Evaluation of current practice: compliance with osteoporosis clinical guidelines in an outpatient fracture clinic

Cheryl M Kimber and Karen A Grimmer-Somers

Abstract

Better detection and management of osteoporosis will reduce unnecessary health expenditure. A number of high quality guidelines are available to support early detection and best practice management of osteoporosis in hospital settings. However, sustainable implementation of guidelines poses practical issues in terms of structure and processes in hospitals. This paper describes an investigation into guideline compliance in one large tertiary metropolitan hospital and discusses practical elements of guideline implementation.

Given the evidence of poor practice across the two audit periods, we recommend that a coordinated clinical pathway be implemented in the fracture clinic, supported by a targeted and discipline-specific training program. Small steps towards improving awareness and management of osteoporosis in patients presenting for the first time with non-trauma wrist fracture may well produce large cost savings by future fracture prevention.

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What is known about the topic?

Osteoporosis contributes significantly to fractures, subsequent disability and premature mortality in Australia.

What does this paper add?

In total 62 patients with wrist fractures were included in two audits in 2004 and 2005. The orthopaedic health care team only identified 29% and 25.8% of patients at risk of osteoporosis. Of those identified as being at risk, zero (2004) and 9.6% (2005) were commenced on a treatment pathway as per guideline recommendations.

What are the implications for practitioners?

Most patients with an osteoporotic fracture will be seen in the fracture clinic by orthopaedic medical and nursing staff. It is particularly important that these health professionals are aware of the need to recognise and identify those patients with, or at-risk of, a fragility fracture, who thus have the potential for having osteoporosis. The authors recommend that coordinated clinical pathways are implemented in fracture clinics.

OSTEOPOROSIS CONTRIBUTES significantly to fractures, subsequent disability and premature mortality in Australia.[1] It is estimated that the annual cost in Australia of both direct and indirect management of osteoporosis is $7.4 billion. This cost includes the management of osteoporosis and, significantly, the costs of osteoporotic-related fractures.[1] In 2004–2005, the direct costs for neck of femur fracture patients in the large Adelaide metropolitan tertiary hospital providing data for this project approximated $6 million, reflecting an average per-patient cost of $13 800. (Flinders Medical Centre. Clinical Epidemiology and Health Outcome Unit Review, 2006; unpublished.) This figure is calculated for an acute inpatient stay only, and does not include rehabilitation, changes to residential status, or financial and social costs to the patient, their family and the community. The costs of osteoporosis prevention are considerably less by comparison. Medication costs per patient range from $19.55–$77.00

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per month depending on subsidisation status.[2] There are additional relatively low costs of health professionals providing education to patients on osteoporosis and lifestyles issues, and guiding and promoting best clinical practice guidelines to other health professionals (about $59 000 per annum full-time equivalent, based on a full-time registered nurse level 2 salary).[3]

Osteoporosis fractures, commonly occurring at the hip, vertebrae or wrist, are typically sustained with little or no trauma.[4-6] A low-trauma fracture is defined as a fracture occurring spontaneously or from a fall no greater than standing height.[6] These fractures are called low-trauma or fragility fractures, and are often associated with considerable morbidity, cost and significant increased risk of further fractures.[5,7,8] Low-trauma wrist fractures (commonly occurring at the distal radius ± ulna) have been proposed as a reliable indicator of patients who may have osteoporosis.[9,10,11] These fractures can signal the beginning of "fracture cascade" events,[1,5,11,12] and reflect patients whose osteoporosis risk may have been undetected, and who are at risk of higher order fractures[11] from falls or other trauma. Identifying wrist fractures without trauma would thus appear to offer a practical and sensitive way in which early risk of osteoporosis can be identified, and which allows risk-reduction strategies to be put in place before more major fractures eventuate. The increasing ageing population in Australia, and the high and increasing incidence of osteoporotic fractures as well as the high associated management costs have the potential to spiral out of control if steps are not implemented to address this problem at the early risk-detection stage.[13,14] There is a particularly strong co-relationship between the ageing process, osteoporosis and being female.[15-19] Other risk factors for osteoporosis and related fractures include inadequate dietary intake of calcium, too little physical exercise or activity, high alcohol intake, smoking, early menopause, inadequate vitamin D intake, family history, comorbid disease states (anorexia, persistent GI disturbances/malabsorption, rheumatoid arthritis problems), and use of certain medications (steroids, anticonvulsants, chemotherapy). Given the costs of managing osteoporotic fractures in an inpatient setting, there are persuasive arguments to incorporate health prevention and promotion activities into the management of patients with low-trauma wrist fractures.

