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AN EXPLORATIVE STUDY OF PHARMACY-BASED BONE MINERAL DENSITY TESTING

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The aim of this paper is to assess the future of pharmacy-based osteoporosis screening services in Malaysia through a survey involving retail pharmacists as well as the general public. An ethnographic-style research strategy method was used involving community pharmacists, and men and women above 50 years old. Pharmacists were interviewed as to whether they would offer such a service and how much they would charge for it. Information regarding knowledge on screening and osteoporosis was also obtained. Patients were queried as to whether they would go to the pharmacy for testing and how much they were willing to pay for such a service. The study found that around half of the pharmacists (n = 30) were willing to offer such a service (56.7%). Reasons cited for not willing to offer such a service were lack of public response and high capital. Those agreeable (88.2%) to offer such a service said they would charge between RM0 to RM50 per patient. The majority (64.7%) of those who answered in the affirmative claimed to have poor knowledge on screening, while 58.8% claimed to have good knowledge on osteoporosis. Among the public (n = 50; 31 female, 19 male), 66% claimed they would not go to the pharmacy for testing. Majority (46%) preferred to go to the government hospital. Of the 17 willing to go to the pharmacy, the majority (64.7%) were willing to pay between RM0 to RM50 for the Bone Mineral Density (BMD) test. BMD testing can be professionally and financially rewarding for pharmacists. As such, pharmacists need to take appropriate steps to implement BMD testing services in the pharmacy. Incorporating an education component into such a service is vital. Although the future of pharmacy-based BMD testing looks bleak in Malaysia, necessary steps can be taken to overcome this problem by increasing public awareness on the severity of osteoporosis.

***Keywords**: Pharmacy, Bone Mineral Density testing, Osteoporosis*

INTRODUCTION

Osteoporosis is a major health problem worldwide, especially in women. Osteoporotic fractures lower a patient's quality of life, lead to spinal deformities, long-term disability, as well as increased mortality (O'Connell and Elliott 2002). There was a marked increase in the incidence among the older age group, and the incidence of hip fracture was noted to be consistently higher in women (Feldstein *et al.* 2003). Men and women are two to five times more likely to die during the first 12

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months following a hip fracture compared with people of the same age and sex in the general population without hip fractures (Ross 1996). Of those surviving up to one year following a hip fracture, only 50% are capable of fully independent living (Mazanec 2004).

In Malaysia, the incidence of hip fracture among individuals above 50 years of age was 90 per 100,000 and direct hospitalization cost for hip fractures in 1997 was estimated at RM22 million (~USD6 million) (Malaysian Clinical Practice Guidelines 2001). However, this is a gross underestimate of the total economic burden, as it does not take into account the costs incurred in rehabilitation and long term nursing care. Therefore, in an ageing population, this cost will escalate without appropriate intervention (Ross 1996).

According to the Asian Osteoporosis Study (Lau, Lee and Suriwongpaisal 2001) the rate of hip fractures in Malaysia was low. However, with urbanization and ageing, these rates are likely to increase. According to the World Health Organization (WHO), by the year 2050, more than 50% of all hip fractures will occur in Asia; thus the total number of subjects with hip fractures in this region will be approximately 3.2 million per year, warranting the need for primary prevention strategies (Cooper, Campion and Melton 1992; Lau 2002). The best way to control osteoporosis is through aggressive prevention strategies targeting high-risk individuals (Summers and Brock 2005). As such, monitoring the condition or 'status' of the bones can be one prevention strategy.

Probably the most useful parameter for stratifying people according to fracture risk is Bone Mineral Density (BMD), which is easily measured and is strongly correlated with both bone strength and fracture risk. The measurement procedure is safe, non-invasive, and can identify large differences in risk between individuals. Most people with osteoporosis are unaware of their status and this is probably due to either limited access to machines used to measure BMD, or patients being unable to afford screening. In Malaysia, private hospitals charge between RM100 to RM200 for screening using a dual energy X-ray absorptiometry (DXA), which is the gold standard. This will, of course, pose an obstacle to those from the lower income group. In government hospitals, on the other hand, screening with the DXA is only done once in every three to four months. DXA is also inadequate for mass screening, as testing time takes approximately 30 minutes (Schaefer 1998). This results in very few patients being screened at a time.

