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Increasing the knowledge, identification and treatment of osteoporosis through education and shared decision-making with residents living in a retirement village community

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(i) Abstract

Objectives:

This pilot study explored whether individual goal setting in a retirement village setting could improve strategies to strengthen bones in an ageing population and help prevent osteoporosis.

Methods:

A two-phased osteoporosis prevention program was developed, piloted and evaluated involving a group education session followed by the development of individualised "Bone Plans" based upon personal understanding of individual fracture risk and lifestyle factors.

Results:

A significant improvement in knowledge and understanding of factors to prevent and manage osteoporosis was achieved and changes in lifestyle behaviours were sustained at six months.

Conclusion:

Success was due to education by specialist medical and health personnel, flexibility of goal setting, use of group sessions and location of the program within the retirement community setting. The "Mind Your Bones" program is a feasible and acceptable way to translate preventative bone health messages to a large number of people via the retirement village network.

Words for indexing: bone plan, osteoporosis, retirement community, targeted intervention, patient education

(ii) Main text

Introduction

Osteoporosis is a disease of weakened bones that often remains "*silent*" until a debilitating fracture occurs. (1) It is a major public health issue worldwide which will increase in prevalence as the population ages. In Australia in 2012, 66% of people aged over 50 years had osteoporosis, osteopenia or poor bone health and many do not know they have it. (1) Fracture often precipitates lifestyle limitations including restricted mobility, causing changes in the ability of older people to remain living independently. (2-4)

Despite publication of clinical guidelines by the Royal Australian College of General Practitioners, (5) instigation of public health campaigns (6) and education for medical professionals, (7-10) a considerable gap still remains in consumer knowledge about osteoporosis as a chronic disease, its consequences and prevention strategies. (11) Studies conducted in different countries (12, 13) have shown that patients diagnosed 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 fold. (14)

An Australian study, (15) which assessed older patients' knowledge of osteoporosis after hospital admission for fracture, found that osteoporosis beliefs, knowledge and medication use remained poor in spite of the large amount of osteoporosis information available to patients in the public domain. Otmar *et al.* (12) 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. Hosking *et al*. (16) 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, but rather than waiting for a fracture to occur, health care professionals need to act early to address this problem.

Aims and Objectives:

This pilot study explored whether individual goal setting, in the context of a retirement village community, could improve strategies to strengthen bones in an ageing population and help to prevent osteoporosis. Following approval from the University of Notre Dame Australia's Human Research Ethics Committee (#016048S), an osteoporosis prevention education program, "*Mind Your*

Bones" targeting community dwelling adults over the age of 55, was developed, piloted and evaluated in order to determine whether an individualised educational intervention can increase the knowledge, identification and treatment of osteoporosis in a retirement village setting.

Method

An innovative approach was utilised by partnering with a retirement village community located in a large regional centre 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 to reinforce positive healthy behaviour change.

The two-phased study involved an initial two-hour group education session followed by individual participation in a "Mind Your Bones" program for six months. The osteoporosis-specific health information in the first phase was delivered by an orthopaedic surgeon, a general practitioner (GP) and an exercise physiologist where a range of individual osteoporosis prevention strategies for residents were discussed and weight bearing exercises demonstrated. Attendees were then invited to volunteer to participate in an individual bone health intervention.

In phase two, volunteers attended for individualised 30 minute sessions with researchers where they completed a 10 item osteoporosis knowledge assessment questionnaire (16) where respondents were required to select "True/False/Unsure" and received one point for a correct response with a maximum total of ten points. The Garvan FRAX calculator incorporating a number of clinical risk factors was used to estimate each individual's percentage risk of fracture over the next 5 or 10 years.(17)] Each resident then set goals in their "Bone Plan" based upon their understanding of individual fracture risk and the facts about osteoporosis. All participants were given a copy of their Bone Plan and FRAX results and a letter with a copy of their results was sent to their GP.