It could be proposed that the availability of clinical guidelines on osteoporosis management since the 1980s should have underpinned improvements since then in risk detection and treatment behaviours. On this premise, it could be expected that each year, larger proportions of the patients at risk of osteoporosis would be identified, and managed appropriately (with education, drugs, lifestyle, etc). However this appears not to have been the case, with a published continual low rate of identification (20%) and investigations (proposed as representing between 3% and 23% of those potentially at risk).[4,20,21] The current "Gold Standard" of management is provided in high quality clinical guidelines (for instance Scottish Intercollegiate Guidelines Network [SIGN] 2005, National Institute of Health Consensus Development Panel on Osteoporosis Prevention, Diagnosis and Therapy [USA] 2000, and National Guideline Clearinghouse 2007).[7,16,18] It was also discussed and agreed upon at the 2001 Australian Fracture Prevention Summit,[1] that Gold Standard management should include accurate history taking and physical examination focussing on detection of osteoporosis risk factors. Tests, specifically bone mineral density (BMD), should be regularly undertaken to diagnose, and monitor osteoporosis status. Once osteoporosis is diagnosed, individual risk factors should be identified so that patient-specific management programs can be implemented. Thus, subsequent tests may include complete blood count, serum levels for calcium and vitamin D, measurement of thyroid stimulating hormone and calcium excretion level.[17] Lifestyle issues should be discussed with the patient, including diet (calcium and vitamin D intake), cessation of smoking, reduction in alcohol consumption, and exercise patterns.[1,7,16,18] Falls prevention and other injury-prevention strategies, and the instigation of

pharmacological treatment should be considered[1,5,7,17,18] (for instance, first line management may be triple therapy of a bisphosphonate, calcium and vitamin D[17,18]). The most important factor in determining whom, and when, to treat is an individual's absolute risk of fracture. Previous fractures, advancing age and lower bone mineral density contribute independently to estimation of fracture risk, with higher prevalence necessitating an increased need for intervention.[5] Knowledge of an individual's absolute risk is central to making appropriate treatment decisions. About 85% of fractures occur in women over 60 years of age. There is three- to five-fold increased risk of further fractures occurring as the number or severity of vertebral fractures increases. The risk of further incidence of fracture increases by 30%–40% within 3 years in a person with osteoporosis.[5] Providing Gold Standard treatment to patients with these presentations complies with good health care practice in fracture management and prevention. Thus, treatment of at-risk individuals makes good sense in view of the evidence that appropriate and timely treatments reduce the risk of other osteoporotic fractures within 6–18 months.[1,5] It has been proposed that all patients over 50 years of age presenting with minimal trauma fracture should be assumed to be osteoporotic unless proven otherwise.[4,20] An accurate prevalence estimate of low-trauma fractures is difficult to calculate in Australia, however, because of the range of treatment location choices made by patients when seeking medical assistance for such conditions (general practitioners, after-hours clinics, outpatient clinics, etc). The lack of data linkage between these locations constrains accurate data capture. In South Australia for instance, there is no universal public patient identifier between hospitals or between hospital and community services, which prevents ready access to information on patient journeys through the public system. Moreover, it is unlikely in the foreseeable future that public and private sectors will be sufficiently linked by information technology advances to allow any patient tracking between these systems, particularly between GPs and hospitals. Hospital and outpatient clinic separations therefore provide the only, and limited, window of opportunity to identify the frequency and nature of low-trauma fracture presentations.[22]

Despite the availability of clinical guidelines, hospital statistics continually flag missed medical opportunities to prevent fragility fractures.[4,20,21,23] Many patients attend Australian hospitals with a low-trauma fracture, however they leave without being recognised as having a fragility fracture, and thus are not investigated appropriately or early enough for osteoporosis, vitamin D deficiency or other underlying causes of osteoporosis. Hence these patients may not be provided with any treatment, causing their risk profiles to continue to rise. This is despite the fact that the clinical guidelines indicate that effective and timely therapies can reduce the risk of fracture by about 50%.[1]