Peripheral bone measurements can be helpful as a screening tool because if bone density is low at one site, it is likely to be low at others. In the pharmacy setting, peripheral bone density testing can be done using portable devices which have been developed such as Quantitative Ultrasound (QUS). Given the existing number of pharmacies everywhere, their presence in communities of almost any size and location, availability after working hours and during the weekends, and the walk-in character of the community pharmacy, the pharmacist is the most accessible of health care professionals (ACCP 2004).

Pharmacy-based BMD testing has shown positive results in terms of identifying patients at risk and increasing physician contact, increasing awareness and initiating lifestyle changes. In a descriptive study by Summers and Brock (2005) to assess the impact of pharmacy-based BMD screening, by six months, 52 of the 102 participants had discussed their results with their physicians, and 95% of those subjects subsequently started preventive or treatment measures. In another study by Elliott *et al.* (2002), patients had their BMD tested and were encouraged to discuss their results with their physicians. At 10-month follow-up, it was found that 50% of the respondents discussed their results with their respective physicians, and of these, 40% subsequently began treatment for osteoporosis.

Numerous studies also found that patients were highly satisfied with the service, were willing to pay for such a service, and would recommend the service to others. It also helped improve the public and physician's perception of pharmacists (Rolnick *et al*. 2001; Elliott *et al*. 2002; Polak 2002; Lata, Brinkley and Elliott 2002; Goode, Swiger and Bluml 2004; Cerulli and Zeolla 2004; MacLaughlin *et al*. 2005; Summers and Brock 2005). This prompted a study to explore the perception of the public as well as retail pharmacists on implementing such a service in Malaysia. The objectives of the study were to explore the perceptions, comments, and readiness of retail pharmacists to provide pharmacy-based BMD testing services, and to obtain the views of the general public on pharmacy-based BMD testing.

METHODS

Part 1: Retail Pharmacists

The retail pharmacists were a convenience sample from the Klang Valley (n = 25) and the state of Penang (n = 25). Pharmacists working in both independent and chain pharmacies were interviewed on whether or not they would provide such a service in their pharmacy, and how much they would charge for testing if they did, based on the following scale: (a) RM0 to RM50; (b) RM50 to RM100; (c) RM100 to RM150; (d) RM150 to RM200; (e) > RM200. They were also asked how they rated their level of knowledge on osteoporosis based on the following scale: (a) Poor (I don't really know much/anything about osteoporosis); (b) Fair (I only know what supplements are necessary and/or risk factors); (c) Good (I know what treatment is needed and how it can be prevented as well as risk factors); (d) Excellent (I know everything about osteoporosis including how diagnosis is done).

Additionally, they were asked how they rated their knowledge on how to conduct a BMD test, ranging from poor to excellent, and what interventions they would make if they found the patient had osteoporosis, based on the following choices: (a) Refer the patient to the doctor; (b) Treat the patient yourself; (c) Suggest supplements such as calcium and vitamin D for the patient to buy; (d) Counsel the patient on lifestyle modification such as diet and exercise; (e) Others.

Finally we sought their opinion on what changes they would make, either personally or to the physical environment of the pharmacy, and what barriers they felt they would face if they decided to offer such a service.

Part 2: General Public

This second part of the study involved men and women 50 years old and above. Interviews were conducted based on a convenience sample of 100 patients where participants were asked if they would go to the pharmacy to be tested for BMD and how much they would be willing to pay for such a service, based on the same scale above. Participants were informed that the normal rate for BMD testing in the private hospitals was between RM100 to RM200.

Statistical analysis: Descriptive statistics were generated for patient demographics using Microsoft Excel and SPSS Version 12.

RESULTS AND DISCUSSION

Part 1: Retail Pharmacists

A total of 30 pharmacists responded to the survey (10 from the Klang Valley and 20 from Penang). Characteristics of the respondents are presented in Table 1. The balance 20 was either not interested to participate in the survey, or did not have the time to be interviewed.

