Health services utilization differences between metastatic (M1) and non-metastatic (M0) prostate cancer (PCa) patients

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Background

Metastatic prostate cancer (PCa) is initially diagnosed in up to 5% of PCa patients, and is an important clinical concern as the prognosis for patients with metastatic PCa is generally poor, with an average survival of 24-48 months.

The skeleton is the most common site of metastasis, with an estimated 70% of patients with stage 4 PCa developing bone metastases. Patients with metastatic bone disease are at risk of skeletal-related events (SRE), such as pathologic fractures, bone surgery, radiation therapy to the bone, and spinal cord compression.

Lung and liver are other common sites of metastasis among PCa patients.

Studies examining the burden of metastatic PCa have largely focused on the impact of bone metastases and SREs on costs. However, there is limited information about the clinical consequences and burden with regard to health services utilization associated with a diagnosis of metastatic PCa.

Objective

To examine differences in health services utilization, measured by skilled nursing facility (SNF) stay, hospice stay, hospitalization, use of walking aid, use of wheelchair, and use of oxygen, between stage IV non-metastatic (M0) and stage IV M1 patients in the one year prior to and post-diagnosis.

Methods

Dataset: Linked Surveillance Epidemiology and End Results cancer registry and Medicare claims (SEER-Medicare) data

- **Study inclusion and exclusion criteria:**
  - AJCC (American Joint Committee on Cancer) stage 4 prostate cancer from 2005-2007 with claims data from 2004-2008
  - Age 66+ at the time of diagnosis
  - Continuously enrolled in Medicare Parts A and B for the 12 months immediately prior to and including the month of diagnosis
  - Enrolled in an HMO during the 12 months immediately prior to and including the month of diagnosis
  - History of cancer within 5 years prior to the prostate cancer diagnosis
  - Unknown diagnosis month
  - Prostate cancer found on autopsy or death certificate

- **Outcomes of interest**
Claims-based indicators of health services utilization during the one year before diagnosis and the one year after diagnosis, including:
  - Skilled nursing facility (SNF) stay
  - Hospice stay
  - Hospitalization
  - Use of walking aids
  - Use of wheelchairs
  - Use of home oxygen

- **Statistical analysis**
  - The proportions of M0 and M1 patients utilizing each health service in the year before and after diagnosis were calculated. We compared the change in proportion of health services utilization over time (from pre-diagnosis to post-diagnosis) between M1 and M0 patients.

