WHAT FACTORS INFLUENCE HOSPITALIZATIONS AMONG DYING CANCER PATIENTS? **AN ANALYSIS OF AGGRESSIVE END-OF-LIFE CANCER CARE.**

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HOSPITAL

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WHAT IS AGGRESSIVE EOL CARE?

- Use of ineffective medical interventions close to death[1]

- High hospitalization rates[2]
- High rates of ICU use
- Use of chemotherapy
- Life-sustaining treatments (LSTs)[3]

1. Committee on Care at the End of Life, Division of Health Care Services, Institute of Medicine. Approaching Death: Improving Care at the End of Life. Washington, D.C.: National Academy Press; 1997.
2. Earle, C.C. et al. Evaluating claims-based indicators of the intensity of end-of-life cancer care. International Journal for Quality in Health Care. 2005;17(6):505-509.
3. Barnato, A.E. et al. Development and validation of hospital "end-of-life" treatment intensity measures. Medical Care. 2009;47(10);1098-1105.

A GOOD DEATH IS…

"…free from avoidable distress and suffering for patients, families, and caregivers; in general accord with patients' and families' wishes; and reasonably consistent with clinical, cultural, and ethical standards."[1]

1. Committee on Care at the End of Life, Division of Health Care Services, Institute of Medicine. Approaching Death: Improving Care at the End of Life. Washington, D.C.: National Academy Press; 1997.

"QUALITY OF DYING"[5]

- Focus on the experience of dying, rather than quality of life

- 1980s hospice movement[6]

- Most patients prefer not to use LSTs when they are unlikely to benefit from them[7]

- Most patients want to die at home, surrounded by loved ones.[8]

5. Wallston, K. et al. Comparing the quality of death for hospice and non-hospice cancer patients. Medical Care. 1988;26(2):177-182.
6. The Hospice of Michigan. Brief history of the hospice movement. 2011. Retrieved from http://www.hom.org/movement.asp
7. Earle, C.C. et al. Identifying potential indicators of the quality of end-of-life cancer care from administrative data. Journal of Clinical Oncology. 2003;21(6):1133-1138.
8. Tang, S.T. When death is imminent- where terminally ill patients with cancer prefer to die and why. Cancer Nursing. 2003;26(3):245-251.

A BAD DEATH IS…

Comprised of "…needless suffering, dishonoring of patient or family wishes or values, and a sense among participants or observers that norms of decency have been offended" and "…unwanted and senseless medical treatments."[1]

1. Committee on Care at the End of Life, Division of Health Care Services, Institute of Medicine. Approaching Death: Improving Care at the End of Life. Washington, D.C.: National Academy Press; 1997.

- Over 1/3 of terminally ill U.S. cancer patients spend their last days in a hospital, many receiving LSTs[9]

- Limited time trend data suggest a rise in aggressive EOL cancer care[10,11]

9. Goodman DC, Fisher ES, Chang C, Morden NE, Jacobsen JO, Murray K, et al. Quality of End-of-Life Cancer Care for Medicare Beneficiaries. The Dartmouth Institute; 2010 Nov.
10. Earle, C.C. Trends in the aggressiveness of cancer care near the end of life. Journal of Clinical Oncology. 2004;22(2):315-321.
11. Sharma, G. et al. Trends in end-of-life ICU use among older adults with advanced lung cancer. Chest. 2008;133(1):72-78

AGGRESSIVE CARE INDICATORS[2,12]

- **Multiple hospitalizations**
- **Multiple ER visits**
- **At least one ICU admission**
- Chemotherapy use in the last 14 days of life
- New chemotherapy in the last month of life

2. Earle, C.C. et al. Evaluating claims-based indicators of the intensity of end-of-life cancer care. International Journal for Quality in Health Care. 2005;17(6):505-509.
12. National Voluntary Consensus Standards for Quality of Cancer Care. Washington, D.C.: National Quality Forum; 2009.

