Productivity Loss Associated with Late versus Early Stage Cancer Diagnosis

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INTRODUCTION

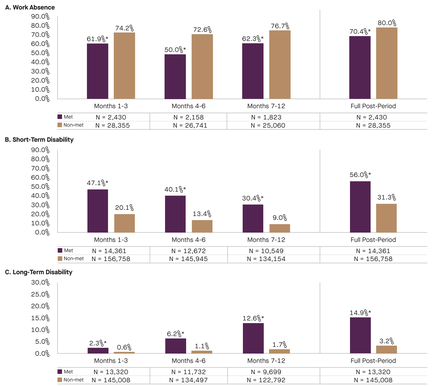
- The total economic burden of cancer reflects both medical costs and productivity loss due to employment change, absenteeism, presenteeism, and premature death of patients as well as caregiver burden[1]
- The elevated medical costs for patients diagnosed with late-stage versus early-stage cancers are well documented in the literature[2]
- Limited evidence is available regarding productivity loss of patients with cancer by stage at diagnosis[3]

OBJECTIVES

- This study estimated the magnitude of work absence (WA), short-term disability (STD), and long-term disability (LTD) of employees newly diagnosed with late stage, defined as metastatic (met) cancer versus early stage, defined as non-metastatic (non-met) cancer in the US

KEY RESULTS: PATIENTS NEWLY DIAGNOSED WITH LATE-STAGE CANCERS MISSED MORE THAN TWICE THE NUMBER OF WORKDAYS COMPARED TO THOSE WITH EARLY-STAGE CANCERS

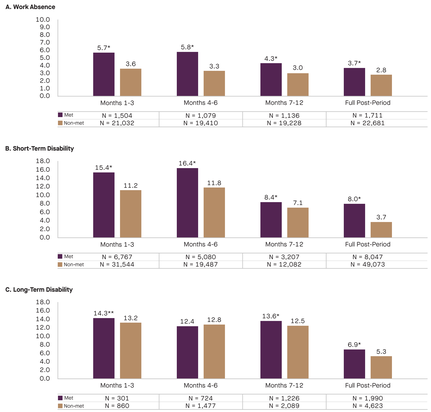
Figure 1. Proportion of Patients Claiming Work Loss by Post-Diagnosis Time Period



*p-value <0.001
Abbreviations: Met, Metastatic; Non-met, Non-Metastatic

- Throughout the first year after cancer diagnosis, more than 50% of patients had WA claims (**Figure 1a**)
- Significantly larger proportions of patients with mets had STD or LTD claims (**Figure 1b** and **1c**) (p-values <0.001 for all comparisons)

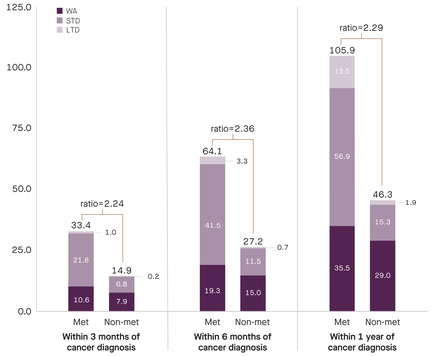
Figure 2. Mean Per Patient Per Month (PPPM) Workdays Lost Among Patients with ≥1 Day Lost by Post-Diagnosis Time Period



*p-value <0.001, **p-value <0.05
Abbreviations: Met, Metastatic; Non-met, Non-Metastatic

- Patients with mets had significantly higher numbers of WA, STD, and LTD days PPPM than patients without mets (**Figure 2a, 2b, and 2c**) (p-values <0.05 for all comparisons except months 4-6 for LTD)

