Prevalence of Diabetes and Its Impact on Hospitalization among Patients with Cancer: A Population-Based Study in the U.S.

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BACKGROUND

- Diabetes mellitus (DM) is a prevalent comorbidity among patients with cancer, potentially due to shared risk factors.[1]
- The presence of DM may adversely impact hospital outcomes, including length of stay (LOS), in patients with cancer. [2]
- Age and race/ethnicity are known to influence both the morbidity and mortality associated with DM and cancer. [1,3]
- However, limited research has examined the prevalence of comorbid DM and its association with hospital LOS among hospitalized cancer patients in the United States.

OBJECTIVES

- To estimate the prevalence of DM by demographic characteristics and cancer type
- To Assess the association between DM and hospital LOS among hospitalized patients with cancer

METHODS

Data Source

2022 Healthcare Cost and Utilization Project-National Inpatient Sample (HCUP-NIS) data

Study Population

Patients were included if they:

- Were hospitalized with a primary diagnosis for any cancer
- were aged 18 years or older

Key Variables

Disease

- **Cancer type**: The top 12 common cancer - breast, prostate, lung/bronchus, colon/rectum, melanoma, urinary bladder, non-Hodgkin's lymphoma, kidney/renal pelvis, corpus uteri, leukemia, pancreas, thyroid
- **DM**: The comorbid DM during hospitalization - type 1, type 2, others

Healthcare utilization

- **Hospital LOS**: the days of a single episode of hospitalization (days)

Patient Characteristics

- **Age** group: 18-54, 55-64, 65-74, and 75+ years
- **Race/ethnicity**: white, black, Hispanic, Asian, and others
- **Sex**: male, and female

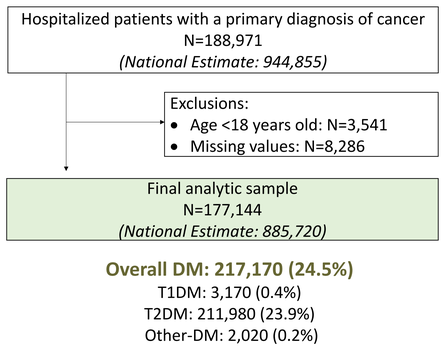
Statistical Analysis

- All analyses considered appropriate sampling weights and design effects
- A multinomial logistic regression: to estimate the incidence rate ratio (IRR) of having DM, controlling for covariates
- A negative binomial regression: to assess the association of DM with LOS, controlling for covariates

Reference
1. Tang Y, et al. Front Endocrinol. 2022;13:800995
2. Deng J, et al. Prev Chronic Dis. 2024;21:E22.
3. Yeh ETH, et al. J Clin Oncol. 2017;35(5_suppl):116.
4. Wang Y, et al. Front Public Health. 2023;11:1171221.

RESULTS

Figure 1. Patient Selection Process



Overall DM: 217,170 (24.5%)
T1DM: 3,170 (0.4%)
T2DM: 211,980 (23.9%)
Other-DM: 2,020 (0.2%)

Figure 2. Patient Demographics by the Presence of DM

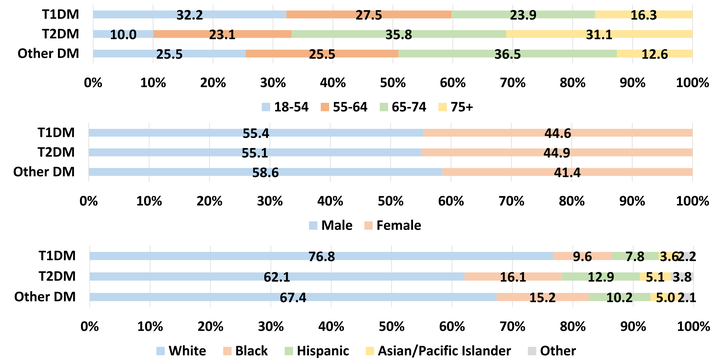


Figure 4. Mean Length of Stay by Presence of DM

Unit: Days	T1DM	T2DM	Other DM	Non-DM
All cancer	**7.4**	**7.3**	**8.5**	**7.1**
Breast	4.0	3.9	4.6	3.8
Prostate	2.8	2.8	3.2	2.7
Lung/Bronchus	6.4	6.3	7.3	6.1
Colon/Rectum	6.9	6.8	7.9	6.6
Melanoma	5.2	5.1	5.9	4.9
Urinary bladder	7.2	7.1	8.3	6.9
Non-Hodgkin lymphoma	11.5	11.3	13.2	11.0
Kidney and renal pelvis	3.8	3.7	4.3	3.6
Corpus uteri	4.7	4.6	5.3	4.4
Leukemia	17.1	16.8	19.5	16.3
Pancreas	7.3	7.2	8.4	7.0
Thyroid	3.6	3.5	-	3.4