METHODS

STUDY COHORT

- New York State breast and colorectal (CRC) cancer patients diagnosed 2004-2006 and died by 2008
  - Female Breast
  - Female CRC
  - Male CRC

- Exclusion critera
  - Below 18 years of age
  - Unknown death dates
  - Non-cancer cause of death
  - Death certificate only
  - Died after 2008

DATA SOURCES

- **New York State Cancer Registry (NYSCR)**
  - diagnosis years 2004-2006

- **Statewide Planning and Research Cooperative System (SPARCS)**
  - 2002-2008 inpatient and outpatient hospital discharge data

- New York State Medicaid enrollment data
  - Enrollment years 2001-2008

- U.S. Census 2000 data

AGGRESSIVE CARE INDICATORS

Obtained from SPARCS

- Multiple hospital admissions
- At least one ICU admission
- Multiple ER visits

EOL= LAST 30 DAYS BEFORE DEATH

PREDICTORS

- Age at death
- Marital status at diagnosis
- Race/Ethnicity
- Insurance
- Rural/Urban status
- Stage at diagnosis
- Comorbidity

UNIVARIATE DISTRIBUTIONS

Patient Characteristics	Full Cohort (N = 9,935)	Female Breast (n = 3,222)	Female Colorectal (n = 3,604)	Male Colorectal (n = 3,109)
Age at death, n (%)				
18 - 44	540 (5.4)	300 (9.3)	106 (2.9)	134 (4.3)
45 - 54	1,059 (10.7)	450 (14.0)	278 (7.7)	331 (10.7)
55 - 64	1,613 (16.2)	648 (20.1)	441 (12.2)	524 (16.9)
65 - 74	2,065 (20.8)	599 (18.6)	688 (19.1)	778 (25.0)
75 - 84	2,731 (27.5)	742 (23.0)	1,107 (30.7)	882 (28.4)
≥ 85	1,927 (19.4)	483 (15.0)	984 (27.3)	460 (14.8)
Marital status at diagnosis, n (%)				
Single‡	5,687 (57.2)	1,975 (61.3)	2,418 (67.1)	1,294 (41.6)
Married	3,904 (39.3)	1,117 (34.7)	1,059 (29.4)	1,728 (55.6)
Unknown	344 (3.5)	130 (4.0)	127 (3.5)	87 (2.8)
Race/Ethnicity, n (%)				
Non-Hispanic Whites	7,117 (71.6)	2,196 (68.2)	2,645 (73.4)	2,276 (73.2)
Non-Hispanic Blacks	1,733 (17.4)	717 (22.3)	583 (16.2)	433 (13.9)
Hispanics	812 (8.2)	256 (8.0)	269 (7.5)	287 (9.2)
Asians	273 (2.7)	53 (1.6)	107 (3.0)	113 (3.6)
Insurance, n (%)				
Medicare	5,992 (60.3)	1,624 (50.4)	2,479 (68.8)	1,889 (60.8)
Medicaid	1,293 (13.0)	557 (17.3)	366 (10.2)	370 (11.9)
Private	2,650 (26.7)	1,041 (32.3)	759 (21.1)	850 (27.3)
Rural-Urban status, n (%)				
Urban	9,388 (94.5)	3,065 (95.1)	3,408 (94.6)	2,915 (93.8)
Rural	547 (5.5)	157 (4.9)	196 (5.4)	194 (6.2)

Clinical Characteristics	Full Cohort (N = 9,935)	Female Breast (n = 3,222)	Female Colorectal (n = 3,604)	Male Colorectal (n = 3,109)
Tumor Site, n (%)				
Breast	3,222 (32.4)	3,222 (100)		
Colon	4,981 (50.1)		2,814 (78.1)	2,167 (69.7)
Rectum	1,732 (17.4)		790 (21.9)	942 (30.3)
Tumor stage at diagnosis, n (%)				
Distant	4,244 (42.7)	1,132 (35.1)	1,657 (46.0)	1,455 (46.8)
Regional	3,122 (31.4)	1,089 (33.8)	1,093 (30.3)	940 (30.2)
Localized	1,373 (13.8)	564 (17.5)	413 (11.5)	396 (12.7)
In situ	71 (0.7)	71 (2.2)		
Unstaged	1,125 (11.3)	366 (11.4)	441 (12.2)	318 (10.2)
Charlson comorbidity score, n (%)				
0	5,397 (54.3)	1,822 (56.6)	1,981 (55.0)	1,594 (51.3)
≥ 1	4,538 (45.7)	1,400 (43.5)	1,623 (45.0)	1,515 (48.7)