  - Separate multivariable logistic regression models were used to examine the association between a diagnosis of M1 disease and the following outcomes in the one year following diagnosis: 1) SNF use; 2) Hospice use.
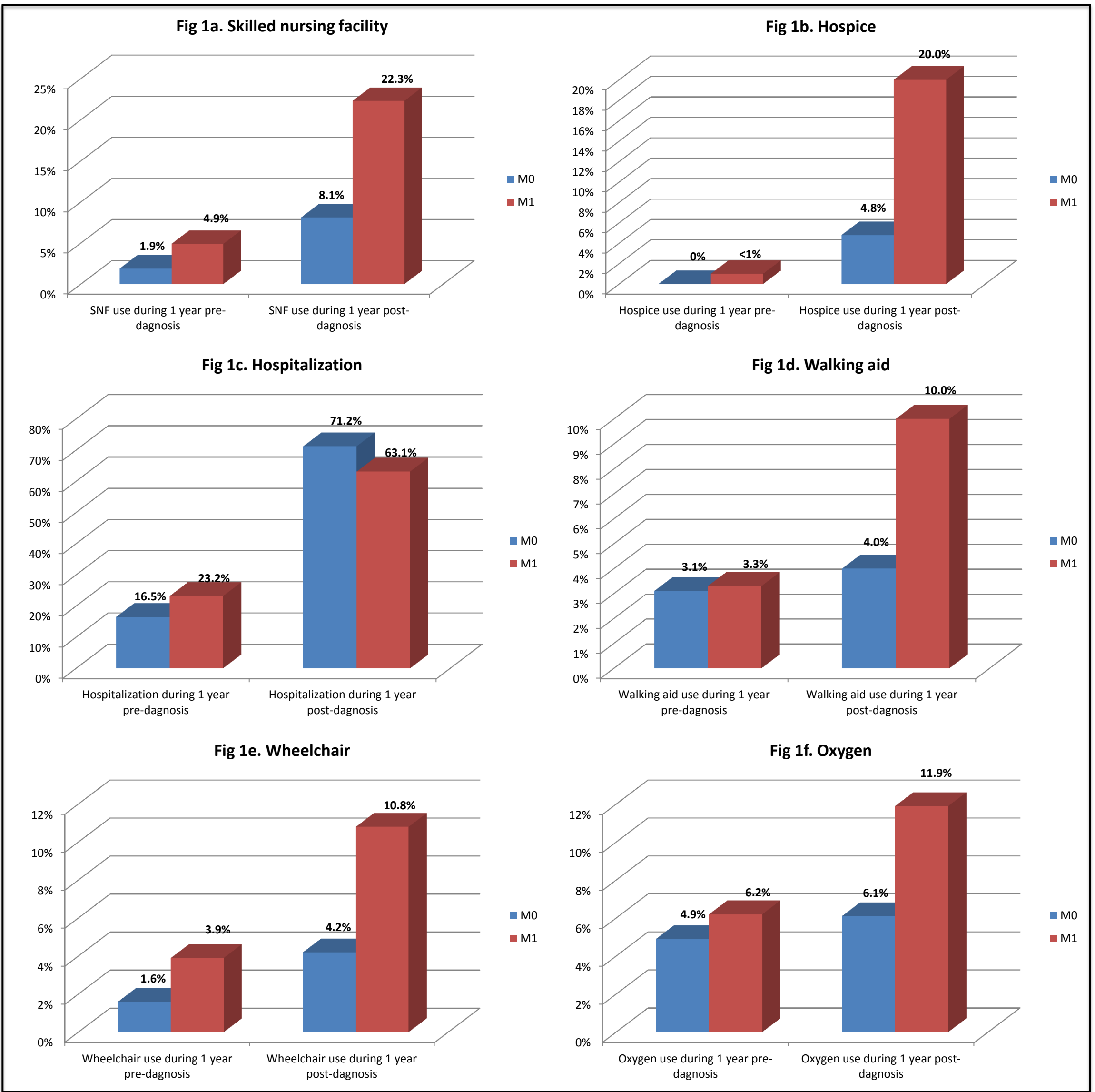
Results

- The final study sample included 3,379 men diagnosed with incident stage 4 prostate cancer, of which 671 (19.9%) had M0 and 2,708 (80.1%) had M1 disease.
- The mean (median) age of the sample was 78 (77) years.

Table 1. Descriptive statistics for patients diagnosed with stage 4 prostate cancer in 2005-2007 (N=3,379)

	Full Sample (N=3,379)		M1 disease (N=2,708)		M0 disease (N=671)		P-value
	N	Col %	N	Col %	N	Col %	
Age							< 0.01
66-69	635	18.8	375	13.9	260	38.8	
70-74	671	19.9	499	18.4	172	25.6	
75-79	662	19.6	555	20.5	107	16.0	
80-84	715	21.2	645	23.8	70	10.4	
85+	696	20.6	634	23.4	62	9.2	
Race/ethnicity							0.01
White non-Hispanic	2619	77.5	2,096	77.4	523	77.9	
African American non-Hispanic	382	11.3	326	12.0	56	8.4	
Hispanic	211	6.2	159	5.9	52	7.8	
Other	167	4.9	127	4.7	40	6.0	
Married	2062	61.0	1,583	58.5	479	71.4	< 0.01
Urban residence	2993	88.6	2,396	88.5	597	89.0	0.72
High PSA at baseline	2860	84.6	2298	84.9	562	83.8	0.48
Poorly Differentiated Tumor	2207	65.3	1,638	60.5	569	84.8	< 0.01
Charlson Comorbidity Index							< 0.01
Zero	1868	55.3	1,453	53.7	415	61.9	
One	686	20.3	547	20.2	139	20.7	
Two or higher	558	16.5	470	17.4	88	13.1	
Missing	267	7.9	238	8.8	29	4.3	
Performance status proxy* pre-diagnosis	871	25.8	739	27.3	132	19.7	<.0001

*Performance status proxy was measured by indicator for any use of skilled nursing facility stay, hospice stay, hospitalization, walking aids, wheelchairs, or home oxygen.