Table 1: Characteristics of respondents: Retails pharmacists

Characteristic	Value
Number of respondents (n)	30
Number of months in retail (Mean ± SD)	49.9 ± 39.2
Type of pharmacy	
Chain (n)	18
Independent (n)	12

Of the 30, only 17 (56.7%) respondents said they would offer BMD testing in the pharmacy. Of the 13 who responded that they would not offer such a service, five (38.5%) said it was because the cost of the machine was too high, while four respondents said it was because there would be no response from the public. Other reasons included no time and space to offer such a service. The majority of respondents (88.2%) claimed they would charge patients RM50 or below per test. The others said they would charge between RM50 to RM100 per test. None of the respondents would charge more than RM100 per test.

A positive outcome from this survey was that the majority of pharmacists said they had good knowledge of osteoporosis (Fig. 1). 58.8% of respondents answered that their knowledge about osteoporosis was good, i.e., they were aware of appropriate drug therapy, risk factors, and supplements needed. Not many pharmacists, however, knew how osteoporosis is diagnosed (Table 2) and the majority of them had very poor knowledge on how to conduct a BMD test (Fig. 1). This was one of the main reasons pharmacists were reluctant to set up such a service. This can be overcome by attending continuous professional education programs, conferences and workshops on osteoporosis and BMD testing. A vast volume of information on osteoporosis and BMD testing is

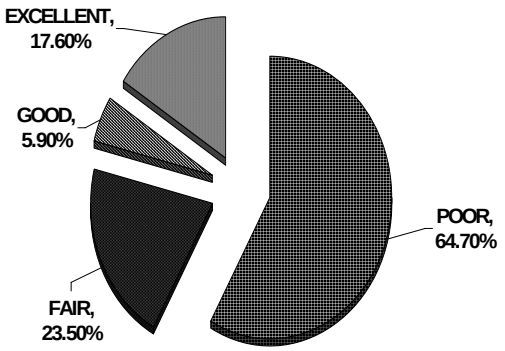

Figure 1: Knowledge on how to conduct a bone mineral density

Table 2: Retail pharmacists' knowledge on osteoporosis

Knowledge of osteoporosis	**Respondents, n = 17**
Poor (I don't really know much/anything about osteoporosis)	0 (0%)
Fair (I only know what supplements are necessary and/or risk factors)	5 (29.4%)
Good (I know what treatment is needed, how it can be prevented and risk factors)	10 (58.8%)
Excellent (I know everything about osteoporosis including how diagnosis is done)	2 (11.8%)

available not only in books, but also reputable medical-based journals as well as accredited web sites. In most of the studies reported, prior to offering BMD testing services in the pharmacy, pharmacists and the staff received formal training sessions in osteoporosis. As most of the respondents in this survey were willing and keen to undergo training and continuous medical education programs, the future of such a service being offered in the pharmacy seems promising.

As for changes to be made to the physical environment of the pharmacy and/or personal changes to be made before implementing such a service, 82.4% said they would undergo training on how to use the machine and to update their knowledge on osteoporosis, while 47.1% said they would prepare a separate area to conduct the testing and provide counselling. Prior to starting such a service, pharmacists should make the

necessary changes to the environment of the pharmacy as well, such as preparing a separate area for counselling and for conducting the screening. They should also determine the amount of time such a service would take up, so as to assess the need for additional manpower. On the average, testing using the peripheral device only takes around three minutes (Schaefer 1998); together with counselling, the whole process takes roughly 15 minutes. As such, in an 8-hour day, pharmacists could easily accommodate around five patients per hour (Cerulli and Zeolla 2004). They should also carefully plan how much to charge the patient so as not to charge too much and subsequently turn-off a lot of customers. The cost should ideally include screening charges, as well as consultation charges.