Figure 3. Predicted Mean Probabilities of Having DM by Demographic Characteristics and Cancer Types

A. Overall DM

	Age				Sex		Race				
	18-54	55-64	65-74	75+	Male	Female	White	Black	Hispanic	Asian	Other
All cancer	15%	25%	27%	27%	26%	23%	21%	30%	34%	34%	28%
Breast	13%	22%	24%	23%	22%	20%	16%	24%	27%	27%	22%
Prostate	12%	20%	22%	22%	21%		18%	26%	29%	29%	23%
Lung/Bronchus	13%	23%	25%	24%	25%	22%	21%	30%	34%	33%	28%
Colon/Rectum	15%	25%	27%	26%	25%	22%	21%	30%	33%	33%	27%
Melanoma	13%	22%	24%	24%	22%	20%	20%	29%	32%	32%	26%
Urinary bladder	16%	26%	29%	28%	28%	25%	25%	35%	39%	39%	33%
Non-Hodgkin Lymphoma	14%	24%	26%	26%	24%	22%	20%	29%	32%	32%	26%
Kidney/Renal pelvis	18%	30%	33%	32%	30%	27%	26%	36%	40%	39%	33%
Corpus uteri	20%	33%	36%	35%		32%	28%	38%	42%	42%	35%
Leukemia	15%	25%	28%	27%	25%	22%	20%	29%	32%	32%	27%
Pancreas	26%	41%	43%	43%	43%	39%	37%	49%	53%	52%	45%
Thyroid	15%	26%	28%	28%	24%	21%	18%	26%	30%	29%	24%

B. Type 1 DM

	Age				Sex		Race				
	18-54	55-64	65-74	75+	Male	Female	White	Black	Hispanic	Asian	Other
All cancer	0.80%	0.47%	0.26%	0.19%	0.39%	0.33%	0.41%	0.25%	0.25%	0.29%	0.21%
Breast	0.78%	0.47%	0.26%	0.19%	0.52%	0.43%	0.51%	0.32%	0.33%	0.38%	0.27%
Prostate	0.47%	0.29%	0.16%	0.11%	0.21%		0.25%	0.15%	0.15%	0.18%	0.13%
Lung/Bronchus	0.68%	0.41%	0.22%	0.16%	0.28%	0.23%	0.28%	0.17%	0.17%	0.20%	0.14%
Colon/Rectum	0.79%	0.46%	0.25%	0.18%	0.38%	0.32%	0.40%	0.24%	0.25%	0.29%	0.20%
Melanoma	0.70%	0.42%	0.23%	0.17%	0.31%	0.26%	0.31%	0.19%	0.19%	0.22%	0.16%
Urinary bladder	0.63%	0.37%	0.20%	0.14%	0.22%	0.18%	0.23%	0.13%	0.13%	0.15%	0.11%
Non-Hodgkin Lymphoma	0.69%	0.41%	0.22%	0.16%	0.32%	0.27%	0.35%	0.21%	0.21%	0.25%	0.18%
Kidney/Renal pelvis	0.61%	0.35%	0.19%	0.14%	0.30%	0.25%	0.32%	0.19%	0.19%	0.22%	0.16%
Corpus uteri	0.47%	0.27%	0.14%	0.10%		0.20%	0.25%	0.14%	0.14%	0.17%	0.12%
Leukemia	0.80%	0.47%	0.26%	0.19%	0.42%	0.35%	0.45%	0.27%	0.28%	0.32%	0.23%
Pancreas	2.21%	1.21%	0.65%	0.48%	0.88%	0.75%	0.95%	0.53%	0.52%	0.60%	0.45%
Thyroid	0.33%	0.20%	0.11%	0.08%	0.23%	0.19%	0.24%	0.15%	0.15%	0.17%	0.12%

