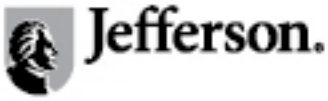

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Factors Influencing Resection in Locoregional Pancreatic Cancer Patients

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Background

- Pancreatic cancer has surpassed breast cancer as the **3rd leading cause of U.S. cancer deaths**, with 41,780 deaths in 2016[1]
- Projected to be **2nd leading cause of cancer death by 2030**[2]
- Mean direct medical costs of **$65,700 per patient** (2000-2007)[3]
- **Five-year survival rate is 7.7%[1],** due to often advanced stage at diagnosis, lack of effective treatment options

- **Five-year survival rate for pancreatic cancer patients undergoing resection, the only potentially curative treatment, is 18-24%**[4]
- Pancreatic cancer resection is underused in eligible patients[5-7]
- ***Factors associated with underuse of pancreatic cancer resection are poorly understood***

Objective

Identify factors associated with resection in a national sample of locoregional pancreatic cancer patients

Methods

Data Source

Surveillance, Epidemiology and End Results (SEER) dataset[8]

- National Cancer Institute cancer statistics program
- Cancer demographics, incidence, treatment and survival data
- Combines data from 20 regional and state registries; covers 30% of U.S. population
- 8,689,771 total cancer cases from 1973-2014

Study Population

Inclusion criteria

- 2004-2012 SEER patients, age 15-89, with primary diagnosis of locoregional (Stage I or II) pancreatic cancer in the pancreas head, body, or tail
- Staging based on American Joint Committee on Cancer (AJCC6)[9] criteria instituted in 2004

Exclusion criteria:

- Pancreatic cancer diagnosis via death certificate or autopsy
- Incomplete survival data
- Incomplete surgical data

Statistical Analyses

- Primary outcome: receipt of pancreatic cancer resection
- Descriptive statistics to characterize sample
- Chi-square tests to identify associations between demographic variables and pancreatic cancer resection
- Multivariate logistic regression to build final model of associations between covariates and pancreatic cancer resection
- Model fit assessed using Hosmer-Lemeshow test
- All analyses performed using Statistical Analysis System (SAS) Studio software[10]

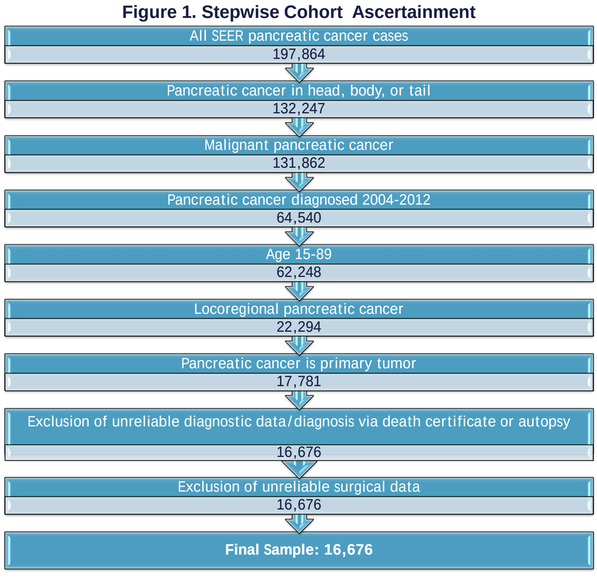
Results

Final sample: 16,676 locoregional pancreatic cancer patients (Figure 1, Table 1), of whom **8152 (48.9%)** did not receive surgery (Figure 2)

Variables associated with not receiving surgery (controlling for registry, stage, and tumor location)(Table 2):

1. **Age:** 65-74 **30%** less likely; 75 or older **72%** less likely to undergo resection
2. **Sex:** Men **9%** less likely to undergo resection
3. **Race/ethnicity**: Non-Hispanic black individuals **31%** less likely, Hispanic **20%** less likely, other non-white race/ethnicity **14%** less likely to undergo resection
4. **Marital status:** Unmarried individuals **29%** less likely to undergo resection

Figure 1. Stepwise Cohort Ascertainment



Results(contd.)

Table 1.Demographics of final sample

Characteristic	Resection N(%)	No resection N(%)	p-value
Total (N=16,676)	8524(51.1)	8152(48.9)	
Age Category			<.001
<65	4088(48.0)	2325(28.5)	
65-74	2647(31.1)	2120(26.0)	
≥75	1780(21.0)	3707(45.5)	
Sex			<.001
Male	4290(52.7)	3857(47.3)	
Female	4234(49.6)	4295(50.4)	
Race/Ethnicity			<.001
White/Non Hispanic	6187(52.2)	5665(47.8)	
Non-Hispanic Black	879(45.9)	1034(54.1)	
Hispanic	804(48.9)	840(51.1)	
Other Race/Ethnicity	654(51.6)	613(48.4)	
Marital Status			<.001
Married	5328(56.2)	44159(43.8)	
Not married	3196(44.5)	3993(55.5)	
Registry			<.001
Diagnosis Year			.313
2004-2006	2390(49.9)	2398(50.1)	
2007-2009	2934(52.1)	2699(47.9)	
2010-2012	3200(51.2)	3055(48.8)	
AJCC Stage			<.001
Stage I	1537(39.7)	2332(60.3)	
Stage II	6987(54.6)	5820(45.4)	
Tumor Location			<.001
Head	6930(49.8)	6994(50.2)	
Body	555(41.0)	799(59.0)	
Tail	1039(74.3)	359(25.7)	

Figure 2. Reason Given for No Surgery (N=8152)

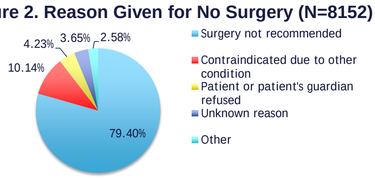


Table 2. Odds of Undergoing Resection

Variable	Univariate Analysis Odds Ratio (CI)	Multivariate Analysis* Odds Ratio (CI)
Age Category		
>65	Reference	Reference
65-74	.71[.66-.77]	.70[.65-.76]
≥ 75	.28[.26-.30]	.28[.25-.30]
Sex		
Female	Reference	Reference
Male	.89[.83-.94]	.91[.85-.98]
Race/Ethnicity		
White/Non-Hispanic	Reference	Reference
Non-Hispanic Black	.78[.71-.86]	.69[.62-.77]
Hispanic	.88[.79-.97]	.80[.71-.89]
Other race/ethnicity	.98[.87-1.10]	.86[.75-.98]
Marital Status		
Married	Reference	Reference
Not married	.63[.59-.67]	.71[.66-.76]

* Controlling for registry, stage, and tumor location

Discussion

- Nearly half of patients with locoregional pancreatic cancer do not receive surgery; the reason why is often unclear
- Factors associated with lower resection rates are non-white race/ethnicity, older age, male sex and being unmarried
- Understanding and addressing these disparities could increase pancreatic cancer resection rates and improve survival

Limitations

- Observational data limits ability to make causal inferences
- Some variables associated with resection (comorbidities, insurance, socioeconomic status)[4] are not available in SEER
- No details on resection decision-making process

Recommendations for Future Research

- Perform sensitivity analysis and instrumental variable analysis
- Explore SEER-Medicare linked data
- Analyze regional care patterns and the impact of high-volume pancreatic surgery hospitals on resection rates
- Conduct interviews with physicians, patients and their caregivers on resection decision-making process

Acknowledgements

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