Reported poor practice in identifying and dealing with potential fragility fractures has been related to a range of structural and process issues in the quality cycle.[24] Issues constraining good practices include cross-sector disengagement between acute hospital settings and community health care, poor staff training in all sites, lack of communication pathways within and between sites, lack of responsibility for progressing and monitoring good practices, lack of awareness of the problem, lack of ownership of the problem, failure to identify fragility fractures using standardised assessment processes, and lack of clear diagnosis and management pathways.[1,20,21,25] Thus a bottom-up, cross-sector and multi-disciplinary approach is required to effectively detect at-risk patients and appropriately manage them.[20,21] These authors highlight the responsibility of the health teams in managing low-trauma fractures, capitalising on every opportunity to identify, diagnose, commence a management plan and refer to appropriate specialists as needed. Most patients with a low-trauma fractured wrist are reviewed by the orthopaedic team at some point in their management, thus the orthopaedic team should be in an ideal position to commence patients appropriately on the osteoporosis clinical management pathway.[4,20]

Translation of best practice guidelines into practical implementation strategies poses practical issues regarding who, when, how and what aspects of guidelines should be implemented.[26] Conducting an audit of patient records is one approach that facilitates setting current standards and monitoring care decisions, determining whether they are guidelines based, and whether they are associated with good patient outcomes.[27]

This paper reports on the findings of such an audit, conducted at one large metropolitan tertiary hospital in Adelaide, in 2004 and 2005 (May–June period) on inpatient and outpatient records of patients who presented with a wrist fracture. All wrist fractures involving the distal radius ± ulna were chosen for the audit because they occur frequently in seemingly fit, healthy and active people, and yet can mark the beginning of the "fracture cascade".[1,11,12] Often these patients' bones are treated and they are discharged without a holistic view being taken of the patient with respect to the underlying causes for the fracture, and the potential for osteoporosis.

Methods

Audit method

One person undertook all aspects of the audit. A list of all patients with a wrist fracture involving distal radius and/or ulna was obtained for the May–June period in both 2004 and 2005, from the one tertiary hospital. These patients had been admitted to hospital, or treated at the hospital's fracture clinic, and had been assigned International classification of diseases 10 version 4 codes of S525; S5250-S5253; S5259 or S526, and DRG codes I74A, 174B or 174C. The records were then sorted to exclude all female patients under 45 years and all male patients under 55 years. These patients are considered in the guidelines as being below the risk age profile for osteoporosis.[7,11,28] The inclusion criteria thus focused on those patients likely to be at risk of osteoporosis, and thus excluded cases with wrist fracture resulting from a significant trauma (motor vehicle accident, falls from height etc). The decision on fracture cause was made from the patients' notes, using patient history and examination findings. The notes of the first 31 patients of the included samples for the two audit periods were considered for the audit. The notes were de-identified for data extraction and reporting purposes.

Audit data

A range of data were extracted into a purpose-built Microsoft Excel file (Microsoft Corporation, Redmond, Wash, USA) from the patients' case notes, including:

- confirmation of wrist fracture diagnosis
- factors likely to increase likelihood of osteoporosis (previous medical history, drug therapy, age, gender, fall mechanism of sustaining an osteoporosis-related fracture)
- mode of treatment (conservative or surgical)
- any information on severity of fracture, including mechanism of injury to assist in determining likelihood of a fragility fracture
- current history of osteoporosis and treatment.

This information was used to identify potentially high-risk patients for osteoporosis, and to determine whether they had been managed in accordance with best practice guidelines.

Data on patients being provided with osteoporosis education were also collected from the case notes, however this could not include verbal interaction between patient and health provider that may not have been formally documented. Referrals to other health professionals for osteoporosis were also noted, as was communication with the patient's GP.

Statistical analysis

The research questions for the audit were:

- Was there a difference between audit periods which might indicate increasing awareness of clinical guidelines?
- What was the gap between what actually happened and what should have happened?
- How complete was the documentation and how did this impact on the audit process?

The data were reported descriptively, and comparisons were made between data in the two audit periods using independent Student *t*-tests, chi-

squared tests (level of significance 0.05) and odds ratios (95% confidence intervals) as appropriate. Trends over time were identified.

Results

Demographics

Of the 31 patients in each audit period, 22 women and nine men were included in audit period 1 (2004), and 26 women and five men in included in audit period 2 (2005). There was no significant difference in gender proportions between the two audit periods, although there were significantly higher percentages of women than men in both samples.

In audit period 1, the average age was 74.3 years (SD, 12.3) and in the second audit period the average age was 71.7 (SD, 11.8) years, with no significant difference in age being detected between the two audit samples. However, over the entire record sample ($n = 62$), the men were significantly younger than the women (65.8 years [SD, 12.5] compared with 75 years [SD, 11.2], respectively).