On what interventions they would make if found that patient had osteoporosis risk, the majority of respondents (88.2%) said that they would refer the patient to the doctor, suggest supplements and provide counselling. Only two pharmacists said that they would treat the patients themselves as well. Pharmacists can refer at-risk patients to physicians and begin to develop collaborative relationships between the patient, pharmacist, and physician. Further, after a diagnosis of osteopenia or osteoporosis is made, the pharmacist can work in collaboration with the physician and other members of the health care team to help provide education and medication therapy management, including improving adherence to therapy (Goode, Swiger and Bluml 2004). Collaboration with physicians is also important, where physicians can refer or promote the service to their patients, who will be referred to them after the BMD test has been carried out. Additionally, pharmacists can also place banners and distribute fliers informing the public that such a service is available in the pharmacy.

As to barriers that they might face, a large number of pharmacists felt that there was a lack of public awareness; 29.4% said there were a lack of public and awareness on osteoporosis as well as the importance of testing for risk assessment. As such, this too will cause a lack of public response as patients are not well informed as to the severe debilitating nature of osteoporosis. In addition, two pharmacists said that they might not have the time to provide such a service. Similar results were found in a survey in Britain where less than 3% of pharmacies offered such a service, citing reasons such as a lack of space in the pharmacy and a lack of time. Also, 43% of the respondents felt that offering such a service was unsound due to the lack of public demand (Dhoot and Rutter 2002).

Also, 23.5% of pharmacists were concerned that there might be a lack of response from the public because a lot of clinics in Malaysia offer free BMD testing periodically. Additionally, drug companies also provide free testing in selected pharmacies. Thus, pharmacists may be reluctant to buy the machine, which could cost between RM60,000 to RM80,000 and charge for the service as they feel that they will not be able to compete with the free services provided by the clinics as well as the drug companies.

Pharmacists are in a unique position to become involved in the care of patients at-risk-for or with osteoporosis, as mentioned above, due to their convenient community setting as well as their approachability. Initially, pharmacists should actively promote such a service to their current customers through education pamphlets, brochures and even through word of mouth. Osteoporosis campaigns can also be organized by pharmacists giving free talks on the disease so as to increase public awareness.

In setting up BMD testing, pharmacists should incorporate a strong educational component as peripheral BMD testing alone, without being linked to education, may not be useful (Elliott *et al*. 2002). Among the risk factors for developing osteoporosis are being female, low lifetime calcium intake, vitamin D deficiency, an inactive lifestyle, current cigarette smoking, excessive alcohol use, and being Asian. Thus, pharmacists can provide education and advocacy for prevention in the younger population by promoting a healthy diet, adequate calcium intake, moderate alcohol consumption, and exercise. Referrals can also be made to smoking cessation clinics. Another key important risk factor is advanced age. By the year 2020, it is estimated that nearly 10% of the population in Malaysia will be above 60 years old. As such, pharmacists should aggressively target this growing number of patients through awareness campaigns and encourage them to go for screening by making them realize the severity of the disease.

Part 2: General Public

A total of 50 people responded with the number of females almost double that of males (Table 3). Of the 50 respondents, the majority of patients (66%) claimed they would not go to the pharmacy for BMD testing. Only 17 respondents (12 females; 5 males) said they would go (Fig. 2). Of the 17, 35.3% were Chinese, 29.4% were Indian, and 23.5% were Malay.

Table 3: Demographics and characteristics of respondents: General public

Characteristic		Value
Number of respondents (n)		50
Mean age of respondents (± SD)		59.82 ± 6.817
Gender	Male, n (%)	19 (38%)
	Female, n (%)	31 (62%)
Race	Malay, n (%)	15 (30%)
	Chinese, n (%)	15 (30%)
	Indian, n (%)	17 (34%)
	Others, n (%)	3 (6%)

