Osteoporosis Case Studies, 95–97[1]

The National Preferred Medicines Centre Inc (PreMeC) was established in 1991 by a dedicated group of doctors from throughout New Zealand, with an express mission: To promote best-practice, evidence-based prescribing, free and independent from political or commercial interference.

To that end, PreMeC has developed a network of people, a technological infrastructure, and proven methodologies which work in concert to provide a range of voluntary and confidential services designed to assist general practitioners in making the best, most rational use of medicines.

PreMeC case studies are designed to reflect typical conditions in general practice and provide valuable insights into the current consensus of prescribing preferences throughout New Zealand.

The collated results are returned to participants with clinical comments from invited general practitioners and specialists.

PreMeC case studies are available free of charge to all GPs.

PreMeC

[1] Date of study: September 2000; date of report: January 2001;

Osteoporosis 95: 958 general practitioners responded to this study

CASE STUDY

Mrs Jones, a 51-year-old Caucasian, presents with back pain and anxiety about osteoporosis. She admits to smoking 25 cigarettes a day. She is not particularly active and weighs 65kg. Her history reveals menarche at 13 years of age, she has never been pregnant and her last menstrual period was 18 months ago.

Dual-energy X-ray absorptiometry (DEXA) shows: lumbar spine bone mineral density of 85% of young adult mean, T score -1.5; femur 91%, T score -0.1.

Results: Number of respondents: n = 958

1. What INVESTIGATIONS (if any) would you order?

YES	% of GPs	NO
84%		16%

Summarised Investigations (% of GPs)

Laboratory tests	
Biochemistry	
Serum calcium	38%
Thyroid function test	25%
Lipids/cholesterol (fasting)	20%
Liver function test	20%
Phosphates	18%
Glucose (fasting)	16%
Vitamin D level, 25 OH-calciferol level	13%
Creatinine	12%
FSH/LH (ICSH)	11%
Thyroid-stimulating hormone	11%
Urea & electrolytes	9%
Alkaline phosphatase	7%
Renal function test	7%
Oestrogen, progesterone	6%
Protein electrophorese	5%
Urinalysis /mid-stream urine	4%
Electrolytes (sodium & potassium)	3%
Others	11%
Haematology	
Full/complete blood count	37%
Erythrocyte sedimentation rate	26%
Haemoglobin	2%
Cytology	
Smear	14%

Examination	
Blood pressure	13%
Breast examination	7%
Pelvic examination	4%
Back examination	3%
Full examination	3%
Body mass index	3%
Measure height	2%
History, lifestyle	
Family history	11%
Patient history	9%
Menopause, symptoms	3%
Osteoporosis/fractures history	3%
Alcohol, smoking	3%
Diet	3%
Others	3%
Special	
Mammogram	29%
X-ray	
Spine (not specified)	21%
Lumbar spine	19%
Thoracic spine	4%
Chest	15%
Lung function test	2%
Others	4%

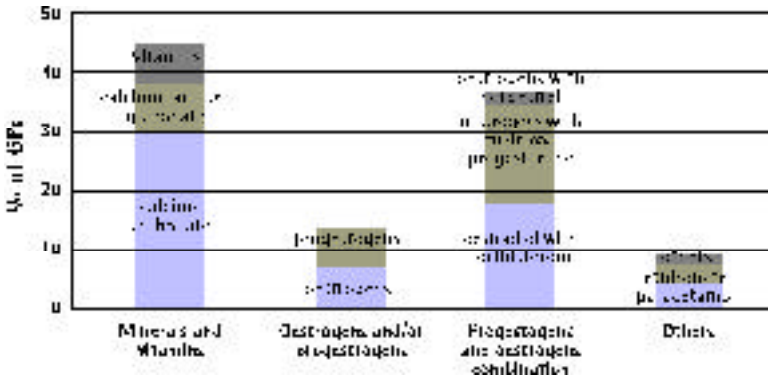
2. Would you WRITE A PRESCRIPTION?

