POPULATION BASED STUDY OF BASELINE BONE DENSITY SCREENING IN PROSTATE CANCER PATIENTS TREATED WITH LONG-TERM ANDROGEN DEPRIVATION THERAPY

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INTRODUCTION

Androgen deprivation therapy (ADT) is a cornerstone of advanced prostate cancer (PCa) treatment

- Most frequently used systemic treatment for men with PCa
- However, wide range of adverse effects resulting from androgen suppression
- Bone metabolism is particularly affected

Loss of bone mineral density (BMD)

- Accelerated loss of BMD during first year of ADT
  - 5 to 10 fold increased rate of loss compared to healthy men
- BMD loss results in increased risk of fractures
  - 50% increased risk compared to non-ADT users
- Several clinical guidelines' recommendations for men starting ADT:

Baseline BMD testing, with a dual x-ray absorptiometry (DXA) scan, should be performed in men starting ADT to properly assess baseline risk of fracture.

- Despite these recommendations, previous research examining rates of BMD testing in men initiating ADT show very low rates
  - USA
    - ~10% from 2001-2008

OBJECTIVE

- Examine the proportion of men initiating long-term ADT who undergo BMD testing in Quebec in a contemporary cohort
- Identify factors associated with BMD testing

METHODS

Design :

- Retrospective, observational cohort

Data sources : Quebec public healthcare administrative databases

- Régie de l'assurance maladie du Québec (RAMQ) and MED-ECHO

Cohort definition :

- Initiated ADT (LHRH agonist/antagonist drugs or orchiectomy) from 2000-2015
  - Received long-term ADT and continuous treatment for at least 12 months
- Non metastatic at time of ADT initiation

Primary outcome: Receipt of any BMD testing (DXA scan) during screening window

Secondary outcomes: Receipt of baseline BMD testing

Receipt of follow-up BMD testing

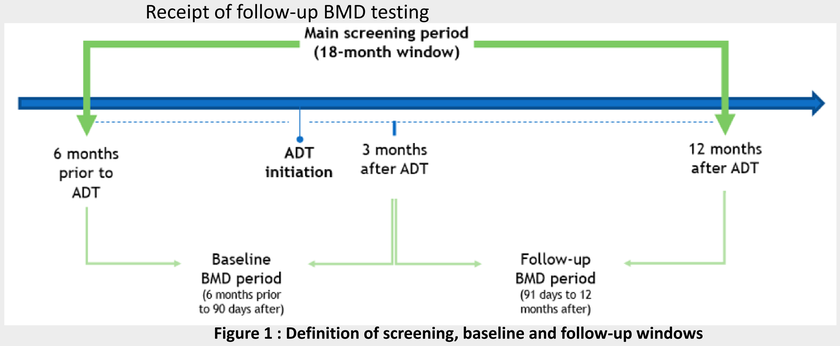


Figure 1 : Definition of screening, baseline and follow-up windows

Statistical Analysis:

- Multivariable generalized linear mixed model (with logit link) to identify factors associated with receipt of BMD test (accounting for clustering of ADT-prescribing physician [considered as random effect])
  - Selection of variables determined a priori (patient-level variables, PCa-related variables, osteoporosis-related variables)
  - Results from regression are presented as odds ratios (ORs) with 95% confidence intervals (CI)