Fracture site and management

The most frequent diagnosis found in the total audit sample ($n = 62$) was distal radius fracture alone (67.7% total), with a further 27.5% of presentations involving a distal radius fracture in association with other problems. Only 4.8% of presentations did not relate in some way to a distal radius fracture. There was no difference in frequency of diagnoses between audit periods.

Wrist fracture sites were relatively equally distributed between left (53.2%) and right (45.2%) side, with only one patient sustaining bilateral fractures (1.6%). There was no significant difference ($P > 0.05$) between the number of patients proceeding to surgery during audit period 1, (46.3%) and audit period 2 (53.8%).

The most common management was conservative, with 33.9% of all patients receiving plaster of Paris (POP) casting, although there was a decreasing (but not significant) prevalence of POP administration over the audit periods (57.1% in period 1 compared with 42.9% in period 2). Of the surgical procedures, the most common approach was closed reduction and K-wires (29.0% of total patients) with a trend towards an increase in this surgery over the audit periods (44.4% in audit period 1, 55.6% in audit period 2). This may reflect the decreased use of POP in the second audit period.

Previous history

Nine of the sample ($n = 62$) had a history of previous fracture (14.5%), and 54 of the total sample records (87.0%) indicated previous history of risk factors for osteoporosis. The percentage of patients with risk factors for osteoporosis was not significantly different between audit periods (90.3% in period 1, compared with 83.9% in period 2). Previous use of drugs (for instance oral steroids, loop diuretics, thyroxine, antiepileptic drugs, aromatase inhibitors and anti-androgens) which could indicate underlying risks for osteoporosis was reported by 12.9% of the sample overall, with no significant difference between audit periods (9.7% in audit period 1 and 16.1% in audit period 2). A previous history of osteoporosis was recorded for 22.6% of the total sample, with 19.3% in audit period 1 and 25.8% in audit period 2, and current osteoporosis medications were reportedly used by 20.9% (16.1% in audit period 1 and 25.8% in audit period 2), with no significant differences.

Mechanism of injury

The type of fall associated with the presenting fracture was classified in the audit as a standing height fall (82.3% overall) and other trauma (17.7% overall). There was no significant difference between audit periods of the standing height fracture events (49% in audit period 1 and 51% in audit period 2). Of the women who fell, 93.7% fell from a standing height (45/48) however only 6/14 men did so (42.9%). The most frequently reported mechanisms of fracture were standing fall and trip (both 29% overall), followed by falling with outstretched arm (16.1%). The greatest number of men fell from a height (28.6%) while the greatest number of women fell from a standing height or tripped (33.3% each).

Compliance with guidelines

	Expected performance	Actual performance audit period 1	Actual performance audit period 2	Actual performance overall
Gold Standard management for every patient	100%	6.4%	0	3.2%
Gold Standard management for patients who had sustained previous fragility fractures	100%	0	20%	11.1%
Reasons provided for non-compliance	100%	0	9.7%	4.8%
Likelihood of a fragility fracture having occurred	100%	80.6%	83.9%	82.3%
Actual recognising and identification of a fragility fracture	100%	29.0%	25.8%	27.4%
Communication with general practitioner for patients diagnosed with fragility fractures	100%	66.7%	25%	47.0%
Discussions with hospital staff for patients diagnosed with fragility fractures	100%	66.7%	50%	59.0%
Commencement on osteoporosis management pathway	100%	12%	9.6%	10.8%

Sensitivity of risk identification

Of the 48 women in the total sample, 45 were likely to have suffered a fragility fracture, however 16 (33.3%) were recognised and identified, while of the 14 men in the sample only one out of five (20%) who were suspected of having a fragility fracture was recognised. No subject considered unlikely to have a fragility fracture was diagnosed with one. No significant differences were found in detection of fragility fractures in at-risk patients between audit periods (OR 1.3; 95%CI, 0.3–4.8). This was calculated from audit period 1, where of the 25 people who were considered likely to have a fragility fracture, nine were recognised has having one (36.0%), while in audit period 2, of the 26 people who were considered likely to have a fragility fracture, eight were recognised as having one (30.7%).