YES	% of GPs	NO
68%		32%

2a) Reasons for not writing a prescription (% of GPs)

Lifestyle changes needed	11%
Discuss situation, options with patient	9%
Does not meet recommended criteria for medication	5%
Await test results, require further investigations	5%
Not currently within osteoporosis range	4%
Not specified	3%
Others	1%

2b) Medicines prescribed



2c) Prescription (% of GPs)

Agent	Calcium	Oestrogens plus progestogens*	Vitamins	Others	Total
Prescribed alone	13%	23%	<1%		36%
In combination with					
Calcium		15%	4%	5%	24%
Others		6%	2%		8%
Total	13%	44%	6%	5%	68%

* includes 38% as fixed oestrogen/progestrogen combination.

3. What ADVICE would you provide?

Summarised Advice (% of GPs)

Advice about the diagnosis and the prescription

HRT: discuss pros and cons, side effects	44%
DEXA: follow up in a few years	27%
Medication depends on patient, diet, results. Needs to be reviewed	17%
Return/review	15%
Regular mammography, breast examination, smear checks	9%
Green prescription	8%
Osteoporosis: discuss risk, give information, reassure	7%
Medication side effects - advise/explain	7%
Other advice on medication	4%
Others	4%

Dietary advice

Diet rich in calcium	48%
Dietary advice, not specified	19%
Diet rich in vitamin D	3%

Lifestyle advice

Smoking - stop	93%
Exercise	93%
Alcohol - decrease/stop	14%
Consider assistance with smoking cessation, e.g. nicotine replacement therapy	10%
Sun exposure	8%
Advise on ideal healthy body weight	5%

Professor Ian Reid

This woman presents with back pain and concern regarding osteoporosis. Each of these issues needs to be considered separately, since they are likely to be quite separate from one another. In addition, this consultation is an opportunity to address other issues regarding her general health status.

Back pain is a common reason for the diagnosis of osteoporosis to be considered. However, the process of osteoporotic bone loss is itself painless and only causes discomfort when it results in fracture or residual deformity after fracture. The history of an osteoporotic vertebral fracture is often characteristic (sudden in onset, severe, localised, gradual improvement over weeks). However, it is much more likely that this woman's back pain is mechanical or of non-osteoporotic cause, particularly in light of the fact that her bone density places her at low risk of fracture.

History-taking with respect to the back pain, plus appropriate investigation are the key initial actions, followed by an X-ray if this was thought to be indicated on the basis of the history and examination. If this shows no evidence of fracture, then she can be reassured that her pain is nothing whatsoever to do with osteoporosis. The X-ray may also rule out rarer but more serious causes of back pain, such as metastatic cancer.

Her anxiety regarding osteoporosis can be allayed on the strength of the bone density results provided. Both are well within the age-appropriate normal range, though in the spine her values are towards the lower end of normal.

Being normal, her bone density results do not suggest the need for investigation of causes of osteoporosis, nor a search for underlying abnormalities of calcium metabolism.

It should be remembered that some clinical risk factors provide useful information in assessing a patient's fracture risk, in addition to that provided by bone density measurement. Therefore, her personal history of fractures during her adult life and a maternal history of osteoporotic fractures should be enquired for. The presence of either of these (particularly a personal fracture history) would weight the balance in favour of intervention.

Her spinal bone density is at a level that she may enter the osteoporotic range (arbitrarily defined as a T-score < -2.5) within the next 5 - 10 years. Therefore, advice regarding osteoporosis prophylaxis is sensible.

The most important advice to her is to stop smoking, but increasing her exercise levels will also be helpful.

If there is no contraindication (i.e. history of renal calculi), then use of a calcium supplement is justified. There is some evidence that soluble calcium preparations (such as calcium lactate gluconate) are better absorbed than less soluble salts such as calcium carbonate, though this is not accepted by all authorities in the area.

Cost-effectiveness analyses suggest that the prescription of HRT in this context purely for osteoporosis prevention is not justified, though many doctors would use it. Similarly, the use of cyclical etidronate is probably not justified in an individual with a T-score of -1.5 and no history of fracture, though it would be in someone with a history of fracture or in someone with a T-score below the -2.0 to -2.5 range.

