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Building research capacity at The University of Notre Dame Australia (Notre Dame) School of Medicine, Sydney, to improve chronic disease management

Final Project Report

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ACKNOWLEDGEMENTS

This research is a project of the Australian Primary Health Care Research Institute, which is supported by a grant from the Australian Government Department of Health. The information and opinions contained in it do not necessarily reflect the views or policy of the Australian Primary Health Care Research Institute or the Australian Government Department of Health.

CITATION

Harding, C., McGirr, J. Hespe, C. Seal, A., Anderson-Wurf, J., and Elliott-Rudder, M., (2016). Building research capacity at The University of Notre Dame Australia (Notre Dame) School of Medicine, Sydney, to improve chronic disease management – Final Project Report. APHCRI: Canberra, the Australian Capital Territory.

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Introduction

In July 2014, an agreement was signed between The Australian National University and The University of Notre Dame Australia (Notre Dame) for the project 'Support for developing research capacity in Primary Health Care.' This building research capacity project enabled the employment of two post-doctoral research fellows each appointed at 0.4 FTE and based at the Notre Dame Rural Clinical School (RCS) at Wagga Wagga. The researchers primarily focused on three research studies:

- > Study 1: Evaluation of attitudes and beliefs of doctors on osteoporosis management in the primary care setting,
- > Study 2: "Mind Your Bones"- A targeted educational intervention to increase osteoporosis diagnosis and treatment in residential community facilities, and
- > Study 3: Analysis of GP databases for osteoporosis in diagnosis and treatment records.

The building research capacity project has helped to develop Notre Dame's organisational skills to undertake primary care research, it has improved grant writing capacity of the organisation and, in doing so has also strengthened links with local organisations. The first section of the report discusses the impact on the organisation in terms of improved capacity to undertake primary care research, increased grant writing capacity and improved linkages with primary care and the community. The second section of the report discusses the background to project and the challenges faced with implementation. The third section of the report discusses the three research studies listed above that were undertaken as part of the project.

DEVELOP THE ORGANISATIONAL SKILLS TO UNDERTAKE PRIMARY CARE RESEARCH

In addition to the three studies listed above, adding the post-doctoral research fellows to the staff of the RCS School of Medicine Sydney has helped to build the capacity of the organisation to undertake primary care research. The RCS has a number of other primary care projects which the additional support provided by these researchers has helped to progress. These include research into general practitioner (GP) and GP registrar intentions for future practice, undertaken with the support of the GP training program for the region and a needs assessment in relation to service provision for refugee health, which was undertaken with the support of the Murrumbidgee Local Health District (MLHD). Two other projects, a musculoskeletal project and exploration of the attitudes of Parkinson's disease patients towards their disease and rural services, have required input from the Murrumbidgee Primary Health Network (PHN). These have improved links with these organisations as well as, increasing capacity and skill within the school for primary care research. In addition to building research output in primary care, the building research capacity project also developed and strengthened links with local organisations in conducting joint research such as MLHD, Western Sydney Local Health District (WSLHD) and Murrumbidgee MPHN. It developed the capacity of the organisation to undertake primary care health research, specifically by improving the capacity of researchers but also by developing and promoting a research culture.

DEVELOP GRANT WRITING CAPACITY

The employment of the post-doctoral researchers has increased the grant writing capacity of the organisation. The building capacity project has led to successful grants with the Murrumbidgee PHN, one for \$71,000 (contract signed) for the evaluation of a 'Vitality Program,' and a second for a further project involving evaluation of a cancer education program within the Murrumbidgee PHN for funding of \$18,000 (contract pending).

A further grant application, undertaken in conjunction with MLHD, WSLHD, Multicultural Council of Wagga Wagga and Settlement Services International Ashfield (SSIA) has been submitted to NSW Translational Grants Scheme second round, 2016. In addition, discussions are currently underway for a grant application to be undertaken in conjunction with Riverina Dental and Medical Aboriginal Corporation (RivMed) to support that organisation with evaluation of a smoking cessation program in aboriginal health.

However, a number of unsuccessful grants were also submitted. In 2015, grant applications for funding of a project, *"Mind Your Bones" – promoting healthy ageing through the development and trial of an educational program to prevent fracture through the appropriate prevention and /or treatment of osteoporosis in retirement community dwelling older Australians* were submitted to: Wicking Trust EOI 2015, IRT Foundation Research Grant 2015, HCF Research Foundation EOI 2016, and Arthritis Australia National Research Program 2016.

In addition, an unsuccessful submission was made to the RACGP Therapeutic Guidelines Research Grant Program with title, *Evidence based antenatal care in rural and regional general practice: how are guidelines used, and how do doctors want them presented?*

IMPROVING LINKAGES

Working with organisations such as Murrumbidgee Local Health District (MLHD) and Murrumbidgee Primary Health Network (PHN) to develop research projects has strengthened research capacity in primary health care by strengthening the linkages between Notre Dame and these organisations.

Discussions with community organisations such as RivMed, Multicultural Council of Wagga Wagga and SSIA around joint concerns in the process of grant writing has also strengthened these community links. Study 2, discussed in greater detail below, was undertaken at a community aged care residential service, again improving community links while undertaking primary care research.

Background and Methods

The University of Notre Dame Australia, School of Medicine Sydney (Notre Dame), is a relatively young medical school with a strong focus on developing research in primary care and rural health.

