission on Safety and Quality in Health Care's *Hip fracture care clinical care standard* outlines the assessment and management of people with a hip fracture to optimise outcomes and reduce their risk of another fracture.⁹
- The ACI *Orthogeriatric model of care: clinical practice guide 2010* provides a practical guide to the care of frail, older orthopaedic patients, including osteoporosis assessment and falls prevention.¹⁰

The model of care is designed for people aged 50 years or over who present to a NSW public health facility having sustained a minimal trauma fracture. People with minimal trauma fractures commonly present to emergency departments. They are also seen in radiology departments, hospital wards and outpatient department of hospitals, as well as in primary care settings such as general practice and private allied health services.

Osteoporotic refracture prevention models of care have been operating in a number of health services across Australia and internationally for many years, but they are still not implemented systematically in NSW to provide local access for all NSW residents.

A localised approach to implementing the model of care is encouraged, with consideration of service settings that best meet the local context; for example, an outpatient department, community health centre, general practice or other private care setting. Efforts should be made to ensure cultural competency to meet the needs of local population groups, including Aboriginal people and people of culturally and linguistically diverse backgrounds. Local plans must include all key elements of the model of care as defined on [page 17](#) and further explained in [The NSW Model of care for osteoporotic refracture prevention](#).

Burden of disease

Osteoporosis is a chronic disease characterised by reduced bone density and strength, which predisposes to minimal trauma fractures (also known as osteoporotic or fragility fractures).^{1, 5} Minimal trauma fractures are described as fractures that may result from falls from a standing height or less, usually indicating decreased bone strength. These fractures often lead to pain, reduced mobility, loss of function and associated loss of quality of life, and the real possibility of further fractures.¹¹⁻¹³

Incidence of osteoporosis

Population data from the Australian Institute for Health and Welfare reports that 1 in 10 Australians aged 50 years and over, or approximately 720,000 people, self-report as having been diagnosed with osteoporosis or osteopenia.¹ Incidence is considerably higher in women, with four times more women aged 50 years and over having osteoporosis or osteopenia than men of the same age. The incidence equates to 15% of women and 4% of men.¹ Given the silent nature of osteoporosis, that is, the lack of overt signs and symptoms prior to fracture, this is thought to grossly under-report the true incidence. That osteoporosis is under-reported is supported by published evidence indicating many people are not told they have osteoporosis, even though it may have been diagnosed with a bone density scan or they may have had a minimal trauma fracture.¹⁴ Osteoporosis Australia released a report in 2013 titled *Osteoporosis costing all Australians: a new burden of disease analysis – 2012 to 2022*. This report suggests that 4.74 million Australians over 50 years of age have osteoporosis or poor bone health, and that the total cost of osteoporosis and associated fractures over the next 10 years is estimated to be \$33.6 billion.¹⁵

Incidence and outcomes of minimal trauma fractures

Minimal trauma fractures occurring in people aged 50 years or more are common, with many due to osteoporosis that had not been diagnosed prior to the fracture. While women with osteoporosis have the highest risk of fracture, there is some indication that the population burden of fractures also comes from women with osteopenia or normal bone mineral density.¹⁶ It is estimated that, for Australians aged 50 and over, one in four men and two in five women will experience a minimal trauma fracture in the future.¹⁷ People who sustain a minimal trauma fracture have a high risk of subsequent fractures. After the first fracture, the risk for refracture doubles for women and increases threefold to fourfold for men.¹⁸ More concerning is that minimal trauma fracture of any bone predisposes to premature mortality. Data captured from a cohort of women and men over the age of 60 years with fractures showed high cumulative incidence of adverse outcomes following all minimal trauma fractures: 51% of men and 39% of women died within five years following a fracture, with a large proportion of this premature mortality related to a refracture.¹¹ With regards to people who sustain a hip fracture, up to 20% die prematurely within 12 months.¹⁹ Importantly, both the increased risk of another fracture and premature mortality are most marked in the first 5–10 years after a fracture.¹¹

Urgency for managing the care burden

This significant burden reinforces the urgent need to identify and assess people at increased risk of refracture, and to treat the underlying cause (which may be osteopenia or osteoporosis) as necessary. If processes are put in place to identify the first minimal trauma fractures in people aged 50 years and over and to begin treatment, health systems can prevent many of the large bone fractures that occur in older age.^{20, 21}