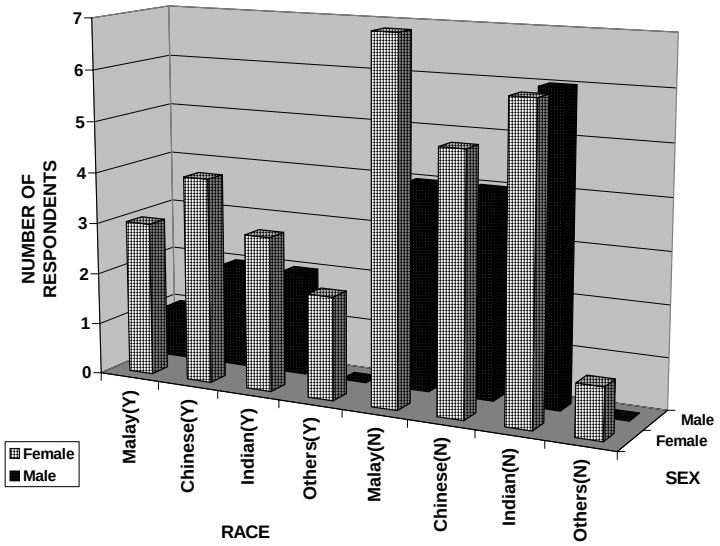

Fig. 2: Willingness to go to the pharmacy stratified according to race and gender.

Reasons for not going to the pharmacy to be tested are presented in Fig. 3. The majority of patients (46%) preferred to go to the government hospitals to conduct a BMD test. Other reasons included BMD testing was too expensive (n = 3), and 'not aware of such a service' (n = 1). One respondent said that BMD testing was 'a waste of time as you cannot die from osteoporosis'. Of the 17 patients who would go to the pharmacy for BMD testing, the majority (64.7%) of patients were willing to pay less than RM50 for the BMD test (Fig. 4).

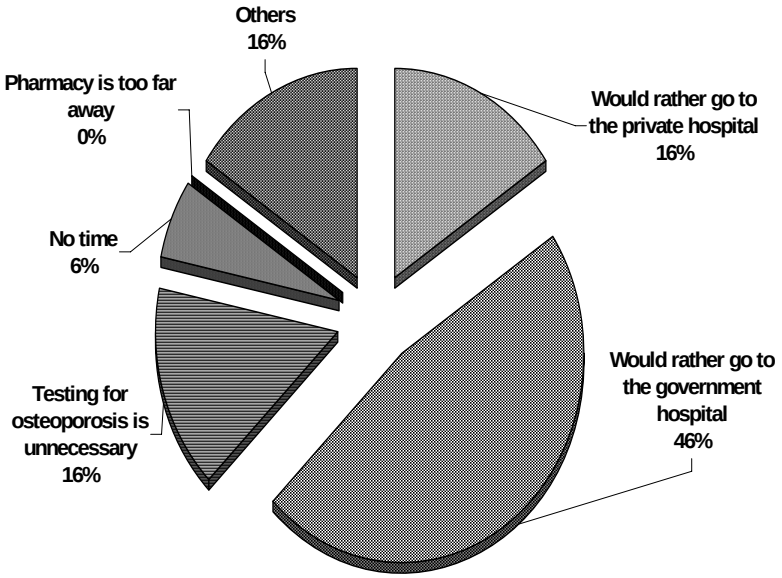

Fig. 3: Reasons for not going to the pharmacy to do a BMD test.

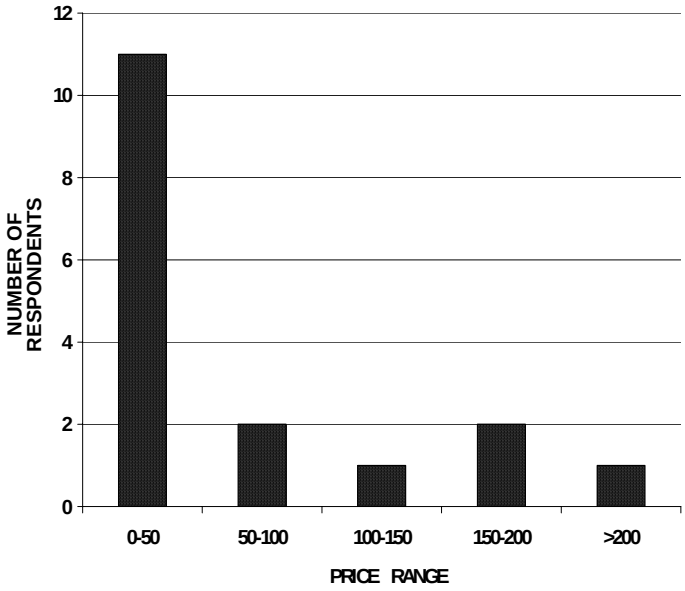

Fig. 4: Price patients are willing to pay for a BMD test.