The School of Medicine Sydney has seven clinical schools, three in Sydney (St Vincent's Hospital, Auburn and Hawkesbury); one in Melbourne (Werribee) and one Rural Clinical School (RCS) at each of Lithgow, Wagga Wagga and Ballarat. The two post-doctoral researchers employed under this project were primarily based at the RCS in Wagga Wagga.

As previously stated, the agreement between The Australian National University and The University of Notre Dame Australia for the project, *Support for developing research capacity in Primary Health Care*, was signed July 2014. APHCRI funding supported the employment of the equivalent of a 0.8 FTE post-doctoral research position at the School of Medicine, Sydney. This was filled by two 0.4 FTE positions, primarily located at the RCS in Wagga Wagga.

The School of Medicine, Sydney matched APHCRI funding (\$91,778 over 2 years) to co-fund the research positions. The post-doctoral researcher associated with studies 1 and 2 held the qualifications of Bachelor Applied Science (Speech Pathology) 1980 La Trobe University (Melbourne), Bachelor of Primary Education Studies (Charles Sturt University, 1999) and PhD - Rural Health (University of New South Wales, 2012). The post-doctoral researcher associated with study 3 held the qualifications of MBBS, PhD (University of New South Wales, 2012), Fellowship Royal Australian College of General Practitioners (2002), and a Graduate Diploma of Rural General Practice (2003).

Contracted activities and milestones for the studies were on target for completion by March 2016 and research activities to that date had involved two studies, *Evaluation of attitudes and beliefs of doctors on osteoporosis management* and *Analysis of GP Databases for Osteoporosis diagnosis and treatment records*. Unexpended funds, primarily because of delay in commencement of the program, allowed extension of the building capacity program to include study two listed below and an expansion of study one by interviewing GPs and orthopaedic surgeons about their attitudes to osteoporosis management in primary care for completion at 31st October 2016.

- > Study 1: Evaluation of attitudes and beliefs of doctors on osteoporosis management in the primary care setting
- > Study 2: "Mind Your Bones" - A targeted educational intervention to increase osteoporosis diagnosis and treatment in residential community facilities, and
- > Study 3: Analysis of GP databases for osteoporosis in diagnosis and treatment records.

The use of unexpended funds was approved to allow the development of Study 1, exploring the attitudes and beliefs of doctors on osteoporosis management,

The primary focus of the research was to explore the optimum management of chronic disease with a primary focus on osteoporosis management systems, the impact of the ageing population and the incidence of falls on the impact of osteoporosis.

POST-DOCTORAL FELLOWS BASED AT THE SYDNEY SCHOOL OF MEDICINE WAGGA WAGGA RURAL CLINICAL SCHOOL

As previously stated, the two post-doctoral research fellows were based at the Wagga Wagga campus RCS. The small size of the campus and the distance from the School of Medicine Sydney provided challenges in terms of supervision and development of the program. In addition, the RCS is a relatively new unit, established in 2011 for clinical teaching for medical students in a rural location; as such it was only beginning to develop its research capacity. These challenges were overcome by having qualified, enthusiastic staff who saw the establishment of capacity within primary care research as an important objective of the RCS. Additional support to the program was provided through scheduled regular meetings with external support, such as that provided by Professor Louis Pilotto (Conjoint Professor, UNSW Rural Clinical School). In addition, the use of videoconference and information and communication technology, along with appropriate funding for travel, allowed strong supervision and support from experienced researchers based in Sydney.

The involvement of the local primary care organisation, the Murrumbidgee Medicare Local, was impacted by the restructure of the primary care system, with Medicare Locals moving to become PHNs. However, the transition has been managed actively with excellent communication and has led to the successful negotiation of grant funding with the Murrumbidgee PHN.

DEVELOPMENT AND SUPPORT OF POST-DOCTORAL RESEARCH FELLOWS

An important part of this project was seen to be the development of the capacity of the organisation by improving research skills of the individuals. This is particularly important for rural based workers.

Notre Dame Rural Clinical School supported the professional development of these research staff in terms of financial support, organised travel and accommodation and time. Both researchers attended research methods workshops on *Information Skills for Researchers, Maximising your Research Impact, Getting Published, Grant Writing and statistical analysis with SPSS and qualitative analysis using NVivo*.

One of the post-doctoral researchers presented her research at the Auburn Research Symposium. This provided the opportunity to network with researchers, including those from the Sydney faculty, and to develop links with researchers at the Western Sydney Local Health District (WSLHD). This link proved valuable in the completion of a joint submission with MLHD and WSLHD for the second round of funding for the Translational Research Grants.

The continued appointment of this researcher has been made possible by a successful grant tender. The researcher will be presenting the findings from project 1 on attitudes and beliefs of osteoporosis management as a poster presentation at the 2016 NSW Rural Health and Research Congress in early November and at the Charles Sturt University Health and Biomedicine 2016 symposium in late November.

The other post-doctoral researcher was supported by the university to attend the PHCRIS conference in June 2016 where she had the opportunity to present a poster, and receive feedback on their research, *Older people and fracture prevention in general practice, Is reform needed?*¹ This researcher also had the opportunity to build on previous experience and present the findings of their doctoral research, exploring ways of improving breastfeeding through motivational interviewing in the general practice setting using the skills of practice nurses at the Australian Practice Nurse Association Conference in Melbourne on 5th May 2016.