Access to care in Australia

In 2002, the Australian Government identified osteoporosis as one of the seven National Health Priority Areas. Despite identifying the huge burden osteoporosis has on society, the chronic disease remains largely undertreated and ignored in Australia, both in the primary and secondary care settings.^{14, 22-25}

The management of osteoporosis in Australian primary care was the subject of a large-scale study published in 2009.²⁵ Almost 40,000 patients (55% female and 45% male) were recruited during the 12-month period from February 2006 to January 2007. A chronic disease management program enabled the identification of patients in this study. More than 3600 female and 1100 male participants had a prior history of a fragility fracture. Only 29.7% of those who had experienced a fracture were receiving any specific therapy for osteoporosis. These findings were particularly concerning given that the Australian BoneCare Study¹⁴ published in 2004 reported practically identical findings: 29% had suffered a prior fracture (66% reported one fracture, 22% reported two fractures and 12% reported three to 14 fractures). Only 27.9% of those with a fracture history had received specific treatment for osteoporosis. The Australian BoneCare Study recruited patients during 1999, and the similarity in results suggests that no change in secondary preventive care had occurred in the seven years between the recruitment phases of these two studies.

Similarly, within the acute setting, an audit of 16 Australian hospitals involving 1829 fragility fracture cases found that less than 13% of patients had risk factors for fracture identified, 10% were appropriately investigated, 12% were commenced on calcium, 12% on vitamin D, 8% on bisphosphonates and 1% on selective oestrogens receptor modulators.²³

Many reasons can be identified as to why people with minimal trauma fractures and osteoporosis are undertreated.

- Medicare rebates can only be sought for reimbursement of bone density scanning in certain high-risk circumstances, such as people aged over 70 years of age for screening purposes; people presenting with a minimal trauma fracture; having certain medical conditions; long-term use of steroid medication; and monitoring low bone density and response to treatment in refracture prevention situations.
- Treating clinical teams do not take responsibility for identifying the need to investigate the causative factor, or treat people presenting with minimal trauma fractures, regardless of their practice setting or profession (primary, secondary and tertiary).¹²
- Osteoporotic refracture prevention services may not be considered in health service planning.²⁶

The NSW burden

A report showing the prevalence and extensive cost of fractures related to osteoporosis in NSW and the ACT has recently been released by Osteoporosis Australia.²⁷

This report found a huge incidence and cost burden, with 70% of people aged 50 and older in NSW and the ACT having osteoporosis or osteopenia in 2017, and around 50,000 fractures occurring annually. In 2017, the total costs of osteoporosis and osteopenia for people in that age group will be \$1.1 billion, of which \$740 million (67%) relates to the treatment of fractures. These costs include ambulance services, hospitalisation, rehabilitation and community services.

By 2022, it is estimated that osteoporosis or osteopenia in NSW and the ACT will affect 2.07 million older people, an increase of 26%. The number of fractures recorded annually is expected to increase by 29%, resulting in 63,685 fractures per annum.

NSW minimal trauma fracture data in 2008

An analysis of admissions to NSW hospitals for minimal trauma fracture and refracture from July 2002 to June 2008 (26) revealed that 35% of people who were admitted with a minimal trauma fracture presented with another fracture at the same hospital within the study period. The refracture rates were mirrored in a similar study conducted in Western Australia, which found that 32.8% of males and 39.8% of females sustained at least one refracture episode within a 10-year period.²⁸

Furthermore, the NSW minimal trauma fracture data showed the average length of stay in hospital for these re-admissions was 22 days, and 17% of the cohort died during the study period.²⁶

The data from NSW is known to be an underestimate 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 (rather than a high trauma fracture). Minimal trauma fracture is not a primary diagnosis International Classification of Diseases (ICD)-10 code. With no ICD-10 code, it is difficult to retrospectively identify these people as a collective group within hospital administration systems. Hence, the increasing incidence of minimal trauma fractures and the significant impact on hospital use are rarely demonstrated.