This consultation is an opportunity to address other health issues, including the institution of 2-yearly mammography in women over the age of 50. From the osteoporosis point of view, Mrs Jones' body weight of 65kg is perfectly satisfactory and attempts to lose weight are likely to result in small decreases in bone density and increases in fracture risk.

Professor Ian Reid
Department of Medicine
University of Auckland

Dr Marshall Donnelly

It is encouraging to see the number of respondents to these three cases (n=965-958). Few GPs would find these rare or uncommon in their daily practice.

Case 95

This is a classic consultation with two issues involving diagnosis and possible screening opportunities. Osteoporotic fractures are, in my experience, extremely painful and often of rapid onset. We have little history of this pain, and most respondents have focused on lifestyle intervention/history and further biochemical investigations – to their credit I believe.

Mrs Jones is in the "early phase" of bone loss. There is good justification to change her lifestyle to reduce her fracture risk and maintain her present bone density.

Thirty-two per cent of GPs would not prescribe, with over 50% of these citing lifestyle changes and discussing options with the patient. This again I believe is very important. HRT is the gold standard in preserving bone density, but many GPs are aware of the difficulties in instituting this in the present attitude to HRT.

With regard to smoking as a risk factor in osteoporosis, this would be considered a very "soft" risk factor. Nonetheless, few of us would recommend continuing smoking!

Many GPs have also taken the opportunity to do opportunistic screening – including mammography, cervical screening and blood pressure – again to their credit.

Marshall Donnelly is a General Practitioner in Dunedin.

Osteoporosis 96: 958 general practitioners responded to this study

CASE STUDY

Mrs Smith is a 75 year-old non-smoker who weighs 52kg. She is a farmer's wife and has been taking prednisone 3-10mg daily for the last five years for polymyalgia rheumatica in order to keep her mobile. Her blood markers are within the 'controlled' range on those doses.

She has a history of previous osteoporotic fractures but because of a change in primary caregiver, has not been reviewed for two years. She has previously taken calcitriol and cyclical bisphosphonate.

On investigation her DEXA scan lumbar spine bone mineral density is 53% of the young adult mean, T score -4.7; left neck of femur 76%, T score -1.9. These values are lower than those recorded two years ago.

Results: Number of respondents: n =958

1. What INVESTIGATIONS (if any) would you order?

YES	% of GPs	NO
81%		19%

Summarised Investigations (% of GPs)

Laboratory tests	
Biochemistry	
Serum calcium	53%
Serum phosphates	25%
Vitamin D level, 25 OH-calciferol level	23%
Thyroid function test	23%
Creatinine	18%
Glucose (fasting)	16%
Liver function test	15%
Renal function test	11%
Urea & electrolytes	11%
Thyroid-stimulating hormone	6%
Electrolytes (sodium & potassium)	6%
Alkaline phosphatase	5%
Lipids/cholesterol (fasting)	4%
C-reactive protein	4%
Parathyroid hormones	2%
Protein electrophorese	2%
Others	13%
Haematology	
Full/complete blood count	30%
Erythrocyte sedimentation rate	28%
Others	2%

Examination	
Full or partial examination	6%
Blood pressure	4%
History, lifestyle	
Patient history	8%
Lifestyle inquiries	4%
Special	
Spine X-ray	8%
Mammogram	3%
Other X-rays	2%
Others	2%

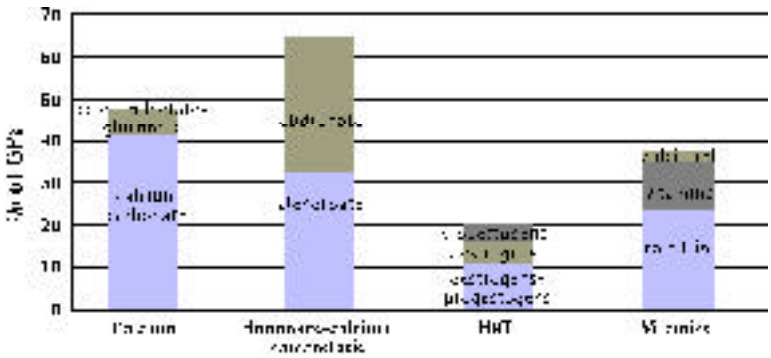
2. Would you WRITE A PRESCRIPTION?