Research Studies Developed

Three major research studies were undertaken with the developing capacity project funding,

- > Attitudes and beliefs of rural and regional general practitioners and orthopaedic specialists towards osteoporosis treatment and management in primary care
- > Piloting an intervention for osteoporosis disease prevention, management and treatment in retirement community residents, and
- > Older people and fracture prevention in general practice: Is reform needed?

The final study involved an audit of general practice database to explore the use of medical records to gain information about management of osteoporosis in general practice.

OSTEOPOROSIS AS A CHRONIC HEALTH ISSUE

Osteoporosis is a chronic condition of reduced bone strength which is undertreated and under-recognised in Australia². This under-treatment leads to preventable fractures that occur with minimal trauma, minimal trauma fractures (MTF). These fractures, which result from a fall from a standing height or less, that would not be expected to fracture a healthy bone, are an indicator of high risk for subsequent fracture³. It is estimated that, in Australia, these fractures are experienced by 50% of women and 30% of men across their lifetime⁴ and are associated with high morbidity, mortality and health system expense⁵ with costs estimated for Australians in 2012 to be \$2.75 billion³. Treatment is effective⁶. In high-risk women, bisphosphonates prevent vertebral fracture (NNT=20) and hip fracture (NNT=22)⁷. Despite this, many patients receive no treatment for osteoporosis⁷.

Health departments in several Australian states have published strategies to improve osteoporosis care and The Royal Australian College of General Practitioners has developed evidence based guidelines for the diagnosis and treatment of osteoporosis⁹. Harrington¹⁰ describes a “Bermuda Triangle of osteoporosis care,” where orthopaedic surgeons do not investigate, or initiate, treatment of osteoporosis, yet GPs are not informed that patient fractures have occurred. One approach to solving this issue has been the establishment of fracture liaison services (FLS). While this may be a promising solution in metropolitan areas, health services in regional and rural locations may not have the capacity to operate a comprehensive FLS¹¹ and this solution neglects the potential role of primary care services.

Prevention and early diagnosis are critical to the optimum management of osteoporosis in the primary care setting. In addition, there is no clear flow of information about presentations with MTFs between hospital and general practice. Current hospital discharge summaries often fail to highlight the need for ongoing management.

The significance of osteoporosis, as a chronic health problem within primary care, led to its being addressed by the research studies undertaken by the post-doctoral research fellows employed with the APHCRI grant funding given to The University of Notre Dame, School of Medicine, Sydney. Each study is discussed separately.

Study 1 – Attitudes and beliefs of rural general practitioners (GPs) and regional orthopaedic surgeons towards osteoporosis treatment and management in primary care

The first study undertaken explored attitudes and beliefs towards osteoporosis management in primary care. In rural and regional areas the role of health professionals in osteoporosis diagnosis, treatment and management is unclear. There is a concern that GPs are often not informed that a fracture has occurred.

This study used a mixed methods design consisting of two postal questionnaires and a series of twelve semi-structured interviews. Following a review of the literature, a 17-item questionnaire was developed for GPs and a 14-item questionnaire was developed for orthopaedic surgeons designed to elicit their opinions about the general management of osteoporosis following MTF and the roles and responsibilities of health personnel. The questions were predominantly multiple choice requiring either single or multiple ranking responses. Seven common questions were asked of both groups, while remaining questions were specific to either GPs or orthopaedic surgeons.

Questionnaires were mailed to 203 rural GPs in the Murrumbidgee LHD (eliciting 35.5% response rate) and to 69 orthopaedic surgeons across rural and regional south east Australia (eliciting a 60.8% response rate).

The second stage of the study involved six semi-structured interviews conducted with purposively sampled GPs practicing within Wagga Wagga and surrounding rural centres within the MLHD. Participants for orthopaedic specialist interviews were selected from 3-4 different regions around regional NSW, including New England, Southern Highlands, Riverina and from Northern Victoria. Interviewees from three different regions, and varying types and location of practice were selected to enable as wide a range of views as possible to be collected (Table 1). In particular, the study explored their attitudes to, responsibility for, and management of osteoporosis in a primary care setting. All interviews were recorded using a portable recording device and transcribed in full for analysis.

The post-doctoral research fellow travelled to all centres and conducted face-to-face interviews with medical practitioners and recorded responses. Data from interviews were analysed using qualitative methodologies, and NVivo software, and main themes were then compared with survey data.

Table 1: Demographics of interview participants

	Specialty	Location	Gender	Place of interview	Interview Duration
1	GP - group practice	Rural town	F	Consulting room	33 mins
2	GP - group practice	Regional city	M	Consulting Room	55 mins
3	GP - solo practice	Rural town	M	University office	45 mins
4	GP- group practice	Regional city	F	University office	42 mins
5	GP - group practice	Regional city	M	Consulting room	21 mins
6	GP - group practice	Rural town	F	Consulting room	33 mins
7	Orthopaedic Surgeon	Hunter region	M	Home	30 mins
8	Orthopaedic Surgeon	Hunter region	F	Consulting room	43 mins
9	Orthopaedic Surgeon	Murrumbidgee region	M	Consulting room	22 mins
10	Orthopaedic Surgeon	Albury –Wodonga region	M	Home via Skype	31 mins
11	Orthopaedic Surgeon	Murrumbidgee region	M	Consulting room	28 mins
12	Orthopaedic Surgeon	Albury-Wodonga region	M	Consulting room	35 mins

Results – Survey Data

Ninety four percent of GPs and 67.5% of orthopaedic surgeons ($p<.001$) thought that the most appropriate health care professional to initiate discussion about osteoporosis was the GP. There was a significant difference between GPs and orthopaedic surgeons about whose role it was to assume leadership in the osteoporosis diagnosis ($p=0.006$). Three quarters of GPs felt that they should assume leadership in osteoporosis diagnosis whereas only 42.5% of orthopaedic surgeons agreed that GPs should take that role ($p=0.001$). Thirty-three percent of orthopaedic surgeons thought that it was their role to diagnose osteoporosis (Figure 1).

