

visive. On balance, I would implement immediate system changes relating to cost and clinician recommendations, as well as a public health information campaign. I would closely monitor uptake and if insufficient, move toward mandates with narrow, reasonable opt-outs.

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## RESEARCH LETTER

### Screening for Osteoporosis in Men Receiving Androgen Deprivation Therapy

**To the Editor:** Prostate cancer is the most common cancer in men.<sup>1</sup> One in 2 men with prostate cancer is expected to receive androgen deprivation therapy (ADT). Use of ADT is associated with accelerated bone loss and an increased risk of fractures.<sup>2</sup> To better characterize fracture risk and optimize bone health, a bone mineral density (BMD) test has been recommended prior to ADT initiation since 2006 in Canada<sup>3</sup> and elsewhere.<sup>4</sup> Low rates of BMD use have been reported by single centers.<sup>5</sup> We examined the rate of BMD testing in men starting ADT in the province of Ontario, Canada, between 1995 and 2008.

**Methods.** We identified men aged 66 years or older who were starting ADT for prostate cancer, using linked administrative databases at the Institute for Clinical Evaluative Sciences in Ontario, Canada (population approximately 11 million) and the Ontario Cancer Registry as previously described.<sup>2</sup> These databases have been shown to be 85% to 99% complete and accurate. Men diagnosed between January 1, 1995, and December 31, 2008, and receiving at least 6 months of continuous medical ADT (luteinizing-hormone-releasing hormone agonists, antiandrogens, or both) or undergoing orchiectomy were included. The BMD tests used dual x-ray absorptiometry within 2 years of starting ADT and were captured using outpatient claims. Sociodemographic characteristics, comorbidity information (including prior diagnoses of osteoporosis and fragility fractures, ie, hip, spine, or wrist), and prior bisphosphonate use were obtained from inpatient and outpatient records using specific diagnostic, procedure, and claims codes as previously described.<sup>2</sup>

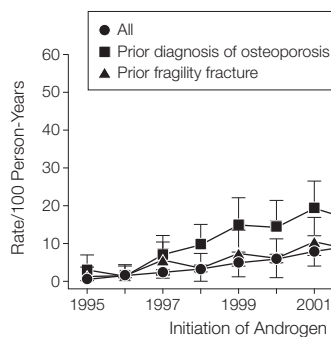
We examined whether a BMD test was performed over time using counts (per 100 person-years) and multivariable logistic regression using SAS version 9.2 (SAS Institute Inc). Level of significance was a *P* value of less than .05 and statistical tests were 2-sided. Study approval was obtained from the institutional research ethics board; individual patient consent was waived.

**Results.** We identified 33 036 men (mean age: 76.0 years; range: 66-100 years) with prostate cancer who initiated ADT

during the study period. A prior BMD test was performed in 1591 men (4.8%), 1332 (4.0%) had a prior diagnosis of osteoporosis, 1053 (3.2%) had a prior fragility fracture, and 808 (2.4%) were taking bisphosphonates at baseline.

The use of BMD tests within 2 years of starting ADT ranged from 0.5 per 100 person-years in 1995 to 18.0 per 100 person-years in 2008 (FIGURE). Even among ADT users at high risk of osteoporosis (prior fragility fractures) or fractures (prior diagnosis of osteoporosis), BMD test ordering remained low, never reaching 50% of patients (Figure). Predictors of greater BMD testing included younger age, not living in a rural area, later start year of ADT, prior osteoporosis, prior BMD test, prior bisphosphonate use, and having a regular primary care physician (all *P* < .01) (TABLE).

**Figure.** Rates of Bone Mineral Density Test Ordering After Starting Androgen Deprivation Therapy



Error bars indicate 95% CIs.

**Table.** Predictors of Bone Mineral Density (BMD) Test Ordering Within 24 Months of Initiating Androgen Deprivation Therapy (ADT)

	Odds Ratio (95% CI) <sup>a</sup>
Age range, y	
65-74	2.81 (2.41-3.27)
75-84	2.02 (1.73-2.36)
≥85	1 [Reference]
Living in rural area	0.57 (0.50-0.65)
Income quintile	
1 (lowest)	0.74 (0.65-0.84)
2	0.84 (0.75-0.95)
3	0.87 (0.77-0.98)
4	0.85 (0.76-0.96)
5 (highest)	1 [Reference]
Year of starting ADT (per year after 1995)	1.26 (1.25-1.27)
Prior diagnosis of osteoporosis, % <sup>b</sup>	1.48 (1.24-1.76)
Prior fragility fracture, % <sup>c</sup>	0.98 (0.79-1.22)
Prior BMD test, % <sup>b</sup>	2.53 (2.22-2.89)
Prior bisphosphonate use	1.56 (1.30-1.88)
Regular primary care physician	1.30 (1.20-1.40)

<sup>a</sup>From the multivariable model, which was adjusted for all of the variables in this table. The odds ratios that are greater than 1 indicate a greater likelihood of undergoing a BMD test.

<sup>b</sup>The lookback period was 4.5 years.

<sup>c</sup>The lookback period was 7.75 years.

**Comment.** Despite growing awareness since the mid-1990s about the risk of fractures among ADT users, our findings demonstrate a low uptake of BMD testing in the province of Ontario. An important contributing factor may be the lack of guidelines advising routine BMD screening during most of the study period. We used a relatively generous window of 24 months after ADT initiation; a narrower interval would have led to even lower BMD use rates. Several clinical risk factors such as prior osteoporosis increased the likelihood of receiving a BMD test. Although BMD testing improved over time, it remained low up to 2008, even in higher risk patients despite universal health care coverage. Key limitations are our inability to determine indication for ADT, inability to distinguish between physician failure to order a BMD test and patient refusal, and unclear generalizability to other provinces or countries.

Use of the BMD test and treatment of men at high risk of fracture may be cost-effective,<sup>6</sup> and multiple treatment options for ADT-induced osteoporosis are available. Education targeted to ADT prescribers and primary care physicians may reduce ADT-associated skeletal morbidity.

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**Author Contributions:** Dr Alibhai had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

*Study concept and design:* Alibhai, Cheung, Paszat.

*Acquisition of data:* Alibhai, Yun, Paszat.

*Analysis and interpretation of data:* Alibhai, Yun, Cheung, Paszat.

*Drafting of the manuscript:* Alibhai, Paszat.

*Critical revision of the manuscript for important intellectual content:* Yun, Cheung.

*Statistical analysis:* Yun, Paszat.

*Obtained funding:* Alibhai.

*Administrative, technical or material support:* Paszat.

*Study supervision:* Alibhai, Paszat.

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