YES	% of GPs	NO
88%		12%

2a) Reasons for not writing a prescription (% of GPs)

Refer to specialist	9%
Wait for test results, require further investigations	2%
Discuss situation with patient	1%
Other	1%

2b) Medicines prescribed



2c) Prescription (% of GPs)

Agent	Alendroate	Etidronate
Prescribed alone	14%	1%
In combination with		
Vitamin D alone	3%	5%
Calcium alone	6%	17%
Vitamin D + calcium	2%	4%
Vitamin D + hormones	1%	1%
Calcium + hormones	1%	2%
Calcium + vitamins	4%	3%
Other agents	2%	4%
Calcium (total)	**12%**	**25%**
Vitamin D (total)	**6%**	**10%**
Total number of prescriptions	33%	32%

Agent	Oestrogens plus progestogens*	Oestrogens progestogens combination
Prescribed alone	1%	3%
In combination with		
Vitamin D alone	<1%	1%
Calcium alone	1%	2%
Etidronate or alendroate alone	1%	1%
Etidronate or alendroate plus calcium and/or Vitamin D	1%	4%
Other agents	1%	1%
Total number of prescriptions	5%	10%

* Progestogens are mostly prescribed with oestrogens. Out of 48 oestrogen prescriptions, only 7 are prescribed without progestogens.

3. What ADVICE would you provide?

Summarised Advice (% of GPs)			
Advice about the diagnosis and the prescription		**Dietary advice**	
Decrease prednisone	39%	Diet rich in calcium	27%
Return/review, monitor progress	30%	Dietary advice, other	13%
Fosamax or didronel: to consider or refer to specialist	27%	**Lifestyle advice**	
Instructions on how to take medication	21%	Exercise	66%
DEXA: follow up in a few years	20%	Safety issues to prevent falls, body protections	28%
HRT to consider, discuss	12%	Sun exposure	12%
VitD: to consider or refer to specialist	10%	Alcohol - decrease/stop	8%
See other specialists	10%	Advise on ideal healthy body weight	7%
Biphosphates: to consider or refer to specialist	6%	Stop smoking	2%
Side effects - advise/explain Information about treatment	6%		
Calcium supplements to consider	4%		
Compliance with medication	3%		

Professor Ian Reid

Mrs Smith has a very high future risk of fracture based on her age, her low body weight, her continuing use of prednisone, her past history of fractures and her very low bone density.

Her bone density is below the age-appropriate normal range and therefore investigations are justified to seek out underlying causes of bone loss, in addition to her known low body weight and prednisone use. A reasonable list of investigations for someone with markedly reduced bone density would include: serum calcium, phosphate, alkaline phosphatase, liver function tests, creatinine, 25-hydroxyvitamin D, markers for coeliac disease, full blood count, thyroid function tests, and serum protein electrophoresis. Depending on the adequacy of documentation of the past fracture history, spine X-rays may also be appropriate.

The bisphosphonates, alendronate and risedronate are the therapies for both postmenopausal osteoporosis and steroid-induced osteoporosis which have the best documentation of anti-fracture efficacy. Hormone replacement therapy produces comparable changes in bone density, though side effects such as breast tenderness and vaginal bleeding have a very low acceptability to elderly patients. Cyclical etidronate is a further option though its effects on bone density tend to be less than those of alendronate. It has been shown to prevent vertebral fractures, but trials have not been carried out to assess its impact on other fracture types. Whichever of the above therapies is chosen, it would usually be combined with a calcium supplement of 1g per day. Calcium must be taken at a different time of day from bisphosphonates, since the two form an insoluble precipitate if administered together. Vitamin D deficiency is common in the elderly and supplementation with calciferol (e.g. Multivite 6, two tablets daily; or Calciferol 50,000 units, 1 tablet per month) should be provided in patients with serum 25-hydroxyvitamin D < 20 mcg/L.