There was agreement between the orthopaedic surgeons and the GPs about whether a discussion by the orthopaedic surgeon about osteoporosis following a minimal trauma fracture (MTF) would improve patient compliance with management. Ninety-seven percent of the GPs and 81% of the orthopaedic surgeons either agreed, or strongly agreed, that if the orthopaedic surgeon discussed osteoporosis following a MTF the compliance was improved.

All respondents were concerned about the existing quality of care in terms of the co-ordination of osteoporosis care. Seventy percent of all respondents considered that the quality of co-ordination of osteoporosis patient care between hospital and general practice was either unsatisfactory or poor. Ninety-nine percent of GPs either agreed or strongly agreed that they would initiate an osteoporosis workup if it was indicated in the patient follow-up letter from the orthopaedic surgeon and 50% of orthopaedic surgeons stated that

the main reason they did not order a BMD scan was the belief that it was best left to the patient's GP.

GPs were asked if they felt there was a need for increased primary care education about osteoporosis and one third thought limited information was available, 21% felt that information was available but not accessed. A similar proportion of orthopaedic surgeons indicated that there was a need for primary care education. Orthopaedic surgeons were asked if they felt there was a need for more education for orthopaedic surgeons about osteoporosis management following MTF and 26% stated they felt limited information was available, 53% felt plenty of information was available, while 12% agreed there was plenty of information available but not accessed.

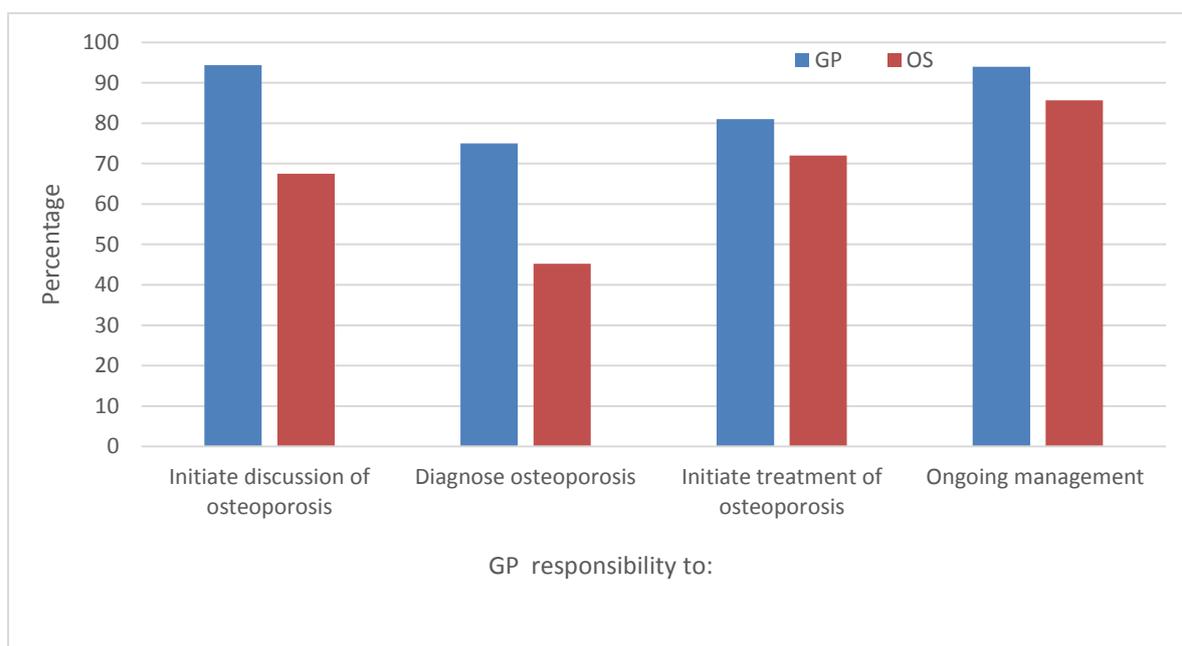


Figure 1: Comparison between GPs' and orthopaedic surgeons' (OS) views on the role of the GP in the osteoporosis care cycle.

Discussion of Results – Interview Data

The twelve interview transcripts were read by two members of the research team and coded into 27 free nodes using open coding in N-Vivo. After reading a summary of the nodes, axial coding occurred where some nodes were expanded or collapsed which resulted in final code reduction to twelve categories. These were further reduced to the final six categories which reflected the main themes of the interviews (Table 2).

Interviews with GPs and orthopaedic surgeons confirmed that both groups felt osteoporosis was an important problem, as one orthopaedic surgeon said, *“It's huge! Three quarters of your bony trauma would be osteoporotic.”* GPs and orthopaedic surgeons agreed that osteoporosis is a disease which affects a large portion of the population with significant effects on patient health and morbidity. Orthopaedic surgeons were concerned about the cost to the health system *“If you can stop them breaking bones when they fall ...they are still going to die but the consumption of health dollars will be decreased”* and admitted it is often overlooked in their discussion with patients following MTF as osteoporosis is *“not in the*

foreground so it's hard to sell". GPs also recognised that its "likely to be forgotten about" due to limited consultation time and if patients present with multiple co-morbidities, osteoporosis is not regarded as high in importance. "People don't die from it in a really dramatic fashion therefore it's not one of those things that you are really worried about in your targets".