Furthermore, vertebral fractures are often dismissed as 'back pain' or arthritis and so frequently remain undiagnosed and untreated for the causative factor, which is generally osteoporosis. It is estimated that only about 30% of vertebral fractures are identified clinically and appropriate intervention for osteoporosis is also often not initiated.²⁹ Conversely, the analgesia often prescribed for back pain can add to the presence and severity of osteoporosis, as opioids can inhibit testosterone production and bone formation.³⁰ Not only would this add to the burden on NSW hospitals, it is likely to skew data as admissions are not attributed to osteoporosis.

Service availability in NSW in 2009

The ACI Musculoskeletal Network undertook a statewide survey in late 2009, seeking to understand the availability of osteoporosis and refracture prevention services across NSW. It found that only three public health sites reported having a budget for attempts to address osteoporosis care needs and refracture prevention, and a further four sites received funding from a private source. While many clinicians undertake interventions that work towards refracture prevention as part of their overall role, only five nurses and three medical officers were funded for a specific role that supported people who have, or suspected to have, osteoporosis. One allied health position with responsibilities to support this cohort was identified, but this position was not funded by the public health site. This lack of dedicated staff was caused by a lack of allocated funding, highlighting a gross lack of resources to meet the needs of local populations. The survey also revealed many opportunities for diagnosis and ongoing care in the community that could be accessed given a greater awareness of the need for these services.

The NSW data, together with the information gathered on minimal trauma fractures and service availability in NSW hospitals, provides a strong argument for implementation of refracture prevention services across NSW hospitals to reduce future fractures and associated costs.

International models of care

While randomised controlled trials in this area are lacking, there is good evidence in the international literature that implementation of appropriate models of care can improve post-fracture osteoporosis care, reduce the incidence of repeat fractures and result in significant cost savings.^{31, 32}

Many of the models described employ a dedicated care coordinator, who acts as the link between the patient, the various care and service providers, and the primary care physician.³¹ The literature also describes the critical role of the dedicated coordinator in proactively identifying people sustaining a minimal trauma fracture, facilitating investigations and supporting the initiation of osteoporosis treatment and care.^{6, 8, 33, 34} The coordinators are also seen as well placed to provide the necessary education and self-management support, as well as long-term follow-up to ensure that treatment interventions are followed.^{32, 33}

Importantly, the review and meta-analysis of the effectiveness of published models of care for the secondary prevention of osteoporotic fractures demonstrated that intensive, coordinated interventions are most effective in improving patient outcomes.⁶ The best outcomes are demonstrated by intensive services led by a coordinator who takes responsibility for the whole process, from identification following a minimal trauma fracture through to investigation, initiation of treatment for osteoporosis and long-term follow-up to ensure adherence.^{8, 33}

It has also been suggested that the person with a minimal trauma fracture should be at the centre of care, and effective, coordinated services should be multipronged, developed through interdisciplinary efforts and implemented to ensure that no person with a minimal trauma fracture is ever neglected.³⁵

Successful services often include:

- routine case-finding
- case or care coordination
- access to multidisciplinary health professionals
- bone density scanning and monitoring of serum levels for vitamin D, calcium and thyroid function
- initiation of specific treatment with antiresorptive drugs (such as bisphosphonates and denosumab), or in selected cases with an anabolic agent (such as teriparatide)
- screening for falls risk and integration with falls prevention services
- health education and self-management support
- lifestyle interventions to increase exercise and improve nutrition
- liaison between primary care and hospital-based teams
- follow-up with patients to ensure persistence of care
- electronic systems to monitor clinical progress and to ensure continuity of care.

Coordinator-based, post-fracture models of care have successfully closed the secondary fracture prevention gap in many countries throughout the world.³² There is strong evidence that these services need no further justification; focus should now be on its widespread implementation.³³

Australian models of care

While no randomised clinical trials can be sourced regarding models of care for osteoporotic refracture prevention, many teams across Australia have successfully implemented local refracture prevention services.^{20, 21, 36-41} A key element in all of these Australian models was the presence of a care coordinator to direct patients to the appropriate investigations, diagnosis and treatment.