Osteoporosis management protocol

Of the total 17 patients recognised as having a fragility fracture and not previously receiving treatment for their osteoporosis, 12% and 9.6% (audit 1 and 2, respectively) were commenced on an osteoporosis management plan. The osteoporosis management plan refers to the commencement of best practice clinical guidelines or Gold Standard management, which includes accurate history taking, physical examination focussing on detection of osteoporosis risk factors, and diagnostic tests (specifically BMD among others) to exclude secondary causes. Osteoporosis treatment included patient and/or carer education as well as the instigation of pharmacological treatment.

Clinical guideline management

The findings of the audit are listed in the Box. There was no guideline element for which the audit compliance matched the expected compliance.

We subsequently defined a new subset of patients — those with a likely fragility fracture which was subsequently confirmed (Group 1); those with a suspected fragility fracture which was not confirmed (Group 2); and those with no risk of a fragility fracture (Group 3) (that is, patients who did not present with a low-trauma fall [six in audit period 1 and five in audit period 2]).

Of Group 1 (high-risk osteoporosis "re-offenders" group — 27.4% overall), in audit period 1 ($n = 9$), five were referred for further counselling

about osteoporosis (55.6%), and in audit period 2 ($n = 8$), only two were referred (25%). Overall this reflected guideline compliance of 4.1%.

Of Group 2 (whom we believed were lucky *this time* in that they did not sustain a fragility fracture — 54.8% overall), in audit period 1, none of the 16 patients were referred for osteoporosis advice, while in audit period 2, only two of the 18 were referred for osteoporosis advice (11.1%). Overall this reflected guideline compliance of 5.8%.

Subsequent fracture

Three patients in audit period 1 and two in audit period 2 were recorded as having sustained subsequent fractures which were treated at the same tertiary hospital. We suspect that this number of subsequent fractures is an underestimate, as other patients may have presented to other hospitals or to their GPs with fractures, none of which would be recorded on this tertiary hospital's notes.

Discussion

Overview

This audit proved to be useful in identifying compliance with established guideline-based best clinical practice. The lessons it delivered may be useful to other clinicians interested in improving the diagnosis and management of patients who are potentially on the cusp of the "fracture cascade". The audit highlighted opportunities to improve practice at a number of points along the diagnosis and management continuum in an outpatient setting for patients potentially at risk of osteoporosis.

Difficulties were experienced in conducting this audit, particularly when seeking relevant and documented information in the patients' notes on risk factors, current osteoporosis therapy, previous history of a low-trauma fracture, or osteoporosis. This was related to consistently inadequate documentation in case notes and the current orthopaedic surgeons' practice of not identifying, diagnosing or documenting likelihood of a low-trauma fracture with a potential underlying cause of osteoporosis. Frequently absent in the operating notes was a statement noting the quality or strength of the operated bone. Missing documentation meant that patients were possibly recorded in the audit as not having received Gold Standard care, when in fact they may have done so, and it was not documented. Written tertiary hospital medical record documentation was the only source of data for the audit, and no contact was made with patients or GPs for further information. Thus, if information on practices was not recorded in patients' notes, the expected practices were deemed not to have happened. Had contact with patients or GPs occurred, additional information may have been provided on detection of risks, prior injury and current osteoporosis management.

Demographics

The predominance of women in the audit sample over the two time periods reflects general population statistics of the greater prevalence of osteoporotic fractures in females.[5,8,29] Similarly the age range in the sample was reflective of usual prevalence,[1] as was the prevalence of low-trauma wrist fracture.[5,7] This and the consistency of the findings of the repeat audit suggest that the findings can be generalised to other time periods within the two sample years.

Guideline compliance

This audit identified that current practice differed significantly from best practice in the detection and management of patients at risk of osteoporosis fracture. It highlighted that despite the availability of clinical guidelines, best practice diagnosis and management was infrequent and could be improved. The issues most identifiable in this audit as constraining best practice management were appropriate detection of at-risk patients, sensitive and specific diagnosis, appropriate immediate management and appropriate communication for ongoing care. Poor practices have been linked in other quality audits to a range of structural and process issues,[24] and the findings of this audit are no different, as they identify staff training, staff hierarchy, resource limitations, communication, documentation and cross-sector medical management issues which could all be

improved. The audit also indicates that further investigations are required to determine how these factors could be improved in a sustainable manner. As an adjunct to further investigations, in-depth interviews are recommended with a range of hospital staff, GPs and patients to clarify details which were missing from the current audit, and to identify why they were missing.