Two months later, a mid-point group education discussion was held in the community centre which focussed on vitamin D in winter and weight bearing exercises to encourage maintenance of their goals. The final follow-up session at six months involved an individual interview with each participant to: (a) complete a post-test knowledge survey; (b) evaluate their achievement of the goals listed on their bone plan and (c) gather feedback on the efficacy and feasibility of meeting their individual goals. Data from the knowledge surveys were analysed using SPSS Inc. (Version 22; Chicago, IL, USA) software. Paired t-tests were used to detect mean changes in total scores and significance was set at $p-<0.05$.

Results

Participants:

The group education session attracted sixty retirement village residents, and thirty participants volunteered to continue to the second phase of the project and develop an individualised bone plan. Half (16/30) had discussed osteoporosis with their GP previously and 47% indicated they were on some form of treatment for osteoporosis, either calcium supplements (16%), Vitamin D medication (20%), bisphosphonates (30%) or a combination of the three (Table 1). No adverse events occurred throughout the study.

Insert table 1 here.

Risk of fracture measures:

Information from participants about age, gender, number of falls in last 12 months and weight was entered into the online Garvan FRAX calculator to obtain 5 and 10-year fracture risk estimates for hip fracture and any fracture in each individual. A *hip fracture* risk score of between 2-5% (5 years) and 3-9% (10 years) or risk of *any fracture* score between 8-13% (5 years) and 14-26% (10 years) are values that are "equivalent to those at which current Pharmaceutical Benefits Scheme reimbursements for osteoporosis therapy apply."(17) A summary of group results is provided in Table 2.

Insert table 2 here.

Goal setting and sustainability:

Participants discussed an individual "Bone Plan" with the GP researcher and were encouraged to select osteoporosis goals within three main areas - *talk to their GP, exercise* or *diet*– depending upon their individual needs. Two thirds of participants (21/30) indicated they intended to speak with their GP about checking their vitamin D levels and/or the need to have a Bone Mineral Density (BMD) test for osteoporosis, 22/30 (73 %) indicated they hoped to either commence regular exercise, maintain or increase their amount of exercise per week and 16/30 (53%) wanted to incorporate some weight bearing exercises into their daily routine. Only 2/30 (6%) of participants indicated they intended to make any dietary changes.

After 6 months, participants reported on their goals with responses obtained from 27/30 (90%) of the original group (one was hospitalised with a fracture and two could not be contacted for follow up). Seven participants did not achieve any of the goals on their list. Within this group who were unable to achieve any of their goals, two remained on bisphosphonate medication and three experienced fractures. 20/27 (74%) had achieved some or all of their goals (Table 3).

Insert table 3 here

Among the sixteen participants who discussed osteoporosis with their GP, six underwent BMD testing and two were scheduled for follow-up BMD scans. At the commencement of the pilot study 10/30 (33%) reported they were on bisphosphonate medication for osteoporosis and by the completion of the study, an additional two participants had commenced on bisphosphonate treatment and another was diagnosed with osteopenia following a BMD test.

Osteoporosis knowledge:

There was a significant improvement between pre-test understanding of the Osteoporosis Australia prevention guidelines concerning osteoporosis (Mean =7.37, SD=1.24) and post-test participant understanding (Mean =7.96, SD=1.34), [t (26) =-2.21, p=0.03]. There was no gender difference in knowledge scores. There were no significant differences in the mean scores on individual items pre and post- intervention.

Pre-test scores were the highest for the following items: *awareness of the need for calcium in the diet* (80%), *long periods of sitting are not good for bone strength* (96%) and *osteoporosis can affect both men and women* (100%). The items which showed the greatest change in knowledge between pre and post- intervention were *sunlight is the source of vitamin D* (73% → 85%) and *alcohol* (66% → 85%) and *smoking can adversely affect bone health* (60% → 85%). The areas of weakest knowledge were *the (non) benefits to bone strength of non-weight-bearing activities* such as swimming and cycling (16%) and *people with osteoporosis can feel their bones weakening* (46%). Although these scores increased after the intervention, they still remained low (16% → 39%) for weight bearing exercise and (46% → 52%) for feeling bones weakening. There was no relationship between knowledge of osteoporosis prior to the intervention and individual fracture risk as determined using the Garvan FRAX calculator.

