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Male Osteoporosis Awareness in the Elderly: an Analysis of Dual-Energy X-Ray Absorptiometry Use in Australia Between 1995 and 2015

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Abstract

Osteoporosis is commonly perceived to be a disease confined to aging females, despite ongoing educational interventions. There are few data on the temporal change of dual-energy X-ray absorptiometry (DXA) use in aging males compared to females. Australian Medicare DXA claims between 1995 and 2015 were analyzed to investigate gender differences and temporal change of DXA use in males and females aged 45–85 yr. In females aged 45–54 and 55–64 yr, there was a progressive increase in DXA claims per capita between 1995 until 2002, with little subsequent change from 2002 to 2015 in the younger group, but a slow subsequent increase in females aged 55–64 yr. In males aged 45–54 and 55–64 yr, there was a progressive increase in DXA claims per capita between 1995 and 2002 with an ongoing slow increase from 2002 to 2015. In older females and males aged 65–74, 75–84, or ≥85 yr, there was a progressive increase in DXA claims per capita between 1995 and 2002, with a slow increase thereafter until 2007. After 2007, following the introduction of Medicare eligibility for age over 70, claims per capita increased sharply in all 3 age groups, with a subsequent ongoing increase. The male : female claim ratio in all groups demonstrates low relative male DXA use, with the ratio consistently below 1.0. Following the 2007 Medicare change, the male : female ratio improved in the 65–74, 75–84, and ≥85 age groups. The rate of increase in the male : female ratio in subjects ≥85 yr was significantly greater than that in the 65–74 ($p < 0.001$) and 75–84 ($p < 0.001$) age groups. DXA use in males is consistently lower than that in females. Government funding intervention appears to have been most effective in relation to very elderly males over 85 yr but less so in relation to the age group 65–84. There is a need for improved education of health professionals about the risk of osteoporosis in males aged 65–84 yr.

Key Words: Densitometry; elderly; osteoporosis.

Introduction

Osteoporosis-related fractures represent a major and increasing problem for the health-care system in most Western societies. With the projected population over 75 yr of age estimated to increase significantly over the ensuing 20 yr *(1)*, the increased demand for resources to treat osteoporotic fractures will impose an even greater burden on Western health-care systems in the next quarter of this century.

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The increasing use of diagnostic tools for osteoporosis, particularly dual-energy X-ray absorptiometry (DXA), and the availability of a number of effective therapies for osteoporosis present an opportunity to, in part, prevent the projected increase in osteoporotic fractures. Osteoporosis is, however, commonly perceived by many to be a disease mainly in aging females *(2)* with possible inadequate attention to osteoporosis in aging males. There is limited published data on relative gender DXA use in the 2 genders in Australia. Brennan et al *(3)* reported more frequent referrals in females than in males with an increase between 2003 and 2010 in regional Australia. Interestingly, the improvement was greater in males aged 70–79 yr compared to males aged 80–84 yr, although the difference was not

quite statistically significant in the sample size (n = 1280). There are no data on the national use of DXA in elderly males vs females. Factors such as social isolation, depression, and the attitude of the medical profession potentially may adversely influence DXA use in the health-care system by elderly males.

In Australia, medical imaging is for the great majority of investigations, partly or wholly subsidized through the Federal Government's Medicare system of health-care funding, which has been operational since 1984. Medicare funding for DXA was introduced in 1994 for patients with osteoporosis presumptively diagnosed on the basis of a minimal trauma fracture or a previously low BMD measurement, as well as a number of conditions associated with increased risk of osteoporosis (Medicare items 12306, 12312, 12315, and 12321). These criteria remained largely unchanged until April 2007. At that time, an additional criterion for subsidized Medicare access to DXA was introduced for elderly males or females over the age of 70 yr (Medicare item 12323). This coincided with the expanded eligibility of government-subsidized bisphosphonate therapy for osteoporosis, based on DXA criteria. The Australian Government Department of Human Service's records of the patient claims for DXA in Australia, since the introduction of Medicare reimbursement, present a unique opportunity to review the change in the use of DXA over the last 20 yr. In particular, the data provide an opportunity to assess the efficacy of the strategy used by the Australian Government to improve the use of DXA in the high-risk elderly group aged over 70 yr and to examine the temporal change in DXA use in elderly males vs females.