The lack of public response is certainly discouraging. The majority of patients preferred to go to government hospital because the service was free. There was also a rather large amount of respondents (>10%) who preferred to go to private hospitals for testing and were willing to pay a lot more.

It was also noted that of the 17 who responded positively, less than 30% were men. In a study by Feldstein *et al.* (2003), of the 70,513 patients studied, only 1.5% of men had BMD measurement done. This again could be due to the lack of public awareness, or rather a false perception which is propagated by osteoporosis campaigns that only post-menopausal women or women above the age of 65 are at risk. Although the incidence of hip fractures is higher in women, once a hip fracture occurs in men, the rates of mortality and morbidity are higher than in women. It was found that one year after hip fracture, mortality in men is 31% compared to 17% in women and as such men are twice as likely as women to die after a hip fracture (Campion and Maricic 2003).

The survey also found that most respondents were not willing to pay more than RM50 for the test. This is in contrast to results found in other studies where patients were very willing to pay for such a service (Goode, Swiger and Bluml 2004; Cerulli and Zeolla 2004), and in one study, almost one-third of the patients were willing to pay as high as USD50 (Lata, Brinkley and Elliott 2002).

The low price range selected by the respondents in this study is perhaps a revelation as to the low level of importance they place on such a service and on the disease. Given that BMD testing in the community pharmacy is not as common as blood pressure monitoring or blood sugar monitoring, this too might have affected the price range selected by the respondents as they are not sure of the real or usual cost of such a service.

Although the results of the survey are disappointing, the situation nonetheless is amendable. We feel that it is imperative to offer such a service, not only to benefit the public but also the pharmacists. Other than being financially rewarding for the pharmacists, this service can also be professionally rewarding as the pharmacists are able to diversify and expand pharmaceutical care services beyond the more common offerings of hypertension, diabetes and cholesterol. A BMD testing service can also serve to anchor a comprehensive program of pharmaceutical care services for the prevention and treatment of osteoporosis (Rosenthal 2004).

It was also noted that 60% of community pharmacists responded to the survey, compared to 50% of members of the general public. The

slightly higher percentage as seen in the community pharmacists group could be due to the fact that pharmacists are more aware of the availability of such services. In terms of the general public, the main obstacle seems to be a lack of public awareness.

The ultimate outcome of BMD testing in the pharmacy is that it offers a means of moving away from the focus of dispensing and toward a focus on providing service as the core function of the pharmacy. It must be stressed however that peripheral BMD testing will only be valuable if it leads to actions that can positively influence osteoporosis risk. It is not a tool for diagnosis but simply a method for screening patients to identify those at risk, who should then be advised to be centrally tested using a DXA. Additionally, the implementation or introduction of such a service should not 'stand-alone', in a sense that it must be a part of a complete program which includes an education component, counselling, preventive therapy and collaboration with physicians.

Thus, pharmacists should establish a progressive pharmacy practice model that would demonstrate improved patient outcomes and maximize the pharmacist's contributions to drug therapy. Although the future of BMD testing-service in retail pharmacies in Malaysia looks bleak, necessary steps as outlined above can and should be taken by pharmacists to overcome this problem.

CONCLUSION

In summary, the study provides insight into the local retail pharmacists' and general public's perceptions about the possibility of the pharmacist-coordinated BMD testing. This study shows that at the present time, the introduction of such a service might not be well supported by the pharmacists as well as the patients. The public as well as the community pharmacists should be made aware that although no symptoms occur prior to fracture, BMD and other risk factors can be used to identify high-risk patients and because effective interventions exist, many of these fractures are now preventable. Pharmacists can play a role in identifying patients at risk and reducing risk factors associated with osteoporosis through BMD testing and counselling.

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