Table 2: Summary of codes extracted from interviews

Raw data themes	Higher order themes
Importance of osteoporosis to GPs Importance of osteoporosis to orthopaedic surgeons Importance of osteoporosis to patients Culture of practice Barriers for orthopaedic surgeons	Importance of osteoporosis
Role of orthopaedic surgeons Role of GP What orthopaedic surgeons think GPs should do What GPs think orthopaedic surgeons should do First contact Use of Endocrinologist	Perceptions of roles
Who should diagnose Testing Use of FRAX calculator Need for earlier diagnosis Diagnosis of osteoporosis	Diagnosis of osteoporosis
Balancing treatment options Confusion over treatment Medications Elderly patients Barriers for patients Barriers for GPs	Treatment of osteoporosis
Communication from hospital to GP Communication between orthopaedic surgeon and GP Communication between orthopaedic surgeon and patient Public versus private patients	Communication
Systems approach	Enablers

There were conflicting comments about GP and orthopaedic surgeon roles in management. Another orthopaedic surgeon stated, *"I write a letter about what I've done with the patient but I can't remember the last time I would have mentioned about screening for osteoporosis,"* and as a GP also noted, *"at least a discussion about osteoporosis and a discussion about management options [by the orthopaedic surgeon] would be great."* Another problem raised by the GPs was that of competing priorities. One GP commented that *"it's not that I'm not interested [in osteoporosis], I just don't have time to do that."*

The study results suggested that communication was a particular problem. As one orthopaedic surgeon noted in an interview, *"the gap in the information is enormous because public hospitals are not really designed and oiled to get that information back to the GPs."*

GPs are not routinely receiving the message, either from the hospital or the orthopaedic surgeon that the patient has had a MTF, so do not know to investigate osteoporosis. Both

GPs and orthopaedic surgeons agreed that patient compliance could be improved if the orthopaedic surgeon raised the osteoporosis issue with the patient who had experienced a MTF, but none of the orthopaedic surgeons interviewed routinely did this. Although orthopaedic surgeons were cognizant of this, it does not always translate into the reality of everyday practice as one orthopaedic surgeon stated, *“The main thing is that the GPs have to know that the patient has had a fracture so we have to get that message back in timely fashion.”*

Significant gaps still exist in osteoporosis follow-up in the care cycle following MTF in rural and regional areas. Clearer roles and responsibilities among health professionals need to be established as a means of closing the gap. GPs felt that they should be responsible for the ongoing management of osteoporosis, and orthopaedic surgeons agreed, but further research is needed to address the problems of communication. If GPs are not informed that a MTF has occurred then the gap cannot be addressed. Further research needs to address these gaps in communication and to improve the links between hospital-based medicine and primary care.

Results will be presented at the 2016 NSW Rural Health and Research Congress in early November: *‘Attitudes and beliefs of rural general practitioners and rural orthopaedic surgeons regarding the treatment of osteoporosis following a Minimal Trauma Fracture’*. Results will also be presented at the Charles Sturt University Health and Biomedicine 2016 symposium in late November. In addition, a manuscript *‘Orthopaedic surgeons’ attitudes to osteoporosis investigation and management after minimal trauma fracture (MTF)*, has been submitted for peer review and accepted for publication¹², and an additional manuscript documenting the opinions of GPs is in preparation.

Study 2 – “Mind Your Bones”- A targeted educational intervention to increase osteoporosis diagnosis and treatment in residential community facilities

Discussion with community stakeholders, and the extra time allowed through the extension of the project, led to the development of a second research study, an intervention to increase osteoporosis diagnosis and treatment in a residential aged-care community facility in Wagga Wagga. It sought to answer the research question, *Can a targeted educational intervention increase the knowledge, identification and treatment of osteoporosis in a retirement village community?*

Background

Despite publication of clinical guidelines by the Royal Australian College of General Practitioners⁹ in 2010, instigation of public health campaigns³ and education for medical professionals¹³⁻¹⁶, a considerable gap still remains in consumer knowledge about osteoporosis as a chronic disease, its consequences and prevention strategies¹⁷.

A 2012 study by Otmar *et al.* in Geelong¹⁸ and a Danish study by Rothman *et al.*¹⁹ showed that patients with osteoporosis displayed limited knowledge about the disease and they did not consider it to be very serious even though there is significant evidence that following a first fracture the risk of subsequent fracture increases two to three fold²⁰. Despite having incurred a minimal trauma fracture, patients struggled to comprehend the severity of the disease as it presents with no symptoms.

An Australian study in 2012²¹ which assessed elderly patients' knowledge of osteoporosis after hospital admission for fracture found that "*current strategies for patient education in osteoporosis did not result in increased patient knowledge about their disease.*" Analysis of patient perceptions of osteoporosis care, in an attempt to identify patterns in health care decision-making, found it required a synthesis of immediate issues gathered from a variety of sources²². Information received from family history, personal information, information from friends and other influential persons changed cognition and provided the impetus for action²².