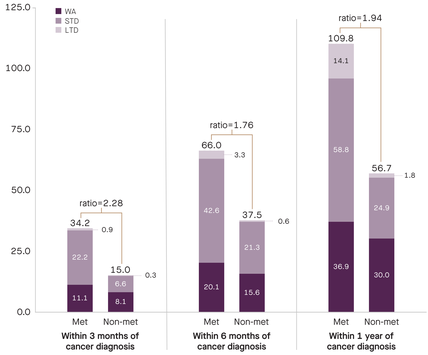
Figure 3. Mean Total Number of Days Missing from Work After Cancer Diagnosis in All Cancer Patients



Note: Aggregated results across WA, STD, and LTD cohorts and across different time periods including patients who contributed data in corresponding cohort and time periods.
Abbreviations: LTD, Long-term disability; Met, Metastatic; Non-met, Non-Metastatic; STD, short-term disability; WA, work absence

- Aggregating WA, STD, and LTD, the mean number of days missing from work for patients newly diagnosed with cancer with vs. without mets was 33.39 vs. 14.91 (ratio=2.24), 64.05 vs. 27.15 (ratio=2.36), and 105.93 vs. 46.29 (ratio=2.29) days within 3-, 6-, and 12-months after diagnosis (**Figure 3**)

Figure 4. Mean Total Number of Days Missing from Work After Cancer Diagnoses in Patients Age 50+



LTD, Long-term disability; Met, Metastatic; Non-met, Non-Metastatic; STD, short-term disability; WA, work absence

- Results were consistent for patients aged ≥50 (**Figure 4**)
- Results were also consistent for the five individual tumor types assessed (breast, lung, colon, pancreatic, and liver)

CONCLUSIONS

- Productivity loss is an important component of cancer burden. Employees diagnosed with late-stage cancer missed more than twice the number of workdays vs. those with early-stage cancer within the first year of cancer diagnoses
- While this study was unable to capture all aspects of indirect cost, such as presenteeism and caregiver burden, these results indicate that earlier detection of cancer may reduce productivity loss of patients

References

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2. McGarvey N, Gitlin M, Qi J, Chung KC. Increasing healthcare costs by stage and over time among patients diagnosed with cancer: 2006-2020. AMCP NEXUS; October 18-21, 2021.
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Disclosures

Study funded by GRAIL, LLC, a subsidiary of Illumina, Inc. ZC and KCC are employees of GRAIL, LLC, a subsidiary of Illumina, Inc., with equity in Illumina, Inc. OT, JN and MS are current or former employees of IBM Watson Health, which received funding from GRAIL, LLC to conduct this study. All financial relationships disclosed at abstract submission.

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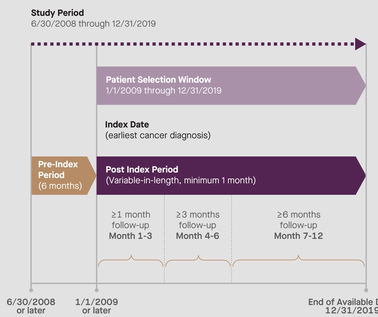
METHODS

- IBM MarketScan® Commercial Claims and Encounters and Health and Productivity Management Databases were used to select employees aged 18–64 years and newly diagnosed with cancer during 2009-2019 (≥1 inpatient or 2 outpatient claims ≥30 days apart and >6 months no cancer claims prior) (**Figure 5**)
- Patients were stratified by met status at cancer diagnosis
- Baseline characteristics assessed during the 6 months prior to diagnosis were summarized descriptively
- The proportions of patients who had any WA (e.g., paid-time off, sick-day leave), STD, or LTD claims, and number of days missing from work per patient per month (PPPM) were summarized 1-3, 4-6, and 7-12 months after diagnosis by met status
- Subgroup analyses were conducted by age (<50 vs. ≥50 years) and for select tumor types (breast, lung, colon, pancreatic, and liver)