Professor Ian Reid
Department of Medicine
University of Auckland

Dr Marshall Donnelly

Mrs Smith has significant osteoporosis and ongoing bone loss on the basis of her continued use of prednisone. She has a significant history of osteoporotic fractures and therefore is at significant risk of further fractures. Most GPs (81%) have considered investigating her further for secondary causes. Assuming these are normal, I would apply to use alendronate (Fosamax®) and give her 1g elemental calcium per day, and would consider giving multivitamin tablets. Thirty-nine per cent of GPs were concerned enough about the prednisone to suggest decreasing this, and 66% advised increasing exercise. Twenty-one per cent gave advice on how to take medication – particularly of importance in both calcium and bisphosphonates.

Marshall Donnelly is a General Practitioner in Dunedin

Osteoporosis 97: 952 general practitioners responded to this study

CASE STUDY

Mrs D is a 76 year-old smoker who weighs 70kg. Because of repeated falls, COPD, congestive heart failure, ischaemia and transient ischaemic attacks she is now living in a supervised rest home. Her medications include, among others, a thiazide diuretic, thyroxine and warfarin. She seldom goes out of the building complex and is not encouraged to move about because of her tendency to fall. The staff at the rest home are worried that she will break her hip one day.

Results: Number of respondents: n=952

1. What INVESTIGATIONS (if any) would you order?

YES	% of GPs	NO
92%		8%

Summarised Investigations (% of GPs)			
Laboratory tests		*Haematology*	
Biochemistry		Full/complete blood count	37%
Thyroid function test	47%	Erythrocyte sedimentation rate	11%
Serum calcium	42%	Haemoglobin	3%
Vitamin D level, 25 OH-calciferol level	28%	Prothrombin ratio/time	2%
Creatinine	26%	**Special**	
Electrolytes (sodium & potassium)	25%	DEXA	36%
Urea & electrolytes	23%	Bone density scan	32%
Serum phosphates	19%	INR	28%
Thyroid-stimulating hormone	15%	Chest X-ray	8%
Glucose (fasting)	15%	Spine X-ray	6%
Liver function test	13%	Electrocardiogram	6%
Renal function test	12%	Others	4%
T4, T3	8%	**Examination**	
Lipids/cholesterol (fasting)	6%	BP - blood pressure	18%
Alkaline phosphatase	3%	Partial examination	7%
Protein electrophorese	3%	Full examination	3%
Vitamin B12	2%	**History, lifestyle**	
Iron/ferritin (Fe)	2%	History of patient (disease, medication)	3%
Urea	2%	Family history (osteoporosis)	3%
Urinalysis /mid-stream urine	2%	Fall causes	3%
Folic acid	2%	Diet, lifestyle	2%
Others	11%		

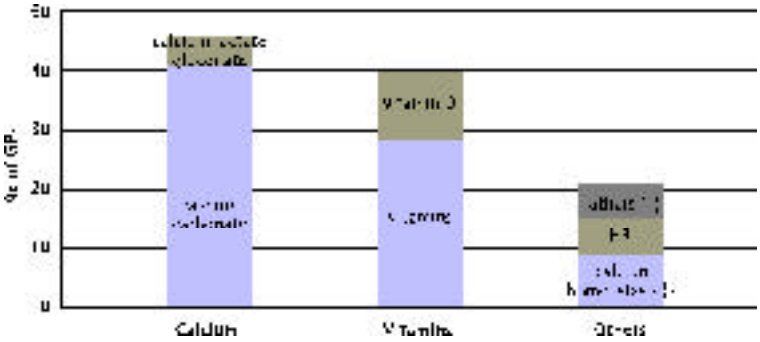
2. Would you WRITE A PRESCRIPTION?

YES	% of GPs	NO
62%		38%

2a) Reasons for not writing a prescription (% of GPs)

Wait for test results	19%
No need, wouldn't benefit from medication	9%
Require further investigations	6%
Non medical solution more suitable	3%
Discuss options, situation with patient	1%
Refer to specialist	2%
Others	2%
Not specified	3%

2b) Medicines prescribed



(1) aspirin mainly, diuretics, ACE inhibitors
(2) etidronate, alendroate

2c) Prescription (% of GPs)

Agent	Calcium
Prescribed alone	12%
In combination with	
Vitamins	17%
Vitamin D	2%
Calcium homeostasis	5%
Calcium homeostasis and vitamins or vitamin D	2%
HRT	1%
HRT and vitamins or vitamin D	2%
Others	3%
Total number of prescriptions	45%