We examined in detail the number of Australian Medicare DXA claims between 1995 and 2015 as an index of the use of DXA in middle aged and elderly subjects.

Materials and Methods

Deidentified yearly data for Australian Medicare DXA claims were obtained from the Australian Government Department of Human Service, Medicare Item Statistic Reports website for all item numbers pertaining to DXA. These data contain figures for the total number of DXA scans, reimbursed by Medicare, performed in Australian males and females of all ages between 1995 and 2015 (item numbers 12306, 12312, 12315, 12321, and 12323). For the purposes of the present study, we examined data for each year, divided into males and females, and broken down into 5 age brackets: 45–54, 55–64, 65–74, 75–84, and ≥85. Australian population figures at all ages studied were obtained from official census data obtained by the Australian Bureau of Statistics *(4)*. For all years examined, as well as for the different age groups, the DXA Medicare claims data were expressed per 100,000 population.

Change of claims vs time was modeled for each age group in males and females using linear regression, and generalized linear models were used to compare rates of change between age groups. The relative use of DXA in males vs females was assessed by calculating the ratio of claims per capita in males divided by claims per capita in females, to derive a male : female claim ratio in each age group. In the 3 other elderly groups, the male : female ratio was also derived using DXA claims as a percentage of the population in males and females, calculated using the number of claims from Medicare and population data from the Australian Bureau of Statistics census *(4)*. DXA claims as a percentage of the population in males was divided by the corresponding values in females, to derive the second estimate of the male : female claim ratio in each of the 3 older age groups.

Results

Total Medicare DXA claims showed a steady increase over the 20 yr from 1995 to 2015, for both males (1884 increasing to 89,266) as well as females (19,494 increasing to 288,956). This was also true in DXA claims per capita, with claims from females higher than those from males in all years studied (Figs. 1 and 2). In females (Fig. 1), the relatively younger age groups 45–54 and 55–64 demonstrated a progressive increase in DXA claims per capita following the introduction of Medicare Benefits Schedule rebates in 1994 until approximately 2002 ($p < 0.001$). Subsequently, the claims per capita in females aged 45–54 yr have not changed significantly with time, whereas the change in claims per capita in females aged 55–64 yr has continued at a slower pace between 2002 and 2015 ($p < 0.001$). This pattern, although significantly lower in claims per capita, is similar in males (Fig. 2), but there was an ongoing slow increase in claims per capita seen in both the 45–54 and 55–64 age groups between 2002 and 2015 ($p = 0.001$ and $p < 0.001$, respectively).

In the 3 older age groups of 65–74, 75–84, and ≥85 yr of age, in both females and males, there was a similar progressive increase in DXA claims per capita over time between 1995 and 2007 (Figs. 1 and 2, $p < 0.001$ all groups). After April 2007, following the additional Medicare eligibility criterion for subjects aged 70 yr and above, DXA Medicare claims per capita demonstrated a sharp increase in all 3 older age groups in both genders (Figs. 1 and 2). There has been a slower ongoing increase in Medicare claims per capita in older males and females subsequently until 2015 ($p < 0.001$).

The per capita use of DXA in males vs females is shown as the male : female ratio in all 5 age groups between 1995 and 2015 (Fig. 3). In all age groups, DXA use in males is low compared to females, with the male : female ratio consistently less than 0.5. There is, however, an increase in relative DXA use in males across all ages over the 20 yr of observation ($p < 0.001$ all groups).

To examine the impact of the Australian Government's initiative in 2007, allowing Medicare funded DXA for all individuals over 70 yr, the data from subjects 65–74, 75–84, or ≥85 yr were compared in more detail by using both the male : female ratio derived from DXA claims per capita (Fig. 3), and the male : female ratio DXA claims obtained using Medicare scan numbers and census population