Otmar *et al.*¹⁸ as part of the Geelong Osteoporosis Study (GOS), have suggested that public health messages to motivate behavioural change targeted at the large numbers of people at risk of osteoporosis outside of community health and hospital settings may be more effective than attempting to provide medical therapy. They concluded that "*consumer knowledge, understanding, attitudes, and behaviours regarding osteoporosis need to be improved to reduce its vast health burden.*" Hosking *et al.*²³ delivered a community-based information session to translate guidelines for osteoporosis prevention into lay terms and concluded that the provision of easily accessible messages to the community can positively influence change regarding osteoporosis prevention.

Research into patient experiences and behaviour has centred upon effecting change after a fracture has occurred and, rather than waiting for a fracture to occur, health care professionals need act early to address this problem. An osteoporosis prevention education program, *Mind Your Bones* was developed, piloted and evaluated involving community dwelling adults over the age of 55 to address the issue.

Method and Study Implementation

This study explored whether individual goal setting, in the context of a retirement village community, could improve strategies to strengthen bones in an aging population and help to prevent osteoporosis. The program was aimed at increasing knowledge and awareness of the disease, and providing strategies for maintaining strong bones and healthy independent living.

An innovative approach was utilised by partnering with a retirement village community to develop a highly focused, individualised, action program aimed at improving bone health and independence by developing individual bone health plans. Working in collaboration with residents in a retirement village community, the program used peer support and feedback to create a physical and social environment that reinforces positive healthy behaviour change. Invitations were distributed in letterboxes to 170 residents informing them of the project and inviting them to an osteoporosis education/information session which 60 people attended. Osteoporosis-specific health information was delivered and a range of individual osteoporosis prevention strategies for residents were discussed. The pilot intervention was outlined and participants were invited to attend an individual bone health goal setting session at a future date.

Thirty residents attended for these follow up individual sessions with researchers where they completed a baseline knowledge assessment about osteoporosis questionnaire and had their fracture risk calculated using the Garvan FRAX calculator²⁴. This enabled residents to make informed decisions about their bone health in their "bone plan" based upon understanding their individual fracture risk and the facts about osteoporosis. All participants were given a copy of their personal goals and their FRAX results.

After two months, all 30 participants were invited to a follow-up information session to encourage maintenance of their goals and 13 residents attended. The final follow-up session at six months involved an individual interview with each participant to: (1) complete a post-test knowledge survey; (2) evaluate the effectiveness of their goalsetting and (3) evaluate feedback on how well were they able to meet their individual goals.

Results and Discussion

Twenty three females and seven males aged between 66 years and 91 years (average age: 78 years) participated in the pilot study with six couples attending. The females ranged in weight from 53 – 85 kilograms, and the males weighed between 65 – 107 kilograms. Half (15/30) had discussed osteoporosis with their GP previously and 47% (14/30) indicated they were on some form of treatment for osteoporosis, either calcium supplements, Vitamin D medication, bisphosphonates or a combination of all three.

Participants were encouraged to select osteoporosis goals that were relevant to their individual needs and included,

- > visiting the GP to discuss osteoporosis
- > being tested for BMD
- > commencing vitamin D medication
- > incorporating more calcium rich foods into their diet, and
- > increasing weight bearing exercise.

Results from the knowledge survey showed that participants had varied levels of understanding about osteoporosis and even those diagnosed and on treatment benefited from increased knowledge about the disease. Feedback from participants at the midpoint follow-up session showed that several residents had followed up with their GP for Bone Mineral Density (BMD) scans with some commenced on osteoporosis medication or discussed having their Vitamin D level checked at the next blood test.

Evaluation of the participants' goals after six months showed that talking to the GP about osteoporosis and undergoing BMD testing were more easily achieved than maintaining changes to exercise goals. Feedback from residents showed that the mid-point follow-up session which focused on sustaining Vitamin D levels in winter and demonstration of some weight bearing exercises that could be carried out inside the home were helpful in sustaining good bone health habits. One participant commented that the session "*helped us to keep on track and brought us back to reality.*" However, at the six-month point, many residents commented on the difficulty in "*trying to make it [weight bearing exercise] a normal part of the day*".

Overall, retirement village residents were very positive about the intervention and achieved changes in their individual goals. As one participant reflected, "*I am doing more exercise than I was before the program.*" and another commented, "*I didn't always follow up but it makes me think to move more*". Feedback received indicated they found the information about diet, weight bearing exercise and medication to help maintain bone strength delivered in the initial information session very helpful and easy to understand. The midway follow-up session which provided opportunity to discuss any issues and gave additional information about vitamin D and demonstration of weight bearing exercises was useful in helping sustain their goals.

Previous research has suggested that while guidelines concerning dietary calcium are generally well understood, osteoporosis is a 'silent disease' and the types of physical activity that can assist in bone health are less well known²³.

All residents indicated that their participation in the program was positive and felt that the program should be offered in all retirement village communities to raise awareness of the disease and to provide strategies for maintaining good bone health. Even though many residents were aware of osteoporosis, the information provided confirmed their ideas and also corrected some misinformation, particularly surrounding the type of exercise that is beneficial for bones. As one participant stated, "*A lot of people didn't realise that swimming wasn't good for strengthening your bones and telling us the different types of exercise was most useful.*"

Feedback from the retirement village residents has ensured that the program will be reproducible with the view to expanding to other interested retirement communities across Australia.