Participant feedback about the program:

At the post-test interview participants were asked to comment on aspects of the program they found most useful and any changes they felt could be incorporated into future programs. All of the participants were positive in their comments and stated the osteoporosis information delivered by the health professionals was very useful as it provided new knowledge particularly around diet and types of exercise, *"A lot of people didn't realise that swimming wasn't good for your bones*." Many were surprised about the types of activities required to incorporate weight bearing exercise into their regular routine and appreciated the demonstration of the exercises and opportunity to practice further reinforced by availability of take home printed information. Several participants commented on the ease of accessibility to the group sessions as they were held at the retirement complex and

how discussing the information and practicing the exercises in a group setting was very motivating, "*you can feed off each other and learn from others*".

Discussion

Educational interventions to enhance knowledge of osteoporosis and to precipitate changes in behaviour to prevent or manage osteoporosis have been trialled with some success over the past few decades. (16, 18, 19) The challenge is to appropriately target population groups most likely to be affected by osteoporosis to enhance their knowledge about the disease and support sustained behaviour change to hopefully prevent a fracture from occurring. Results of these programs show an increased understanding of the disease but often the behavioural goals fall short or are not maintained over time.

This pilot study was a unique osteoporosis intervention targeted at older community dwelling residents living in a retirement village in a large regional city in Australia. The intervention combined several key components which resulted in sustained behaviour changes in residents to aid in maintaining healthy bones. These components were: (a) delivery of an initial education session by specialist medical and health personnel, (b) flexibility of individual goal setting, (c) use of group sessions for maintaining progress and (d) delivery of the program within the retirement community setting.

Orthopaedic surgeons are recognised by the general population as the bone specialists (11) so the involvement of an orthopaedic surgeon provided a high level of expertise and validity to the osteoporosis information presented. Information regarding vitamin D and calcium requirements was delivered by a GP researcher who was experienced in dealing with complex clinical questions and provided the opportunity for patient questions. To emphasise the need for weight bearing exercise, an exercise physiologist explained the types of exercise that are considered weight bearing and gave a practical demonstration with volunteers from the group.

The provision of choices in goal setting for each participant meant that individuals could choose a goal that they considered achievable and best suited to their lifestyle needs. Many residents were happy to receive FRAX risk information to take to their general practitioner to initiate a conversation about osteoporosis and discuss the need for possible testing or review medication. Patients who are encouraged to take an active role such as in setting their own goals have demonstrated increased confidence in self-managing their bone health and understanding their medication and decreased rehospitalisation rates. (20)

The use of group education sessions to discuss health issues is effective as it provides opportunities for group members to share strategies and concerns in a non-threatening atmosphere, allows for health professionals to provide current and accurate information and can legitimise acceptance of support services. (21) A participant in our study commented "*it was very good, also to see who else had osteoporosis and it was good to talk to people about it.*"

The findings from the osteoporosis knowledge questionnaire showed a significant improvement in participants' overall knowledge regarding osteoporosis prevention sustained at six months post intervention. Despite the overall increase in knowledge scores, there was still poor awareness of the need to incorporate weight bearing exercise into daily routine and the understanding that an absence of symptoms until fracture occurs is characteristic of osteoporosis.

Whilst the individualised bone health program achieved knowledge change in some areas such as understanding the negative effects of smoking and drinking on bone health and the need for vitamin D and weight bearing exercise, many participants still failed to comprehend the potentially debilitating effects of osteoporosis. This may be due to the asymptomatic "silent" nature of the disease and for older patients often suffering multiple co-morbidities, preventing osteoporosis is not considered high priority compared with other health problems they may have. One participant stated that "*it* (osteoporosis) *is not a burning issue for me*" and another with a broken clavicle and sprained ankle, felt she "*had more important things to deal with".*