*All patients in this cohort died by December 31, 2008, the date of
most complete collection of cancer deaths in New York State.
†Percentages may not sum to 100 due to rounding.
‡Includes never married, separated, divorced, and widowed.

HOSPITAL ADMISSIONS

MULTIPLE HOSPITAL ADMISSIONS

Patient Characteristics	Female Breast OR	95% CI	Female Colorectal OR	95% CI	Male Colorectal OR	95% CI
Age at death (years)						
18 - 44	1.14	0.80 to 1.61	0.93	0.52 to 1.65	1.46	0.90 to 2.37
45 - 54	0.92	0.67 to 1.27	0.67	0.43 to 1.03	0.95	0.65 to 1.41
55 - 64	ref	ref	ref	ref	ref	ref
65 - 74	0.83	0.61 to 1.13	0.99	0.68 to 1.43	1.10	0.78 to 1.56
75 - 84	**0.70**	**0.52 to 0.94***	0.71	0.49 to 1.04	0.97	0.67 to 1.39
≥ 85	**0.33**	**0.22 to 0.51***	**0.51**	**0.34 to 0.76***	**0.60**	**0.38 to 0.94***
Marital status at diagnosis						
Single†	ref	ref	ref	ref	ref	ref
Married	0.98	0.79 to 1.22	0.87	0.68 to 1.13	1.11	0.89 to 1.39
Race/Ethnicity						
Non-Hispanic Whites	ref	ref	ref	ref	ref	ref
Non-Hispanic Blacks	**1.26**	**1.00 to 1.60***	**1.79**	**1.37 to 2.34***	**1.62**	**1.22 to 2.16***
Hispanics	**1.41**	**1.00 to 1.97***	**2.33**	**1.66 to 3.29***	**1.74**	**1.25 to 2.42***
Asians	0.75	0.32 to 1.78	1.22	0.65 to 2.27	**1.76**	**1.06 to 2.90***
Insurance						
Medicare	ref	ref	ref	ref	ref	ref
Medicaid	0.77	0.54 to 1.10	1.18	0.79 to 1.78	1.30	0.89 to 1.92
Private	**1.29**	**0.99 to 1.68**	**1.50**	**1.12 to 2.01***	**1.41**	**1.07 to 1.86***
Rural-Urban status						
Urban	ref	ref	ref	ref	ref	ref
Rural	0.81	0.48 to 1.37	0.75	0.42 to 1.34	0.95	0.59 to 1.53

MULTIPLE HOSPITAL ADMISSIONS

Clinical Characteristics	Female Breast		Female Colorectal		Male Colorectal	
	OR	95% CI	OR	95% CI	OR	95% CI
Tumor site						
Colon			ref	ref	ref	ref
Rectum			1.22	0.95 to 1.57	**0.78**	**0.62 to 0.99***
Tumor stage at diagnosis						
Distant	ref	ref	ref	ref	ref	ref
Regional	0.87	0.68 to 1.10	0.82	0.64 to 1.05	0.92	0.72 to 1.18
Localized	0.99	0.75 to 1.33	**0.63**	**0.42 to 0.95***	1.04	0.73 to 1.46
In situ	1.13	0.58 to 2.21				
Unstaged	0.83	0.57 to 1.23	0.79	0.54 to 1.18	0.85	0.57 to 1.26
Charlson comorbidity index						
0	ref	ref	ref	ref	ref	ref
≥ 1	0.85	0.69 to 1.05	**0.76**	**0.61 to 0.95***	1.00	0.81 to 1.25

All estimates are based on adjustments for only the factors included in the final most parsimonious models.
*Significant α = 0.05
†Includes never married, separated, divorced, and widowed.