Study 3 – Older people and fracture prevention in general practice, is reform needed? – Identifying rates of osteoporosis diagnosis and treatment in regional Australia using general practice electronic medical record data (EMRD)

Background

Previous audits of general practice medical records have shown low rates of identified osteoporosis. Chiang *et al.*²⁵ found that only 12.6% of women and 3.8% of men had a diagnosis of osteoporosis in their medical record and only 53% of these were receiving anti-resorptive drugs. A more recent review of medical records using the PENCAT tool to extract data relating to risk factors, followed by a manual file audit²⁶ found that 26% of those diagnosed with osteoporosis in one practice were not receiving treatment.

Aim

This study aimed to identify rates of osteoporosis diagnosis and treatment in regional Australia using general practice electronic medical record data (EMRD).

Method

The study involved an audit, using an adaption of the Canning Data Extraction Tool, of the EMRD of 3,535 patients aged more than 70 years, and therefore falling within the subsidised screening and treatment category. The study involved the secondary analysis of a general practice EMR database that had previously been used to explore rates of use of anticholinergic medications in primary care²⁷. Written consent was obtained from the practices involved and The University of Notre Dame Australia Human Research Ethics Committee. Data were analysed for active patients, seen at least three times in the three years prior to the establishment of the database, and variables collected included a de-identified patient code, practice code, number of visits in the prior two years, patient age, gender, clinical diagnostic items routinely recorded by the GP and current medication prescriptions. EMR were manually reviewed for diagnosis and treatment/prescriptions for osteoporosis.

As stated above, in the description of methods, this study focused on electronic medical record data of patients with age-based eligibility for subsidised osteoporosis screening and treatment, comprising the EMR of 3,535 patients aged ≥ 70 years, including 2,057 females and 1,478 males. Females ranged in age from 70 – 105 years (mean 79.4; median 78.0; SD 6.9), and males ranged from 70 – 102 years (mean 78.0; median 77.0; SD 6.1).

Results

Among patients aged ≥ 70 years, osteoporosis was identified for 728 patients, 589 females (28.6%) aged 70-99 years (mean 80.7; SD 6.5) and 139 males (9.4%) aged 70-92 years (mean 80.7 SD 5.5) (Table 3). Osteoporosis was identified by a manual review of the EMRD from structured and unstructured diagnostic field entries and from bone-active prescriptions (Table 4). Diagnosis was more common for females than males ($p < 0.001$) (Table 3). Among diagnosed patients there was no significant difference in the prescription of bone-active treatment according to gender.

There was a significant difference in the prevalence of bone-active treatment for patients with osteoporosis identified (≥ 70 years old, $n=728$) according to age range in 10-year intervals for females but not for males. This difference persisted with both genders combined; 67.6% at age 70-79 ($n=333$), 77.0% at age 80-89 ($n=335$), and 51.7% at age 90-99 ($n=60$) (Chi square=18.5, $p < 0.001$).

Table 3. Prevalence of low bone density diagnoses and active treatment prescriptions in patients aged ≥ 70 years

	Patients [number (%)]		
	Female* (n=2,057)	Male* (n=1,478)	Total (n=3,535)
Diagnosis recorded			
Fracture	282 (13.7)	92 (6.2)	374 (10.6)
Osteopenia	52 (2.5)	21 (1.4)	73 (2.1)
Osteoporosis	505 (24.6)	116 (7.8)	621 (17.6)
Bone-active treatment prescribed			
With fracture diagnosis	143 (7.0)	24 (1.6)	167 (4.7)
With osteopenia diagnosis	7 (0.3)	2 (0.1)	9 (0.3)
With osteoporosis diagnosis	338 (16.4)	69 (4.7)	407 (11.5)
With no diagnosis recorded	84 (4.1)	23 (1.6)	107 (3.0)
Osteoporosis identified¹	589 (28.6)	139 (9.4)	728 (20.9)

Notes: osteopenia and osteoporosis are exclusive categories, *significant gender difference, $p < 0.001$, ¹ diagnosis recorded plus implied

Regression analyses were conducted for variables with significant associations with diagnosis and treatment. Among patients identified with osteoporosis (≥ 70 years old, $n=728$), the relationship between age group and the likelihood of being prescribed bone-active medication differed by decade of age. Compared to the age group 70-79 years, those aged 80-89 years were more likely to be prescribed bone-active medication (OR 1.61 95%CI 1.14-2.26, $p=0.007$). However, those aged 90 years or more years were less likely to be prescribed bone-active medication (OR 0.51 95%CI 0.29-0.90, $p=0.019$).

Among all patients aged ≥ 70 years ($n=3,535$), the likelihood of having osteoporosis identified was increased with a record of fracture (OR 6.80 95%CI 5.36-8.62 $p<0.001$) and with each additional year older (OR 1.04 95%CI 1.02-1.05 $p<0.001$). Females were 3.4 times more likely to have osteoporosis identified than males (95%CI 2.74-4.15, $p<0.001$).