One Australian service, established in 2005 at a large tertiary referral centre in Sydney, provides a good illustration of an effective physician-led service. With a systematic approach to refracture prevention, including active identification and management of people presenting with a minimal trauma fracture through a coordinated intervention program, it has reduced 4-year absolute refracture risk from 19.7% to 4.1%, and significantly increased the time to refracture.²¹ This service is both clinically effective and excellent value for money.⁴²

Similarly, another large tertiary referral hospital in NSW established a multidisciplinary team in August 2007 with the primary intention of improving the identification, referral and ongoing management of people over 50 years of age presenting to the emergency department with a fragility fracture, and decreasing refracture incidence.³⁶ Identification and rate of referral to the fracture prevention clinic increased from 9% to 34% between 2007 and 2008. In 2014, they evaluated the impact on initiation of treatment, continuing treatment and new fracture rates. New fracture rates were significantly lower in people who attended the clinic (5.1%) than in people who did not, (16.4%) and the rate of treatment with osteoporosis-specific medications at least 12 months after the fracture were almost twice as high in the attender group than in the non-attenders.⁴³ More recently, the team has found that having a fracture liaison service that identifies, investigates and treats people with minimal trauma fracture is associated with a reduction in the 3-year risk of major bone refracture of around 40%, and of any bone refracture of around 30%.²⁰ From the perspective of the Australian health system, this generates an annual gain of \$500,000 to \$830,000 in potential savings for every 1000 people who access the service, or approximately \$1–2 million.⁴⁴ This service describes the use of a fracture liaison coordinator as pivotal in enabling a dedicated and concentrated effort to identify patients and follow-up with bone health treatment and self-management support.⁴³

Services in regional Australia have also reported their outcomes from implementing the care coordinated service model. Establishing a fracture liaison service coordinated by a dedicated fracture liaison coordinator in regional Australia has been shown to be feasible and effective in improving osteoporosis management following fracture, leading to prevention of the next fracture. Specific fracture management improvements include increased treatment rates of people who have presented with minimal trauma fracture; facilitating a seamless continuum of care between the acute fracture care team, the specialist medical team and the GP; and providing ongoing efforts to support self-management of people regarding their bone health requirements.⁴¹

Formative evaluation of the model of care 2011–2012

The NSW *Model of care for osteoporotic refracture prevention* was launched in 2011. A formative evaluation⁴⁵ was undertaken in 2011 and 2012 to ascertain the impact and applicability of the model of care across various service settings in NSW, and to then inform statewide implementation. Three sites participated in the evaluation, representing urban, regional and rural service sites.

Information was collated from: people accessing the services for advice and treatment of their bone health; service providers across primary and secondary care settings; and emergency department and hospital admission data. The data showed that osteoporotic refracture prevention can achieve positive outcomes for patients and health services.

Analyses of the patient-reported outcomes demonstrated that osteoporotic refracture prevention had a substantial positive impact on:

- the uptake of osteoporosis medication in the target populations
- the patients' amount of exercise and intake of calcium
- health-related quality of life in areas relating to bodily pain, physical functioning, the capacity to engage in regular activities, and levels of social functioning.

Osteoporotic refracture prevention models of care were also associated with:

- a significant reduction in hospital re-admissions for care of fractures within 28 days of hospital discharge
- an average 10% reduction in the number of potentially preventable re-admissions for fracture by the third year of implementation.

Analysis of long-term data (1989–2005) in Australia¹⁸ shows that approximately 41% of refractures in women and 52% of refractures in men occurred in the first two years after the first fracture. If the model of care is implemented in its entirety across NSW, and if this refracture rate is reduced by 10%, then over a 10-year period it may prevent 10,000 refractures of people previously admitted with a fracture and avert 100,000 bed days.

Implementation

Many services across NSW have implemented the NSW *Model of care for osteoporotic refracture prevention* since its launch in 2011. The formative evaluation of the model of care concluded that it is suitable for implementation across a variety of geographic areas with diverse population demographics and health system and community resources. Together with highly positive outcomes in the published literature, osteoporotic refracture prevention needs no further justification. The focus now remains on widespread implementation.

The NSW Government's Leading Better Value Care Program provides a necessary impetus for all local health districts in NSW to establish and implement the model of care in the 2017–18 financial year. System-wide implementation is expected to improve outcomes for people in NSW who sustain minimal trauma fractures; and improve use of NSW health system resources.