ICU ADMISSIONS

AT LEAST 1 ICU ADMISSION

Patient Characteristics	Female Breast		Female Colorectal		Male Colorectal	
	OR	95% CI	OR	95% CI	OR	95% CI
Age at death (years)						
18 - 44	1.03	0.69 to 1.54	0.54	0.24 to 1.25	0.49	0.24 to 1.02
45 - 54	0.76	0.52 to 1.10	0.66	0.38 to 1.14	0.78	0.51 to 1.21
55 - 64	ref	ref	ref	ref	ref	ref
65 - 74	0.79	0.56 to 1.12	0.71	0.46 to 1.10	0.73	0.50 to 1.06
75 - 84	**0.62**	**0.44 to 0.88***	**0.61**	**0.40 to 0.94***	0.87	0.60 to 1.26
≥ 85	**0.41**	**0.26 to 0.67***	**0.49**	**0.31 to 0.77***	**0.56**	**0.36 to 0.88***
Marital status at diagnosis						
Single†	ref	ref	ref	ref	ref	ref
Married	1.23	0.96 to 1.58	1.01	0.77 to 1.32	1.17	0.93 to 1.47
Race/Ethnicity						
Non-Hispanic Whites	ref	ref	ref	ref	ref	ref
Non-Hispanic Blacks	**1.38**	**1.06 to 1.80***	**1.65**	**1.22 to 2.22***	1.18	0.87 to 1.62
Hispanics	1.13	0.75 to 1.72	1.35	0.87 to 2.09	1.19	0.81 to 1.73
Asians	1.58	0.73 to 3.44	**1.90**	**1.05 to 3.42***	0.74	0.38 to 1.44
Insurance						
Medicare	ref	ref	ref	ref	ref	ref
Medicaid	0.82	0.55 to 1.23	**0.46**	**0.27-0.79***	0.75	0.49 to 1.16
Private	1.02	0.75 to 1.40	**0.61**	**0.43-0.88***	**0.65**	**0.48 to 0.89***
Rural-Urban status						
Urban	ref	ref	ref	ref	ref	ref
Rural	1.00	0.56 to 1.76	1.00	0.59 to 1.71	1.13	0.74 to 1.75

AT LEAST 1 ICU ADMISSION

Clinical Characteristics	Female Breast		Female Colorectal		Male Colorectal	
	OR	95% CI	OR	95% CI	OR	95% CI
Tumor site						
Colon			ref	ref	ref	ref
Rectum			0.87	0.65 to 1.17	0.90	0.71 to 1.15
Tumor stage at diagnosis						
Distant	ref	ref	ref	ref	ref	ref
Regional	0.99	0.76 to 1.29	**1.58**	**1.21 to 2.07***	1.23	0.95 to 1.59
Localized	0.90	0.64 to 1.27	**1.51**	**1.03 to 2.20***	**1.66**	**1.20 to 2.28***
In situ	**3.14**	**1.76 to 5.58***				
Unstaged	**0.54**	**0.32 to 0.91***	0.95	0.62 to 1.48	0.87	0.58 to 1.33
Charlson comorbidity index						
0	ref	ref	ref	ref	ref	ref
≥ 1	1.05	0.83 to 1.34	**0.67**	**0.52 to 0.85***	**0.71**	**0.57 to 0.89***

All estimates are based on adjustments for only the factors included in the final most parsimonious models.
*Significant α = 0.05
†Includes never married, separated, divorced, and widowed.

