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Association Between Emergency Department (ED) Involvement in Cancer Diagnosis and Survival Across Cancer Types in the Medicare Population

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BACKGROUND

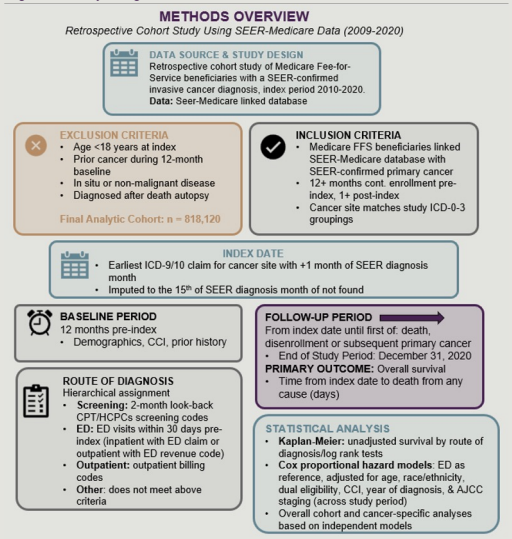
- 20–50% of cancers are diagnosed following emergency department (ED) presentation, rising to 60% for some malignancies (e.g., pancreatic).[1-2,4]
- ED diagnosis is associated with advanced stage, poorer survival, higher comorbidity, and worse patient experience.[3]
- ED presentation can reflect underlying barriers to timely diagnosis (e.g., limited access).[5,6]
- Evidence on the independent impact of diagnosis route on survival, especially in Medicare populations, remains limited.

OBJECTIVE

To quantify the association between ED involvement at diagnosis and overall survival across different cancer types in the SEER-Medicare population.

METHODS

Figure 1. Study design.



AJCC: American Joint Committee on Cancer; CCI: Charlson Comorbidity Index; CPT: Current Procedural Terminology; ED: Emergency Department; FFS: Fee-for-Service; HCPCS: Healthcare Common Procedures Coding System; HR: Hazard Ratio; ICD: International Classification of Diseases; IP: Inpatient; OP: Outpatient; SEER: Surveillance, Epidemiology, and End Results.

KEY RESULTS: ED INVOLVEMENT WAS COMMON, ROSE WITH STAGE, AND ASSOCIATED WITH 2-4X HIGHER MORTALITY RISK

Study Population

- 818,120 Medicare beneficiaries (mean age 74) diagnosed with invasive cancer between 2010-2020.
- Cohort was mostly non-Hispanic White (82.8%), followed by non-Hispanic Black (8.9%), Hispanic (2.2%), and other/unknown (6.0%). 54.6% were female and 45.4% were male (Table 1).

Table 1. Baseline characteristics among patients with invasive cancer diagnosis between 2010-2020.

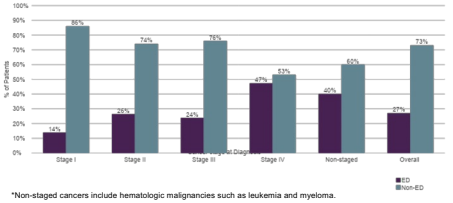
Description	Overall Sample
Number of Patients	818,120
Age at Index	
Mean (years, SD)	74 (9.1)
Sex	
Female	54.6%
Race/Ethnicity	
Non-Hispanic White	82.8%
Non-Hispanic Black	8.9%
Hispanic	2.2%
Other/Unknown	6.0%
Original Reason for Entitlement	
Age	80.3%
Disability or ESRD	19.3%
Both	0.4%
Dual Eligibility	
Full	19.9%
Partial	6.1%
No or Unknown	74.0%
Stage*	
I	36.3%
II	16.7%
III	14.1%
IV	24.9%
Unknown/Missing	8.0%
Charleston Comorbidity Index (CCI)	
Mean	3.5
0	16.6%
1	15.0%
2	16.2%
3+	52.2%

