

学位論文の要旨

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学位論文名 Osteoporosis Management in a Rural Community Hospital in Japan: a Cross-Sectional Retrospective Study

発表雑誌名 BMJ Open
(巻, 初頁~終頁, 年) (14, e086845, 2024)

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論文内容の要旨

INTRODUCTION

Osteoporosis is characterised by decreased bone strength and increased fragility fracture risk. Bone strength depends on the density of bone as well as the integrity of the tissue, both of which decrease with increasing age and disuse. As population ageing has accelerated in developed countries, this condition is becoming more of a concern. For example, in the USA, the prevalence of osteoporosis in adults aged ≥ 50 years in 2010 was 10.2% and is estimated to reach 13.6% by 2030. Among Japanese women aged ≥ 40 years, the prevalence of osteoporosis in the femoral neck was 26.5%. Osteoporosis is defined as a bone mineral density (BMD) of $\leq 70\%$ of peak bone mass according to the criteria of the Japanese Society for Bone and Mineral Research, and its prevalence in the lumbar spine (L2–L4) was previously reported to be 19.2%. To complicate this situation, when patients with osteoporosis develop fragility fractures, their health-related quality of life decreases. Moreover, the mortality rate at 1 year following a hip fracture is quite high at 36%.

A key aspect of the Japanese diagnostic criteria for osteoporosis is the inclusion of fracture events that should be prevented as part of the diagnosis. A medical history of a hip or vertebral fracture, which are the most typical fragility fracture sites, is sufficient for diagnosing osteoporosis, regardless of BMD. However, it is essential to intervene in patients with osteoporosis before the development of these fractures by assessing BMD. In the presence of other fragility fractures, osteoporosis is diagnosed if BMD is less than 80% of the young adult mean (YAM). In the absence of a history of fragility fractures, osteoporosis is diagnosed at a YAM of 70% or less. Many patients with low BMD remain underdiagnosed, and those diagnosed with osteoporosis often do not take appropriate medications. Moreover, while patients aged ≥ 65

years are screened for osteoporosis using BMD, the rate of screening for those aged ≥ 66 years is only 56%, with screening rates among physicians and hospitals varying widely at 19–97% and 26–91%, respectively.

As osteoporosis risk significantly increases with age, an appropriate approach for its treatment is needed to address Japan's super-ageing society (ageing rate $>21\%$). As Japan is undergoing a more rapid ageing process than other developed nations, it currently has over 30million people aged ≥ 65 years (one in four people), and this number is predicted to peak at approximately 39million by 2042. However, osteoporosis screening tests and treatments are insufficient despite the large number of patients in Japan. BMD screening in Japan is performed in only 4–5% of the population, coupled with a low target age (>40 years). There are limited data on how many women aged ≥ 65 years are screened using BMD tests.

Early diagnosis can mitigate osteoporosis and prevent fragility fractures through proper treatment, and timely identification and treatment may help patients increase their health-related quality of life. In this study, we investigated how many women aged ≥ 65 years were examined using BMD tests and how many people are treated for osteoporosis in a rural community hospital in Japan, representing a progressively ageing society. Additionally, we aimed to clarify who tended to be examined. As Japan is a global pioneer in terms of an ageing society, our results may be of value beyond the Japanese population.

MATERIALS AND METHODS

Design was cross-sectional retrospective study. Setting was department of General Medicine from a rural community hospital in Japan. Participants was a total of 984women aged ≥ 65 years who were recommended to undergo osteoporosis screening were included. Primary and secondary outcome measures were bone mineral density (BMD) testing rates and characteristics of patients who underwent these tests, including diagnosis and treatment rates for osteoporosis. The study protocol was approved by the Research Ethics Committee of Iinan Hospital.

RESULTS AND DISCUSSION

A total of 984 patients were included in this study, with a median age of 81 (73–87) years, average height of 147.3 ± 6.6 cm and average body weight of 47.9 ± 9.8 kg. There were 695 participants aged ≥ 75 years (71%), 137 (14%) who underwent BMD tests, 134 (14%) who required nursing care, 21 (2.1%) who had a habit of drinking, five (0.5%) who smoked, 39 (4.0%) who took steroids and 466 (47%) who used polypharmacy. Regarding comorbidities, 221 (22%) had diabetes mellitus, 33 (3.4%) had rheumatoid arthritis, 226 had chronic kidney disease, and 21 (2.1%) had Basedow disease. A total of 404 participants (41%) were diagnosed with osteoporosis. Among these patients, 186 (19%) started medication for osteoporosis, 214 (22%) had already taken medications for osteoporosis, and 111 (11%) had visited another hospital and

had received medication before visiting this hospital. Regarding medication type, 128 participants (13%) received bisphosphonates, eight (0.8%) received denosumab, 17 (1.7%) received teriparatide, 78 (7.9%) received calcium, and 137 (14%) received vitamin D. 78 participants (7.9%) visited an orthopaedist in addition to a generalist at this hospital. In univariate association with BMD testing rate, age ($p=0.046$); requirement for nursing care ($p=0.0072$); use of bisphosphonates ($p<0.0001$), teriparatide ($p<0.0001$), calcium ($p<0.0001$) and vitamin D ($p<0.0001$); fragility fractures ($p<0.0001$); vertebral fractures ($p<0.0001$); and orthopaedic status ($p<0.0001$); significantly differed between patients who underwent BMD testing and those who did. In multivariate associations with BMD testing rate The multivariate logistic model revealed that age (OR 0.95; 95% CI 0.94 to 0.97, $p=0.0002$), requirement for nursing care (OR 0.38; 95%CI 0.16 to 0.90; $p=0.027$), bisphosphonate use (OR 4.02; 95%CI 2.37 to 6.84; $p<0.0001$) vertebral fractures (OR 3.58; 95%CI 1.77 to 7.25; $p=0.0004$) and orthopaedists (OR 4.65; 95%CI 2.60 to 8.32; $p<0.0001$) were significantly associated with BMD testing rates.

The rate of BMD tests for women aged ≥ 65 years was low (14%), despite the members of this age group being the target group for osteoporosis screening. Furthermore, old age and a high requirement for nursing care were associated with a low screening rate.

The low screening rate for BMD may be attributed to various factors, including physician (generalists and orthopaedists) and patient unawareness or disinterest in the risk factors for osteoporosis, patients being afraid of the side effects of osteoporosis medication, a lack of equipment for measuring BMD and the difficulty of performing BMD tests in rural areas due to poor transportation facilities.

Although advanced age and a high requirement for nursing care are risk factors for osteoporosis, we found that patients with these risk factors tended not to undergo BMD tests. The concept of ageism is attracting increasing attention in medicine and refers to the tendency of older adults to be undertriaged or treated with inappropriate medication. In osteoporosis treatment, old age and a high requirement for nursing care can lead to low treatment rates. Moreover, owing to advanced age, patients may refrain from voicing symptoms or seeking treatment, even if they have been previously diagnosed with osteoporosis (self-ageism). Informed consent and personalised treatment should be provided regardless of age.

CONCLUSION

The management of osteoporosis in a rural Japanese community hospital was found to be inadequate. The rate of BMD testing was low, particularly among older adults and those requiring nursing care. This finding suggests that osteoporosis may be underdiagnosed in many cases in this population or diagnosed but not appropriately followed up. Further cohort studies and intervention strategies are needed to fully investigate these issues.