ER VISITS AND ADMISSIONS ORIGINATING FROM THE ER

MULTIPLE ER VISITS

Patient Characteristics	Female Breast		Female Colorectal		Male Colorectal	
	OR	95% CI	OR	95% CI	OR	95% CI
Age at death (years)						
18 - 44	1.06	0.70 to 1.60	1.13	0.57 to 2.24	1.31	0.71 to 2.43
45 - 54	0.75	0.51 to 1.11	0.82	0.48 to 1.40	1.04	0.64 to 1.68
55 - 64	ref	ref	ref	ref	ref	ref
65 - 74	0.81	0.57 to 1.15	**0.62**	**0.40 to 0.96***	0.96	0.65 to 1.43
75 - 84	**0.56**	**0.39 to 0.80***	**0.51**	**0.33 to 0.77***	0.81	0.55 to 1.21
≥ 85	**0.36**	**0.22 to 0.57***	**0.50**	**0.32 to 0.77***	**0.60**	**0.36 to 0.99***
Marital status at diagnosis						
Single†	ref	ref	ref	ref	ref	ref
Married	0.82	0.63 to 1.06	1.07	0.78 to 1.47	1.08	0.83 to 1.41
Race/Ethnicity						
Non-Hispanic Whites	ref	ref	ref	ref	ref	ref
Non-Hispanic Blacks	1.22	0.92 to 1.62	**1.65**	**1.18 to 2.32***	1.32	0.92 to 1.88
Hispanics	1.01	0.65 to 1.58	1.46	0.91 to 2.35	0.87	0.54 to 1.41
Asians	1.38	0.61 to 3.12	1.18	0.53 to 2.60	1.52	0.83 to 2.78
Insurance						
Medicare	ref	ref	ref	ref	ref	ref
Medicaid	1.03	0.71 to 1.52	0.83	0.51 to 1.37	0.98	0.62 to 1.55
Private	0.85	0.60 to 1.20	0.79	0.52 to 1.21	0.87	0.60 to 1.27
Rural-Urban status						
Urban	ref	ref	ref	ref	ref	ref
Rural	0.94	0.52 to 1.68	0.76	0.37 to 1.58	1.39	0.86 to 2.26

MULTIPLE ER VISITS

Clinical Characteristics	Female Breast OR	Female Breast 95% CI	Female Colorectal OR	Female Colorectal 95% CI	Male Colorectal OR	Male Colorectal 95% CI
Tumor site						
Colon			ref	ref	ref	ref
Rectum			0.92	0.66 to 1.29	0.90	0.68 to 1.20
Tumor stage at diagnosis						
Distant	ref	ref	ref	ref	ref	ref
Regional	1.23	0.92 to 1.64	1.08	0.79 to 1.48	1.06	0.78 to 1.44
Localized	1.30	0.92 to 1.85	0.66	0.39 to 1.15	1.33	0.90 to 1.98
In situ	1.97	0.97 to 3.99				
Unstaged	0.98	0.61 to 1.58	1.06	0.66 to 1.71	0.85	0.51 to 1.41
Charlson comorbidity index						
0	ref	ref	ref	ref	ref	ref
≥ 1	1.04	0.81 to 1.33	0.99	0.75 to 1.31	1.26	0.97 to 1.65

All estimates are based on adjustments for only the factors included in the final most parsimonious models.
*Significant α = 0.05
†Includes never married, separated, divorced, and widowed.

SUMMARY OF FINDINGS

- Factors that predicted aggressive EOL care
  - Racial and ethnic minorities
  - Earlier stage at diagnosis

- Factors that were negatively associated with aggressive EOL care
  - Age (at death)
  - Comorbidity

  - Private insurance?

STRENGTHS

- Multiple data sources
  - Enhanced data quality
  - Wider cohort

- Novel approach by a state cancer registry

- Additional analysis approach: total time spent in EOL admissions

LIMITATIONS

- Retrospective analysis of decedents vs. prospective analysis of dying patients

- Excluded cohorts

- Psychosocial and clinical factors

- Generalizability

CONCLUSION

This exploratory analysis pinpointed significant predictors of aggressive EOL cancer care that can now be further assessed with ongoing research.

AREAS FOR FUTURE RESEARCH

- Minority subgroups: race or hospital-level effect?

- Studies of cohorts with longer survival time

- Is aggressive EOL care among private insurance carriers being driven by their inability to afford cancer care earlier in the disease course?

Questions?