The NSW Model of care for osteoporotic refracture prevention

Overview

The core of the *NSW Model of care for osteoporotic refracture prevention* is osteoporotic refracture prevention services supported by a dedicated fracture liaison coordinator and medical officer at each service site. Access to multidisciplinary support to meet the chronic care needs of people accessing the service is also required.

Administration officers support the osteoporotic refracture prevention service by carrying out duties such as booking appointments, ensuring communication between the service and the primary and secondary care clinicians, billing and data collation.

Chronic care

The *NSW Model of care for osteoporotic refracture prevention* is underpinned by the Chronic Care Model.^{46, 47} This model has informed much of the development of the *NSW Model of care for osteoporotic refracture prevention* over the past seven years, and is a framework that can complement the model.

The Chronic Care Model identifies the essential elements of a healthcare system that encourages high-quality chronic disease care. Effective chronic disease management requires:

- a culture, organisation and mechanisms that promote safe, high-quality care
- appropriate system design to ensure the delivery of effective and efficient clinical care
- promotion of care that is consistent with scientific evidence and the person's preferences
- use of self-management support to empower and prepare people to manage their health and healthcare
- mobilisation of community resources to meet the person's needs and help activate and inform people and families so they are better able to cope with the challenges of living with and treating chronic disease
- clinical information systems to organise patient and population data to facilitate efficient and effective care.

Fracture liaison coordinators

The role of fracture liaison coordinator in identifying patients, coordinating care, assessment, education and referral is central to the model. The coordinator has a dedicated role to ensure that the patient gains early access to appropriate interventions and community services that support reduced risk of refracture and effective management of bone health.^{6, 8, 32}

Fracture liaison coordinators have clinical undergraduate qualifications to at least bachelor degree level. They are commonly experienced senior nurses and physiotherapists with an understanding of how acute, outpatient and community care is provided in NSW, both in the public and private healthcare sectors.

Fracture liaison coordinators need to understand the range of clinical disorders that people from the community present with for healthcare. They must understand the principles of chronic care and appreciate the clinical, social and psychological issues that can arise from living with a long-term condition within the community. In relation to refracture prevention, this includes having:

- an in-depth understanding of the appropriate disease management requirements
- the ability to express the importance of, and actively support adherence to, interventions through an understanding of behaviour change theory and application
- knowledge of the needs of the population group as well as how and where to gain access to services to support self-management and maintain independence within the community.



Lead fracture liaison coordinators

Lead fracture liaison coordinators are senior clinicians, typically experienced senior nurses and physiotherapists who have clinical responsibilities and also responsibility for providing leadership and support to all fracture liaison coordinators and the osteoporotic refracture prevention services across their local health district. This position involves facilitating activities such as:

- ensuring the models of care within the local health district are congruent with this model of care
- ensuring data capture for each person accessing the service is congruent with the ACI osteoporotic refracture prevention codebook, to facilitate care in line with the concepts of chronic care and record the data required to report on service outcomes
- mentoring other fracture liaison coordinators across the local health district through individual and group workshops
- fostering a culture of critique of clinical and operational activities across all osteoporotic refracture prevention services within the local health district to ensure the services are grounded in evidence and the activities are provided using resources to the best advantage
- developing and leading the delivery of educational opportunities for all clinical staff on the needs of people presenting with minimal trauma fractures
- supporting quality improvement activities of the osteoporotic refracture prevention services within the local health district.

Key elements of the model of care

Osteoporotic refracture prevention services will include the key elements outlined below. The elements will be delivered by the osteoporotic refracture prevention team with responsibilities allocated as appropriate. Team members include the fracture liaison coordinator, the dedicated medical officer, local falls prevention team members, and other collaborators within and outside the local health district; for example, allied health department, primary care practitioners and others within community settings. These elements are aligned to the guidelines and recommendations described in the published literature.^{6, 8, 32}



Active identification

People aged 50 years or more presenting with minimal trauma fractures at acute, outpatient, community and primary healthcare settings will be actively identified.



Care coordination

Fracture liaison coordinators will work with people, their families and carers to facilitate the appropriate delivery of care that supports reduced risk of refracture and effective management of bone health.