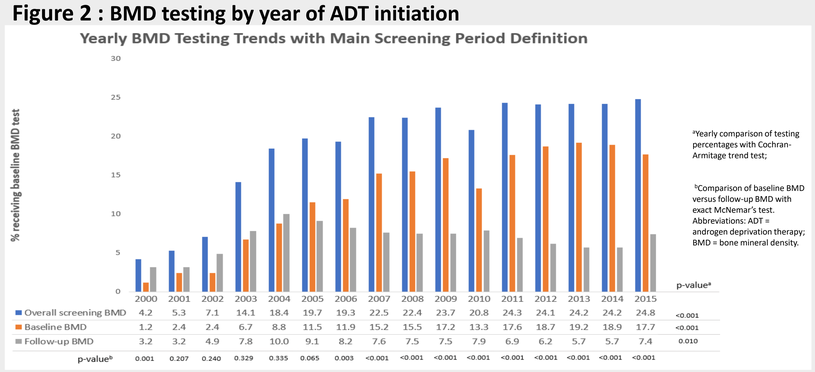
RESULTS

Table 1: Cohort characteristics

Variables, n (%)	Total N = 18,365
Age at ADT	
< 70	4,287 (23.3)
70-74	4,064 (22.1)
75-80	4,662 (25.4)
> 80	5,352 (29.1)
Charlson comorbidity score	
0-1	15,680 (85.4)
2-3	2,130 (11.6)
≥4	555 (3.0)
Region of residence	
Urban	12,212 (66.5)
Rural	6,153 (33.5)
Prior osteoporosis diagnosis	192 (1.1)
Prior use of bisphosphonates	1,093 (5.9)
Prior diabetes diagnosis	2,624 (14.3)
Prior rheumatoid arthritis diagnosis	205 (1.1)
Prior hyperthyroidism diagnosis	33 (0.2)
Prior chronic corticosteroids	194 (1.1)
Prior fracture	876 (4.8)
Year of ADT initiation	
2000-2001	2,496 (13.6)
2002-2003	2,337 (12.7)
2004-2005	2,404 (13.1)
2006-2007	2,443 (13.3)
2008-2009	2,304 (12.6)
2010-2011	2,194 (12.0)
2012-2013	2,176 (11.9)
2014-2015	2,011 (11.0)
Prior local PCa treatment	6,670 (36.3)
Specialty of ADT prescriber	
Urology/Radiation Oncology	14,656 (79.8)
Other	3,709 (20.2)
ADT type	
LHRH agonist/antagonist	17,937 (97.7)
Orchiectomy	428 (2.3)

Abbreviations: SD = standard deviation; PCa = prostate cancer; ADT = androgen deprivation therapy

Figure 2 : BMD testing by year of ADT initiation



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	p-value[a]
Overall screening BMD	4.2	5.3	7.1	14.1	18.4	19.7	19.3	22.5	22.4	23.7	20.8	24.3	24.1	24.2	24.2	24.8	<0.001
Baseline BMD	1.2	2.4	2.4	6.7	8.8	11.5	11.9	15.2	15.5	17.2	13.3	17.6	18.7	19.2	18.9	17.7	<0.001
Follow-up BMD	3.2	3.2	4.9	7.8	10.0	9.1	8.2	7.6	7.5	7.5	7.9	6.9	6.2	5.7	5.7	7.4	0.010
p-value[b]	0.001	0.207	0.240	0.329	0.335	0.065	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	