Table 4. Examples of text in EMR diagnostic field to be coded as osteoporosis

Structured	
Osteoporosis	
Osteoporosis - corticosteroid induced	
Osteoporosis - no fracture	
Osteoporosis - preventive care	
Osteoporosis with fracture	
Unstructured	
??OSTEOPROSIS	OSTEOPORISIS HIP - NOT BACK
20% T11 LOSS OF HIGHT	Osteoporosis - no fracture BMD - 3.52
ACTONEL FOR ? OESTEOPOROSIS	Osteoprosis # L4 @ CTscan 9/2011
Admitted - Aclasta	Outpatients - Aclasta
L spine T score --2.5 for follow up	T score - 3.0
OSETOPROSIS	T9 Fracture, Osteoprosis
Osteo- prosis BMD T-4.4	T9 wedge vertebra-start fosamax
OSTEOPRO	Xr-Dorsal vert # -start protos

Note: the unstructured text and typographical errors reflect how notes appeared in EMR diagnosis field

Discussion of Results

Osteoporosis was identified for almost one in three women, and one in ten men, aged ≥ 70 years. These values are lower than the rates obtained with an epidemiological study that undertook Bone Mineral Density (BMD) screening on a random sample of community-based men and women ≥ 70 years²⁸. Henry *et al.* (2010)²⁸ found that 12.9% of men and 42.5% of women in this age range had osteoporosis. This is consistent with the well recognised under-recognition of this problem in the primary care setting.

In this study, 71% of the patients identified with osteoporosis were on current medication for this condition. The treatment rate changed with age, increasing to three quarters of osteoporosis patients aged 80-89 being treated, compared to only half of patients aged 90-99 years. Possible reasons for the absence of a recorded current treatment prescription for 29% of osteoporosis patients include medication side effects, medication contraindications²⁹ patient awareness or choice and GP concern about financial barriers and the salience of osteoporosis and their clinical judgment of holistic patient needs³⁰. In the current study, although identification of osteoporosis in older men is lower than expected, treatment rates were not significantly different for males compared to females.

The overall treatment rate of 71% for osteoporosis patients aged ≥ 70 years found in this research was consistent with other current Australian GP studies²⁸, although an EMR audit in regional Victoria ten years ago prior to national subsidies for screening and treatment

found only 53% of osteoporosis patients aged ≥ 60 years were prescribed anti-resorptive medication²⁵.

Previously published research has documented the potential to improve rates of treatment for osteoporosis. A Melbourne, pharmacist-led intervention³¹ used individual GP academic detailing to increase treatment from 59% to 70% of osteoporosis patients aged ≥ 50 years and a larger study in Western Australia³² used cycles of GP audit, reflection and review to increase treatment rates with bone active medication after minimal trauma fracture from 76% to 86%. This study also noted that GP audit and review could increase the rate of BMD screening of patients aged ≥ 70 years with no fracture history. The methodology used in our research to review of EMRD in a general practice setting has the potential to provide a framework for future studies to evaluate the success of interventions to improve access to treatment for this chronic condition.

Limitations exist in the use of data extraction from the EMRD in primary care research, despite the use of individualised software extraction tools. It has been argued that EMR are a poor source of public health data as GPs have varying interest and expertise in data management³³. However, although issues such as incomplete and missing data exist,^{34,35} they can be addressed by being aware of this possibility and adequately scrutinising the results³⁶. This study found that the EMR diagnosis field in particular needed recoding and imputation prior to analysis (Table 4) and that the prescriptions listed in the EMR may not have been recently updated, which may have led to an overestimation of current scripts.

Despite these limitations, the researchers feel that the use of data extraction tools, particularly as a measure of change in practice, in the Australian general practice setting have enormous potential. The study has added to the body of evidence that supports their use as well as to knowledge about osteoporosis in the general practice setting. Refinement of these tools with targeted software development³⁷ may address some of the potential limitations into the future.

Summary

The project '*Building research capacity at The University of Notre Dame Australia (Notre Dame) School of Medicine (Sydney) to improve chronic disease management*' was undertaken with the support of funding from the Australian Primary Health Care Research Institute.

The funding for the project enabled the employment of two, part-time, skilled, post-doctoral research fellows, one with a medical background and one with an allied health background. Both fellows had undertaken their doctoral research in a primary care setting and had additional experience in the primary care sector. They also brought to the project considerable enthusiasm for the tasks involved. This enthusiasm, as well as the extra time approved by the extension of the project (from a completion in March 2015 to a completion in October 2016) a considerable body of research was undertaken. This research explored various aspects of osteoporosis as a chronic disease in the primary care setting. During the eighteen months they were employed under this project their grant writing skills improved considerably and, although at the time of writing this report some grant applications are still outstanding, at least one of these was successful. A contract has been signed with the Murrumbidgee PHN to undertake an evaluation of an intervention aimed at improving vitality in the elderly.

However, perhaps more important than the research output, has been the contribution to building the research capacity of The University of Notre Dame, Australia, School of Medicine, Sydney. During the time that these two researchers were based at the Rural Clinical School (RCS) of the School of Medicine at the Wagga campus they participated extensively in the research activities of the School, attending both internal, and external, research symposia. The presence of these two primary care researchers within the RCS has helped to build a research culture, through activities such as group presentations and combined review of research. They have also contributed to the supervision of medical students undertaking research as well as supporting other researchers.

In addition to building the research capacity within Notre Dame this project has succeeded in *strengthening links with local organisations*. These have included the Murrumbidgee Local Health District (MLHD), Western Sydney Local Health District (WSLHD) and Murrumbidgee Primary Healthcare Network (MPHN).

This project has significantly improved the capacity of The University of Notre Dame, Australia *to undertake primary care health research*. It has done this in part by improving the capacity of the two post-doctoral research fellows, but it has also helped to create a research community, to strengthening organisational research capacity and to develop organisational expertise in primary care research. In addition, it has *built research output* within the field of osteoporosis.

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