Comprehensive person-centred assessment

Assessment will determine future fracture risk including bone health (i.e. osteoporosis) and falls risk. It will be holistic and person-centred, taking into consideration the medical health, physical functioning, comorbidity, psychological and social needs of the person.



Patient-reported outcome measures (PROMs)

Valuable information about the person's health and wellbeing will be gathered with the use of patient-reported outcome measures as part of the assessment process. PROMs will be used to improve quality of care by informing care planning and management.



Supported access to investigation

Access to further investigation will be supported. That may include bone mineral density scanning for either a definitive diagnosis (though not necessarily required to start treatment), to monitor treatment over time, or to assess for future fracture risk. Serum blood assays may also be indicated to look for underlying causal disease processes.



Initiation of appropriate medical interventions

Required medical treatment will be initiated by the dedicated osteoporotic refracture prevention medical officer before handover to the person's general practitioner. This treatment will include the prescription of an osteoporosis medication regimen as an addition to conservative care measures, such as vitamin D and calcium supplementation.



Health education and self-management support

Health education and self-management support will be provided to enhance knowledge and support active and informed engagement in care. It will promote a healthy lifestyle, physical activity, good nutrition and healthy eating, and osteoporosis treatments that support bone health and reduce fracture risks.



Development of a personalised management plan

A personalised management plan will be established to promote planning and application of long-term chronic disease management. It will be designed to help the person address their care needs and to meet their health goals within the context of their care preferences.



Multidisciplinary support

People will be linked to the appropriate multidisciplinary support to promote bone health and reduce falls and fracture risks. This will be achieved through establishing and fostering relationships and referral pathways to services.



Access to community services

Local community resources will be used to provide ongoing self-management support for people to facilitate behaviour change (e.g. falls prevention).



Timely and efficient communication

Communication between primary and secondary care physicians, allied health and community service providers will facilitate reinforcement and continuity of care across healthcare settings and ensure optimum adherence with treatment and recommendations.



Follow-up

Follow-up will support the maintenance of long-term lifestyle and behaviour changes and adherence with treatment and interventions.



Data systems

Services will have data systems to collect and record the person's interventions; collate patient outcomes; and analyse and report on service outcomes.



Patient-reported experience measures (PREMs)

Patient-reported experience measures will be used to support service evaluation and inform improvements.



Engagement in quality improvement

Regular time will be assigned in the service weekly plan to critique service interventions and processes, follow up on patient care, conduct literature reviews seeking solutions to identified issues, and plan and implement quality improvement cycles as required.

Case study: Susan

53-year-old Susan presented to the emergency department following a first-time fall while walking her dog. She reported being fit and healthy, working full-time as a nurse and being married with three children. Her mother had been diagnosed with osteoporosis at a similar age. Other risk factors included having a low body mass index and poor calcium intake and being a smoker.

X-ray revealed an ankle fracture. The fracture was immobilised with plaster and Susan was booked for follow-up through the fracture clinic. Susan was also referred to the ORP service.

At the ORP service, Susan was first seen by the fracture liaison coordinator and asked to complete the PROMIS 29 questionnaire, which she and the coordinator reviewed at the outset of their discussion. Susan scored high on the poor sleep domain so initial discussion centred on this. It was ascertained that Susan was not using her Panadol Osteo regularly so pain in her ankle was disturbing her sleep. After discussing the need for Susan to use her pain medication regularly in the first few weeks after a fracture, and agreement to trial this, the discussion then turned to her risk factors for osteoporosis and what this can mean to her bone health. Susan and the fracture liaison coordinator then discussed what osteoporosis is and its relationships to her risk factors. She was asked to have blood taken to check her thyroid function, vitamin D levels and other parameters indicating the state of her health. Susan then had a bone mineral density scan. She was given reading material to take away with her and was advised to have a dental review prior to her next clinic appointment. A letter was sent to Susan's GP regarding her fracture and the follow-up arrangements for her refracture prevention care.

At her next visit to the osteoporotic refracture prevention service, Susan reported that her sleep patterns were much improved as was her pain at the fracture site. Consequently, she had decreased the paracetamol to a 1 gram dose whenever she felt discomfort, but still took a dose prior to going to bed. Susan was advised that her investigations had shown she was osteopenic and had low vitamin D levels in her blood. Her dentist had reported that her teeth and oral cavity were in good health, and no dental intervention was required at this time.