*Among staged cancers; SD: Standard Deviation

Emergency Department Involvement in Diagnosis

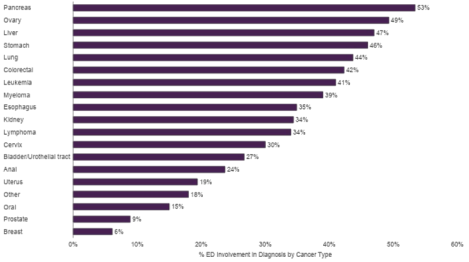
- 26.4% of cancer patients had ED involvement at diagnosis
- ED involvement rose with stage, reaching 47.3% in Stage IV; non-staged hematologic cancers had 40% ED involvement (Figure 2).
- Wide variation by cancer type (Figure 3):
  - Lowest: Breast (6%)
  - Highest: Ovarian (49%), and pancreatic (53%)
- Highest ED reliance observed in cancers with nonspecific or rapidly progressing symptoms (Figure 3).

Figure 2. Percent of patients diagnosed in the emergency department compared to non-emergency department settings, by stage.



*Non-staged cancers include hematologic malignancies such as leukemia and myeloma.
ED: Emergency Department

Figure 3. Percent of patients diagnosed in the emergency department, by cancer site.



Pancreas n =26,242; Ovary n=8,020; Liver n=17,756; Stomach n= 10,229; Lung n= 158,706; Colorectal n= 86,078; Leukemia n=25,317; Myeloma n=17,805; Esophagus n= 7,294; Kidney n= 20,778; Lymphoma n= 28,844; Cervix n= 2,214; Bladder/Urothelial tract n=33,331; Anal n= 4,118; Uterus n=24,237; Other n = 16,746; Oral n= 18,499; Prostate n=141,083; Breast n=170,823
*Cancer groupings were defined according to SEER major cancer sites.
**'Other' cancer category includes thyroid, gallbladder, other digestive organs, and other uncategorized cancers. These cancers were combined to comply with SEER-Medicare cell suppression requirements.
ED: Emergency Department.

Observed Mortality

- Follow-up mortality was substantially higher for ED-diagnosed patients (44%) vs. non-ED pathways (19%).
- Represents an approximate 2-fold higher crude mortality among ED-diagnosed patients.

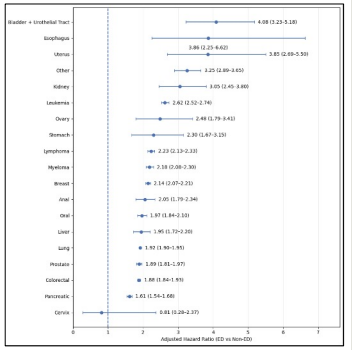
Adjusted Survival

- After adjustment, route of diagnosis remained associated with hazard of death.
- All non-ED pathways were associated with lower hazard of death vs ED diagnosis.
- Screening-detected cancers showed the greatest survival advantage.

Survival by Route of Diagnosis Across Cancer Types

- ED diagnosis was associated with higher hazard of death across most cancers (Figure 4).
- 3–4x: bladder/urothelial, uterus, esophagus
- 2x: breast, lung, colorectal, prostate, liver
- Overall, ED diagnosis was associated with 2–4x higher hazard, independent of stage and patient characteristics.
- Results were consistent in sensitivity analyses using SEER summary stage.

Figure 4. Mortality hazard ratios for ED vs non-ED by cancer site.



ED: Emergency Department.

CONCLUSIONS

- ED involvement accounted for a substantial share of overall mortality among cancer patients.
- ED involvement at diagnosis remained a strong independent predictor of mortality after adjusting for sociodemographics, comorbidities, and stage at diagnosis.
- These findings highlight the need for earlier, non-emergent diagnostic pathways.

LIMITATIONS

- Residual confounding may remain; factors such as symptom duration, performance status, and access to or initiation of therapy were not captured.
- Route of diagnosis was claims-based and may be subject to misclassification.
- Stage adjustment may not fully account for disease severity or tumor biology.
- Findings may have limited generalizability to non-Medicare FFS populations.
- Observational study design limits causal inference.

References

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Disclosures

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