In this study, use of an individualised Bone Plan with goals tailored to personal lifestyle priorities not only improved community knowledge but resulted in an increased number of participants who discussed osteoporosis management with their GP. Increasing patient knowledge about osteoporosis and encouraging them to discuss the disease with their GP can in turn influence general practitioners' awareness and attitudes. (16) Influencing GPs is important as, although adequate calcium intake and adequate vitamin D levels is the best mitigation for osteoporosis risk factors and the most cost effective prevention strategy for people aged over 50 (22), studies have shown that a 5% increase in bone density using bisphosphonate medication can result in a 50% decrease in fracture risk. (22, 23) It is encouraging that, in this retirement community based study, 76% of participants who intended to visit their GP to discuss osteoporosis and its management, did so. A previous hospital based study of patients to whom a GP visit was suggested following a minimal trauma fracture found only 25% of patients undertook the visit. (15)

Analysis of the types of goals selected by participants on their Bone Plans indicated that the most difficult goal to achieve was the introduction of weight bearing exercise into their regular routine. This is similar to other researchers who have also found osteoporosis knowledge easier to change

than behaviour. (24, 25) In an attempt to improve appropriate exercise, during the initial and mid-point sessions the exercise physiologist demonstrated weight bearing exercises which could easily be incorporated into personal daily routines. However, at the six-month evaluation less than half of the participants who listed weight bearing exercise as their goal felt they had achieved this. This was a limitation of the program as there is increasing evidence showing that the addition of weight bearing exercise into daily routines for older adults has a positive effect on strength, balance, flexibility and posture (19) and can lead to gains in bone density. (26) A number of participants suggested that exercises in a regular group class is a strategy which could have helped reinforce behaviour as it was "*harder to do things at home*."

A US study which examined older men and women's health beliefs about osteoporosis concluded that in order to bring about change there is a need to influence health beliefs which can be achieved through patient education. (27) However, Gaines *et al.* (2010) stated that in order to achieve success there is a "*need for a personalised bone health program that includes more than just classroom-based education."* (24) One of the unique characteristics of this pilot program was that it was conducted in a retirement village setting which enabled a good number of participants to attend. Delivering the initial education session, individual Bone Plan sessions and follow-up session in an accessible, familiar environment could have helped to increase participation numbers and sustainability. One participant commented that he "*wouldn't have gone outside to do it.*"

A potential limitation of this study was that some members of the participant group already had some awareness of osteoporosis as a disease and some were being treated or had undergone bone density testing. However, despite being treated for osteoporosis, participants did not fully understand their condition prior to the intervention and benefited from both the education and goal setting exercise.

Conclusion

This pilot study of a targeted intervention in a retirement village setting effectively increased participants' knowledge about osteoporosis and their understanding of the physical and dietary lifestyle factors which can impact upon their bone health. People in this age demographic are the most susceptible for fracture risk therefore this population group needs to be aware of factors that can impact upon falls and fracture. The choice of goals offered to participants in the individual bone plan allowed them to select and maintain changes appropriate to their lifestyle in line with Osteoporosis Australia guidelines. The number of participants who discussed their bone health with their GP also suggests an increased confidence in self-management and understanding of preventative bone health measures.

Health messages on the prevention and management of osteoporosis are still not having an impact upon the majority of people who are at risk of the disease, but this type of targeted retirement community intervention has the potential to reach an increasing number of community dwelling populations. The Commonwealth of Australia's Intergenerational Report (28) predicted that the number of Australians aged 65 and over is projected to more than double in the next fifty years and retirement villages are an increasingly popular choice of housing amongst retirees with 2300 retirement villages currently operating. (29) The "Mind Your Bones" program is a feasible and easily acceptable way to translate osteoporosis and preventative bone health messages to a large number of people via the retirement village network.

(iii) Impact Statement

The incidence of bone fractures due to osteoporosis is increasing as the population ages, yet current education programs are having minimal impact upon patient knowledge and behaviours. The "Mind Your Bones" program piloted in the retirement village setting is a unique and sustainable option to translate osteoporosis and preventative bone health messages to the population group who are most at risk from this silent and potentially debilitating disease.

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