Consequently, Susan was asked to commence vitamin D supplements and advised on how to obtain 1300 mg a day of calcium through her diet habits. Bisphosphonate therapy was prescribed, and Susan was instructed to commence this as soon as her vitamin D levels had normalised. Her GP would advise her on when this was achieved. Susan was also advised to commence weight-bearing exercise once her fracture had healed. A falls assessment was undertaken and advice given on falls prevention services she could access locally. Once again, a letter of communication regarding this visit was forwarded 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 had scheduled six-monthly visits to her dentist. She had gained access to the services of Osteoporosis NSW and was attending a falls prevention exercise group. When the coordinator phoned her 12 months after her fracture, she was managing herself well and adhering to her medication regimen with her GP's support and she hadn't had another fracture.

Importantly, 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

Since 2011, the model of care has been implemented in a variety of settings across NSW. The adoption of the model of care followed formative evaluation that revealed highly positive outcomes for people accessing osteoporotic refracture prevention services that deliver their services in line with the model of care. There are also a number of positive outcomes for the NSW health system. Based on these outcomes and subsequent outcome reports from individual service sites, from 2017 the NSW Government is supporting systematic implementation of the model of care across all local health districts in NSW.

It is acknowledged that areas across NSW differ in their distance from health services and access to resources, and in their local population numbers, cultural beliefs and attitudes. Therefore, a localised implementation plan is recommended to ensure service alignment to both the model and the local context.

The ACI Musculoskeletal Network and associated teams from the ACI will support service implementation as is required with tools and resources, training opportunities, hosting of peer-mentoring workshops, service site visits, and sharing of implementation experiences by other service sites.

Additional implementation support as required or requested from the local service sites will be provided in a tailored approach.

Evaluation framework

Consistent with the framework to evaluate musculoskeletal models of care,⁴⁸ the *Osteoporotic refracture prevention: monitoring and evaluation plan*⁴⁹ has been developed through collaboration between the ACI Health Economics and Evaluation Team and the ACI Musculoskeletal Network. The evaluation will assess the extent to which the model of care has been adopted and implemented and how well it achieves its intended outcomes. The evaluation will examine clinical outcomes for NSW residents accessing the osteoporotic refracture prevention services and the experience and satisfaction of both consumers and clinicians. It will also assess sustainability within the NSW health system context and the benefits to the overall health system. Monitoring and evaluating the osteoporotic refracture prevention services will also provide useful information to guide future investment decisions related to the management of people in NSW who sustain minimal trauma fractures.

Key performance indicators

As a part of the monitoring and evaluation plan, key performance indicators (KPIs) will be routinely monitored across NSW. They will assess key outcomes, including service access, patient-reported outcome and experience measures, health service use and fidelity to the model of care.

Clinical indicators

A number of clinical indicators will also monitor implementation of the model of care. They will include key elements of care such as access to investigations; initiation and persistence of specific osteoporosis pharmacotherapy; engagement with and adherence to lifestyle behaviours such as exercising, healthy eating, preventing falls, quitting smoking and taking calcium and vitamin D supplements as required; and fracture rates.

It is envisaged that the KPIs and clinical indicators will be used by service sites to inform quality improvement.

The ACI Musculoskeletal Network will refine the KPIs and clinical indicators over time according to clinical practice and health service needs.

Communication strategy

Strategies will be adopted to alert health services and the general community of NSW about this model of care.

- Formal and informal presentations describing the model of care, planned implementation strategies, lessons learnt from previous implementation efforts, and clinical and service outcomes will be presented at events within the NSW Health system, at clinically appropriate professional events, and any other suitable opportunities.
- Advance notification and additional guidance to support implementation of the model of care will be provided to chief executives, managers and lead clinicians of the local health districts, primary health networks, Aboriginal Community Controlled Health Organisations and clinical support clusters.
- Newsletters will be disseminated through the ACI Musculoskeletal Network targeting a wide range of stakeholders.

Other communication strategies developed for broader use within the ACI and across the NSW health system in general will be accessed to complement the points noted here.

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