Figures 1a-f. Pre-post diagnosis differences in health services utilization during the one year before diagnosis and the one year after diagnosis (M0: N=671; M1:N=2,708)

Results

Table 2. Multivariable logistic regression results (Outcome=SNF use in 1 year post-diagnosis) (N=3,379)

	OR	95% CI	p-value
Metastatic disease	**1.89**	**(1.38 - 2.59)**	**<.0001**
Race/ethnicity			
White non-Hispanic		Reference	
African American non-Hispanic	1.03	(0.75 - 1.41)	0.86
Hispanic	0.97	(0.63 - 1.49)	0.89
Other	0.75	(0.45 - 1.27)	0.29
Age			
66-69		Reference	
70-74	1.28	(0.86 - 1.90)	0.22
75-79	2.50	(1.73 - 3.61)	<.0001
80-84	2.60	(1.81 - 3.75)	<.0001
85+	4.08	(2.84 - 5.85)	<.0001
Married	0.51	(0.42 - 0.61)	<.0001
Urban residence	1.24	(0.87 - 1.77)	0.23
High PSA at baseline	1.05	(0.82 - 1.35)	0.71
Poor tumor differentiation	0.63	(0.52 - 0.77)	<.0001
Charlson Comorbidity Index			
CCI = zero		Reference	
CCI = one	1.07	(0.84 - 1.38)	0.58
CCI = 2+	1.49	(1.14 - 1.96)	0.00
CCI missing	2.05	(1.39 - 3.02)	0.00
Performance status proxy* pre-diagnosis	1.79	(1.43 - 2.25)	<.0001
Primary care physician visit pre-diagnosis	1.15	(0.88 - 1.49)	0.30

C-statistic=0.754
*Performance status proxy was measured by indicator for any use of skilled nursing facility (SNF) stay, hospice stay, hospitalization, walking aids, wheelchairs, or home oxygen.
**Model also included the following covariates: region of SEER registry, year of diagnosis, percent speaking English but not well or not at all, median income for census tract.

Table 3. Multivariable logistic regression results (Outcome=Hospice use in 1 year post-diagnosis) (N=3,379)

	OR	95% CI	p-value
Metastatic disease	**3.22**	**(2.19 - 4.72)**	**<.0001**
Race/ethnicity			
White non-Hispanic		Reference	
African American non-Hispanic	0.90	(0.65 - 1.26)	0.545
Hispanic	0.92	(0.57 - 1.49)	0.746
Other	0.79	(0.45 - 1.39)	0.419
Age			
66-69		Reference	
70-74	1.27	(0.84 - 1.92)	0.250
75-79	1.90	(1.29 - 2.80)	0.001
80-84	2.09	(1.43 - 3.05)	<.0001
85+	3.58	(2.46 - 5.20)	<.0001
Married	1.00	(0.82 - 1.22)	0.991
Urban residence	1.85	(1.30 - 2.64)	0.001
High PSA at baseline	0.93	(0.72 - 1.20)	0.593
Poor tumor differentiation	0.57	(0.47 - 0.69)	<.0001
Charlson Comorbidity Index			
CCI = zero		Reference	
CCI = one	1.12	(0.87 - 1.45)	0.390
CCI = 2+	1.44	(1.09 - 1.91)	0.011
CCI missing	1.39	(0.92 - 2.11)	0.123
Performance status proxy* pre-diagnosis	1.69	(1.34 - 2.15)	<.0001
Primary care physician visit pre-diagnosis	1.07	(0.82 - 1.40)	0.626

C-statistic=0.736
*Performance status proxy was measured by indicator for any use of skilled nursing facility (SNF) stay, hospice stay, hospitalization, walking aids, wheelchairs, or home oxygen.
**Model also included the following covariates: region of SEER registry, year of diagnosis, percent speaking English but not well or not at all, median income for census tract.

Multivariable logistic regression results

Compared to M0 patients, patients with M1 disease had statistically significantly higher odds of SNF use in the one year following diagnosis (OR=1.89; 95% CI=1.38-2.59).

Patients with M1 disease had statistically significantly greater odds of hospice use in the one year post-diagnosis compared to patients with M0 disease (OR=3.22; 95% CI=2.19-4.72).

Conclusion

Overall, with the exception of hospitalization, we find greater increase in percentage of health services utilization from pre- to post-diagnosis period among M1 patients compared to M0 patients.

A diagnosis of M1 disease is associated with statistically significantly greater likelihood of SNF use and hospice use in the one year following diagnosis compared to a diagnosis of M0 disease.

High proportion of SNF and hospice use (>20%) in the one year post-diagnosis suggests that many M1 patients experience the debilitating effects of disease and require specialized care within a year of M1 diagnosis.

Acknowledgements

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