C. Type 2 DM

	Age				Sex		Race				
	18-54	55-64	65-74	75+	Male	Female	White	Black	Hispanic	Asian	Other
All cancer	14%	25%	27%	27%	25%	23%	21%	30%	34%	33%	28%
Breast	12%	21%	24%	23%	22%	19%	16%	23%	27%	26%	21%
Prostate	11%	20%	22%	22%	20%		17%	26%	29%	28%	23%
Lung/Bronchus	12%	22%	24%	24%	24%	22%	21%	30%	33%	33%	27%
Colon/Rectum	14%	24%	27%	26%	25%	22%	21%	30%	33%	33%	27%
Melanoma	12%	21%	24%	23%	22%	19%	19%	28%	32%	31%	26%
Urinary bladder	15%	26%	29%	28%	28%	25%	25%	35%	39%	39%	33%
Non-Hodgkin Lymphoma	13%	23%	26%	25%	24%	21%	20%	28%	32%	31%	26%
Kidney/Renal pelvis	17%	30%	33%	32%	30%	27%	25%	36%	40%	39%	33%
Corpus uteri	19%	33%	35%	35%		32%	27%	38%	42%	41%	35%
Leukemia	14%	24%	27%	26%	23%	21%	19%	28%	31%	31%	26%
Pancreas	23%	38%	42%	41%	41%	37%	35%	47%	51%	50%	44%
Thyroid	15%	26%	28%	28%	23%	21%	18%	26%	30%	29%	24%

D. Other DM

	Age				Sex		Race				
	18-54	55-64	65-74	75+	Male	Female	White	Black	Hispanic	Asian	Other
All cancer	0.32%	0.25%	0.26%	0.11%	0.26%	0.19%	0.22%	0.27%	0.24%	0.25%	0.14%
Breast	0.03%	0.02%	0.02%	0.01%	0.03%	0.02%	0.02%	0.03%	0.02%	0.03%	0.01%
Prostate	0.11%	0.09%	0.09%	0.04%	0.08%		0.08%	0.10%	0.09%	0.09%	0.05%
Lung/Bronchus	0.20%	0.16%	0.17%	0.07%	0.16%	0.12%	0.13%	0.16%	0.14%	0.15%	0.09%
Colon/Rectum	0.08%	0.06%	0.06%	0.03%	0.06%	0.04%	0.05%	0.06%	0.06%	0.06%	0.03%
Melanoma	0.43%	0.35%	0.36%	0.15%	0.33%	0.23%	0.29%	0.36%	0.32%	0.33%	0.19%
Urinary bladder	0.04%	0.03%	0.03%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.01%
Non-Hodgkin Lymphoma	0.45%	0.36%	0.36%	0.15%	0.36%	0.26%	0.31%	0.38%	0.33%	0.35%	0.20%
Kidney/Renal pelvis	0.10%	0.08%	0.08%	0.03%	0.08%	0.06%	0.07%	0.09%	0.07%	0.08%	0.05%
Corpus uteri	0.15%	0.11%	0.11%	0.05%		0.10%	0.10%	0.12%	0.10%	0.11%	0.06%
Leukemia	0.81%	0.64%	0.65%	0.27%	0.68%	0.49%	0.58%	0.72%	0.64%	0.67%	0.38%
Pancreas	1.76%	1.29%	1.30%	0.54%	1.26%	0.94%	1.09%	1.24%	1.06%	1.13%	0.67%
Thyroid	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

DISCUSSION

Limitations

- Clinical details such as cancer stage were unavailable due to limitations of the NIS dataset.
- Patients may have been counted multiple times if hospitalized more than once, as NIS captures hospitalizations, not unique individuals.
- The cross-sectional nature of the data prevents establishing a causal relationship between DM and LOS.

Strength

- This is the first U.S. population-level study to estimate the prevalence of comorbid DM among hospitalized cancer patients by demographics and cancer type.
- Comorbid DM was associated with significant differences in LOS, impacting patients and the healthcare system clinically, operationally, and financially.

Implications

- This study supports the need for improved care strategies for cancer patients with comorbid DM.
- Understanding DM prevalence can inform prevention efforts to reduce poor outcomes and healthcare costs.
- Effective DM management before and during hospitalization may reduce LOS and associated complications.

"DM is prevalent among hospitalized cancer patients, especially T1DM and T2DM in pancreatic cancer, and T2DM in corpus uteri and kidney cancers.

Its association with prolonged hospital stays underscores the importance of targeted screening and management for high-risk patient groups."