At-risk patient identification

The importance of recording the nature of injury/mechanism of injury as a key to identifying osteoporosis risk is highlighted by this audit, as the group which sustained a fracture from a standing fall was significantly more likely to be at risk of osteoporosis than the group which sustained the fracture from a trauma or a fall from a height.

This audit identified two issues with respect to identification of at-risk patients for osteoporosis.

The first issue is the detection and management of patients with a history of previous fragility fracture, and who presented with a distal radius fracture in the audit periods. It is proposed that had these patients been better managed with their first fracture, with respect to osteoporosis detection and long-term management, they may not have returned within another fracture within either audit period. This finding concurs with current clinical guidelines, which recommend early and proactive detection of risk as a preventative measure for later fractures.[1,7,17]

The second issue reflects the at-risk patients who presented in this audit without a previous history of fragility fracture. There were two clearly at-risk groups of these patients — those with a likely fragility fracture which was subsequently confirmed by testing, and those with a suspected fragility fracture which was not confirmed in this instance. The suspected underestimation of subsequent fracture in all patients in this audit suggests that failure to detect patients with osteoporosis at their first presentation of fracture potentially incurs greater downsteam costs of subsequent fracture management. For instance, neck of femur fractures, which are likely to occur in these patients in the future, are far more costly to manage than wrist fractures, and both are much more expensive than providing appropriate assessment and management pre-fracture.[13]

The findings of this audit highlight the need for proactive detection and management of any suspected fragility fracture, and the need to ensure that guidelines are in place and consistently complied with to ensure that all potentially at-risk patients are detected and managed appropriately. It is important to detect individuals who are at the commencement of the fracture cascade, rather than wait until they have a future, more severe fracture.[5,11] The audit highlighted consistently missed opportunities to identify and inform at-risk individuals about osteoporosis. Such information should have included the need for assessment for the presence of risk factors, instigating appropriate and timely investigations (BMD, specific laboratory blood tests), and implementing individualised management programs, including gait control, risk-of-falls assessments, home environment modifications and rationalisation of medications.[6,21,23,30] The medical and nursing teams in fracture clinics who missed these opportunities are inadvertently contributing to spiralling financial, social and emotional costs of osteoporosis-related fractures.

Gold Standard management of osteoporosis in this audit was infrequent, with little documentation available to explain why any management approach was followed. Particularly disappointing was the lack of evidence of the use of consistent referral pathways to specialist clinics or GPs, or clear communication with the patients' GPs regarding the nature of the fracture and its management in the outpatient clinic. The need to improve management across health sectors was highlighted by this audit, as the quality of treatment delivered in a small window of opportunity in a fracture clinic can only be enhanced if it is followed through in the community setting.[20,21,31,32]

Conclusion

This audit in one tertiary metropolitan hospital identified a multitude of opportunities to improve

practice, in recording information and providing care as per established and agreed clinical guidelines. At some stage of their illness–wellness journey, most patients with an osteoporotic fracture will be seen in the fracture clinic by orthopaedic medical and nursing staff. It is particularly important that these health professionals are aware of the need to recognise and identify those patients with, or at risk of, a fragility fracture, who thus have the potential for osteoporosis. Given the consistency of the evidence of poor practice across the 2-year audit period, we recommend that to improve practice in the hospital which provided the audit data, a coordinated clinical pathway is implemented in the fracture clinic. This could be done using dedicated trained health care workers (such as orthopaedic nurses) as change champions, to prompt and facilitate better diagnosis and management practices, including the systematic initiation of GP and/ or specialist follow-up regarding osteoporosis management.

Consequently, tailored education programs need to be developed for all stakeholders (patients, hospital staff and community health providers) and delivered regularly and in appropriate forums, in order to keep best practice in osteoporosis detection and management a high priority. The education programs themselves need to be based on best practice, which recognises different learning styles, different mechanisms for delivery of information and discipline-specific opportunities for information exchange and uptake.

Structured communication between patients and primary health care providers is essential so that patients receive the most informed care at every health care contact. Achieving a consistent evidence-based approach when instigating a management plan for patients at-risk of osteoporosis will result in more patients with osteoporosis being diagnosed and managed in accordance with current best practice guidelines. When this occurs, future audits should demonstrate a decrease in the "fracture cascade" phenomenon. Small steps towards improving awareness and management of osteoporosis in patients presenting for the first time with non-trauma wrist fracture may well produce large cost savings by future fracture prevention.

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Competing interests

The authors declare that they have no competing interests.

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