Figure 5. Study Schema

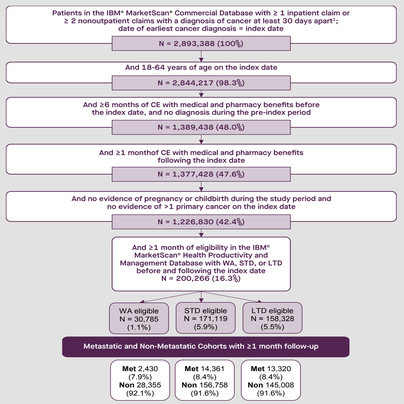


SUPPORTING DATA

Participants

- The numbers of patients newly diagnosed with cancer that were analyzed include 30,785 for the WA cohort, 171,119 for STD cohort, and 158,328 for LTD cohort (**Figure 6** and **Table 1**)
- Baseline characteristics for the WA cohort are presented in **Table 1** and were similar to those for the STD and LTD cohorts
- A minority (<10%) of patients had mets at cancer diagnoses: 7.9% for the WA cohort, 8.4% for the STD cohort, and 8.4% for the LTD cohort
- Across the three work loss cohorts:
  - Most patients were 50-64 years of age (mets 71%-75%, non-mets 71%-76%) and male (mets 54%-68%, non-mets 61%-73%)
  - Median length of follow up was 16.9-18.1 months (mets) and 32.5-44.6 months (non-mets)

Figure 6. Patient attrition



Abbreviations: CE, continuous enrollment; LTD, Long-term disability; Met, Metastatic; Non-met, Non-Metastatic; STD, short-term disability; WA, work absence.
*Patient selection was from 1/1/2009-12/31/2019

Table 1. Demographic and Clinical Characteristics[1] of Work Absence Cohort

	Metastatic N=2,430		Non-metastatic N=28,355		p-value
Age, years (Mean, SD)	53.2	7.8	53.3	7.4	0.553
Median	55.0		55.0		
Age category, years (N, %)					0.300
18–24	11	0.5%	72	0.3%	
25–34	73	3.0%	793	2.8%	
35–44	206	8.5%	2,336	8.2%	
45–49	317	13.0%	3,529	12.4%	
50–64	1,825	75.0%	21,651	76.3%	
<50	607	25.0%	6,730	23.7%	
Sex (N, %)					<0.001
Male	1,664	68.4%	20,769	73.2%	
Female	768	31.6%	7,612	26.8%	
Duration of follow-up, months (Mean, SD)	30.1	30.1	50.0	34.6	<0.001
Median	18.1		44.6		
NCI Comorbidity index (Mean, SD)	0.30	0.69	0.24	0.71	<0.001
Median	0.0		0.0		
Cancer Type (N, %)[2]					
Breast	278	11.4%	2,677	9.4%	0.001
Lung or bronchus	210	8.6%	460	1.6%	<0.001
Colon or rectum	288	11.8%	1,271	4.5%	<0.001
Pancreas	104	4.3%	179	0.6%	<0.001
Liver	53	2.2%	207	0.7%	<0.001
Head or neck	109	4.5%	550	1.9%	<0.001
Esophageal	40	1.6%	130	0.5%	<0.001
Ovarian	56	2.3%	166	0.6%	<0.001
Cervical	10	0.4%	108	0.4%	0.814
Other	1,284	52.8%	22,633	79.7%	<0.001

Abbreviations: NCI = National Cancer Institute (modified Charlson Comorbidity Index); WA = work absence
[1]Demographic characteristics were measured on the index date and clinical characteristics were measured during the 6-month pre-index period, unless otherwise specified
[2]Cancer type was measured on the index date

Limitations

Beyond those common in claims data analysis, this study has several limitations:

- Pathological findings for determining precise cancer stage are unavailable in claims data, so metastasis diagnosis (secondary cancer) was used as a proxy for late (advanced) cancer stage
- Work-loss cohorts for WA, STD, and LTD were selected separately so any conclusions for total work loss (WA + STD + LTD) are an extrapolation from the individual groups
- Other aspects of indirect cost to the employer and society, including presenteeism of the cancer patient and productivity loss of caregivers, were not captured