3. What ADVICE would you provide?

Summarised Advice (% of GPs)			
Advice about the diagnosis or the prescription		**Dietary advice**	
Thiazides: stop, replace, review	18%	Diet rich in calcium	17%
Warfarin: stop, review	8%	Dietary advice, other	11%
Return/review	8%	Advise on healthy body weight	4%
Advice about the medication	5%	**Lifestyle advice**	
Refer to specialists	4%	Smoking - stop	49%
Others	13%	Exercise	35%
Consider the medication		Sun exposure	32%
Medication depends on results	21%	Physiotherapy	11%
Consider biphosphonate	11%	Enjoy life	1%
Consider calcium supplement	7%	**Safety advice**	
Consider vitamin D supplement	6%	Hip protector, clothing protection	29%
Consider HRT	6%	Supervised exercise	27%
Consider multivitamins	2%	Mobility aids, walker	23%
Consider ACE Inhibitor	2%	Create safe environment	15%
		Educate staff	5%
		OT for assessment of mobility	5%

Prof Ian Reid

Investigations are appropriate to determine why Mrs D has such a high frequency of falling and to assess the likelihood of her sustaining a fracture as a result of these falls. Fall frequency can be decreased by adjusting medication to avoid postural hypotension, by correcting vision impairment, and by removing hazards in the home environment (e.g. power cords, loose rugs etc.). Depending on the circumstances of the falls, the possibility of cardiac arrhythmias or neurological disease including epilepsy, may need to be considered. Mrs D has a number of risk factors for osteoporosis, including smoking and COPD. Therefore, measurement of bone density is important, the proximal femur being the most important site for bone density assessment in this age group. It would also be important to ensure that she is not overreplaced with thyroxine (i.e. that TSH is normal) and that if warfarin therapy is necessary, that it is well controlled. If she seldom ventures outdoors she is almost certainly vitamin D deficient and this should be verified by measurement of serum 25-hydroxyvitamin D. Vitamin D deficiency causes myopathy and will itself contribute to falls. If she requires vitamin D replacement then Multivite 6, two tablets/day or Calciferol 50,000 units/month are both acceptable regimens. Vitamin D replacement together with calcium supplementation in this age group reduces the incidence of hip fractures by about one quarter.

If osteoporosis is documented on bone density scans, then treatment of this is appropriate. Bisphosphonates (e.g. etidronate, alendronate, risedronate) are the most commonly used agents in this age group, though HRT can also be successfully used if it is given in a continuous combined regimen (i.e. oestrogen plus progesterone) and is introduced gradually to avoid oestrogenic side effects. The wearing of hip protectors is a non-pharmacological way of reducing hip fractures in patients who are falling frequently. Based on the limited trial data available, fractures are extremely uncommon in people wearing hip protectors. Maintaining compliance is the main problem with their use. Appropriately tailored exercise programmes can reduce fall frequency in patients such as Mrs D. Leg strengthening exercises and exercise to improve balance can be carried out with minimal supervision.

Professor Ian Reid
Department of Medicine
University of Auckland

Dr Marshall Donnelly

Again we have a patient with significant risk factors of fracture, but no current investigation to manage her bone density. A dexa scan is essential – and I agree with most GPs (92%) that further investigations are appropriate. This lady is at significant risk because of the active discouragement to exercise/bear weight. Her repeated falls are most likely a combination of factors and it will probably require a multidisciplinary approach to reducing these.

Eighty-two per cent of GPs would not prescribe – I would have to disagree. This lady has likely Vitamin D deficiency and would benefit from calcium if insufficient in her diet. Again the appropriate advice of stopping smoking, improving exercise and safety advice has been well adhered to.

Summary

I am extremely impressed at the number of respondents and the quality of decisions made in these cases.

Osteoporosis and its ramifications are well known to us and are likely to impose significant economic risk and disability in our ever-aging population. From the quality of responses I believe we will make significant inroads to treating this condition.

Marshall Donnelly is a General Practitioner in Dunedin.