Table 2 : Multivariable analysis of variables associated with BMD testing

	ANY BMD TEST DURING SCREENING PERIOD				BASELINE BMD TEST				FOLLOW-UP BMD TEST			
FACTORS	OR	95% CI		p-value	OR	95% CI		p-value	OR	95% CI		p-value
Year of ADTi (ref: 2000-2001)		-				-				-		
2002-2003	*2.45*	*1.92*	*3.13*	*<0.001*	*2.45*	*1.69*	*3.54*	*<0.001*	*2.04*	*1.53*	*2.72*	*<0.001*
2004-2005	*5.71*	*4.54*	*7.19*	*<0.001*	*6.64*	*4.72*	*9.32*	*<0.001*	*3.36*	*2.57*	*4.41*	*<0.001*
2006-2007	*5.83*	*4.63*	*7.34*	*<0.001*	*8.80*	*6.28*	*12.32*	*<0.001*	*2.56*	*1.94*	*3.38*	*<0.001*
2008-2009	*6.25*	*4.96*	*7.88*	*<0.001*	*10.48*	*7.48*	*14.68*	*<0.001*	*2.28*	*1.71*	*3.03*	*<0.001*
2010-2011	*5.62*	*4.44*	*7.11*	*<0.001*	*8.66*	*6.16*	*12.18*	*<0.001*	*2.27*	*1.70*	*3.03*	*<0.001*
2012-2013	*5.46*	*4.31*	*6.92*	*<0.001*	*10.16*	*7.23*	*14.27*	*<0.001*	*1.75*	*1.30*	*2.37*	*<0.001*
2014-2015	*5.26*	*4.13*	*6.69*	*<0.001*	*9.08*	*6.43*	*12.82*	*<0.001*	*1.91*	*1.41*	*2.58*	*<0.001*
Age (ref: < 70)		-				-				-		
70-74	1.13	1.00	1.28	0.054	1.10	0.95	1.27	0.198	1.14	0.96	1.34	0.131
75-80	1.00	0.88	1.13	0.976	1.06	0.92	1.23	0.404	0.97	0.82	1.14	0.688
> 80	*0.70*	*0.61*	*0.80*	*<0.001*	*0.75*	*0.64*	*0.88*	*<0.001*	*0.76*	*0.63*	*0.92*	*0.004*
Charlson score (ref: 0-1)		-				-				-		
2-3	*0.77*	*0.66*	*0.89*	*0.001*	*0.74*	*0.61*	*0.88*	0.001	0.85	0.69	1.04	0.117
≥ 4	*0.61*	*0.45*	*0.83*	*0.002*	*0.55*	*0.37*	*0.81*	0.002	0.73	0.48	1.12	0.155
Prior local treatment (ref: no)		-				-				-		
Yes	*1.52*	*1.38*	*1.69*	*<0.001*	*1.43*	*1.27*	*1.61*	*<0.001*	*1.45*	*1.26*	*1.67*	*<0.001*
Rheumatoid arthritis (ref: no)		-				-				-		
Yes	*1.66*	*1.14*	*2.43*	*0.009*	*2.09*	*1.36*	*3.21*	*0.001*	1.05	0.60	1.83	0.878
Diabetes (ref: no)		-				-				-		
Yes	1.00	0.88	1.14	0.978	1.12	0.97	1.30	0.132	0.90	0.75	1.08	0.261
Hyperthyroidism (ref: no)		-				-				-		
Yes	0.82	0.29	2.33	0.703	1.12	0.35	3.53	0.847	0.43	0.06	3.21	0.408
Osteoporosis (ref: no)		-				-				-		
Yes	*2.10*	*1.44*	*3.06*	*<0.001*	*1.95*	*1.26*	*3.01*	*0.003*	*1.88*	*1.18*	*3.01*	*0.008*
Fracture (ref: no)		-				-				-		
Yes	1.08	0.89	1.33	0.432	1.15	0.91	1.46	0.240	0.92	0.69	1.23	0.594
Prior bisphosphonates (ref: no)		-				-				-		
Yes	*1.47*	*1.23*	*1.77*	*<0.001*	*1.41*	*1.15*	*1.74*	*0.001*	*1.50*	*1.18*	*1.91*	*0.001*
Prior chr corticosteroids (ref: no)		-				-				-		
Yes	*1.54*	*1.03*	*2.30*	*0.035*	1.34	0.83	2.17	0.231	1.34	0.77	2.34	0.295
Prescribing specialty (ref: other)		-				-				-		
Urology/Radiation oncology	1.09	0.94	1.25	0.251	1.04	0.88	1.24	0.214	1.00	0.83	1.21	0.987
Residence (ref: urban)		-				-				-		
Rural	*0.73*	*0.64*	*0.84*	*<0.001*	*0.69*	*0.59*	*0.82*	*<0.001*	*0.72*	*0.63*	*0.82*	*<0.001*

LIMITATIONS

- Administrative data:
  - Lacks patient, clinical, and disease variables (performance status, tumor stage, grade, etc.)
- Cannot account for patient refusal
- BMD testing outside RAMQ public insurance coverage
  - BMD testing is non-urgent, so patients less likely to pay through private insurance
- No consensus for explicit timing of appropriate BMD testing
  - Sensitivity analyses conducted with varying definitions of screening window
    - Consistent results (not shown on poster)

CONCLUSION

- BMD testing is still low (24.8% in main screening period)
  - Increased from earlier years and remained stable
- Potential gaps in care in these populations
  - Older age
  - Greater comorbidity
  - Rural residence
- Overall, there may be a need for increased emphasis on bone health screening/management in PCa-specific guidelines

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