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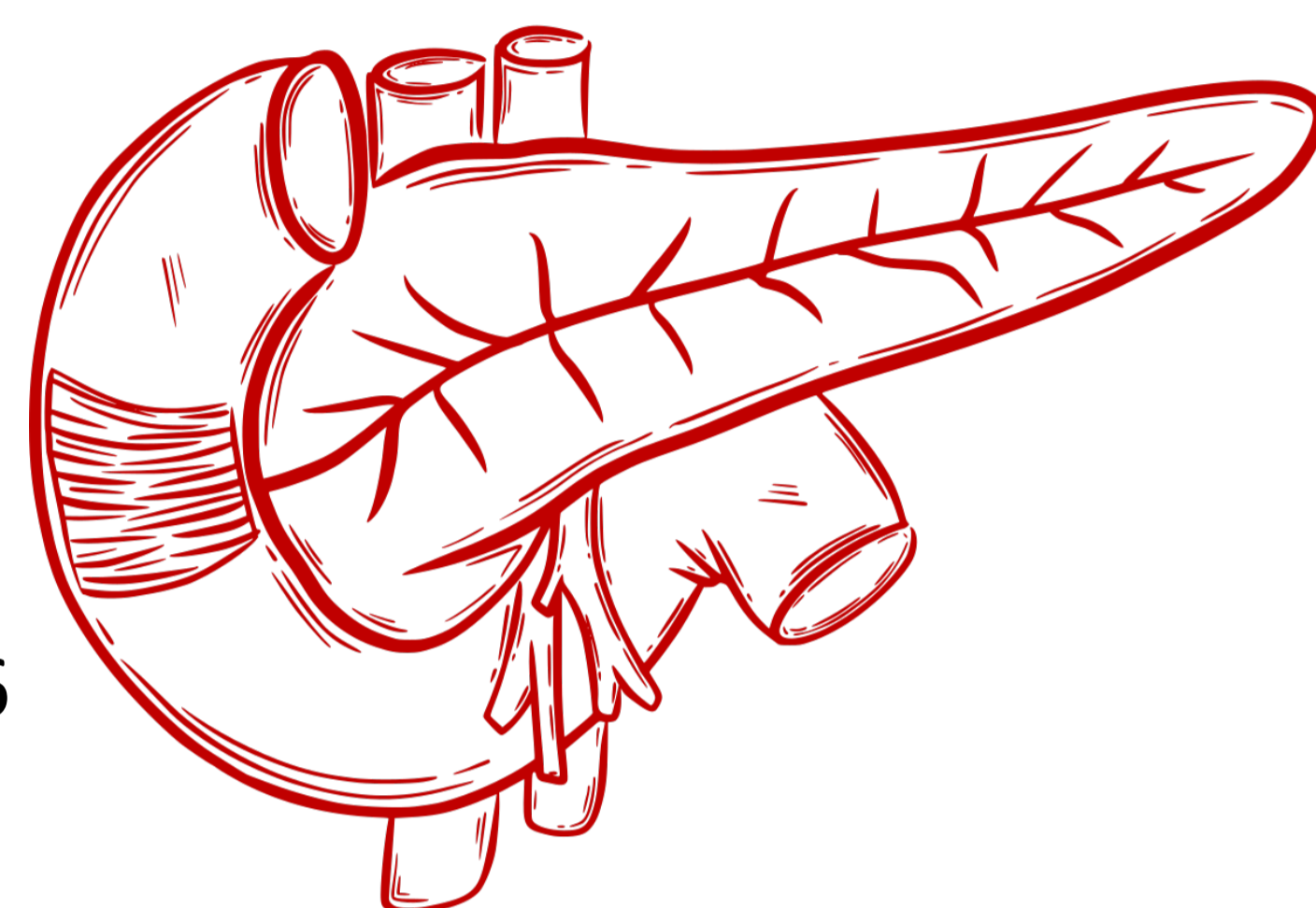
Assessment of Intermediate-Term Mortality Following Pancreatectomy: Implications for Informed Consent and Shared Decision-Making

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Background

Pancreatic adenocarcinoma remains highly lethal, and surgical resection, combined with multimodality therapy, is the only hope for cure. Pancreatectomy is a complex procedure with significant risk for short-term morbidity and mortality. However, little is known about **intermediate-term outcomes** – between 3 to 6 months – that may better guide informed consent and shared decision-making.

Research Objectives

1. Identify factors associated with intermediate-term mortality.

2. Characterize hospital variation in intermediate-term mortality following pancreatectomy.

Methods

- National Cancer Database from 2006 to 2018

- Included adult patients with stage I-III adenocarcinoma undergoing curative-intent pancreatectomy. Excluded palliative operations.

- Logistic regression used to examine predictors of intermediate-term mortality.

- Hospital-level rates of intermediate-term mortality were calculated and grouped into quintiles.

- ANOVA used to compare differences in patient, clinical, or facility factors between hospital quintiles.

Table 1. Multilevel Multivariable Logistic Regression of Intermediate-Term Mortality

Clinicopathologic Characteristics			Treatment Characteristics		
	OR	95% CI		OR	95% CI
Charlson Comorbidity Score			Surgery		
0	Ref		Partial	Ref	
1	1.13	(1.02, 1.26)	Whipple	1.14	(1.00, 1.31)
2	1.32	(1.12, 1.55)	Total	1.11	(0.93, 1.33)
3+	1.42	(1.12, 1.80)	Extended	1.34	(1.08, 1.67)
Cancer Stage			Neoadjuvant Chemoradiation		
Stage 1	Ref		No	Ref	
Stage 2	1.89	(1.58, 2.26)	Yes	0.85	(0.74, 0.97)
Stage 3	2.78	(2.12, 3.66)	Adjuvant Chemoradiation		
Unknown	2.35	(1.39, 3.95)	No	Ref	
Grade			Yes	0.27	(0.24, 0.30)
Well-Differentiated	Ref		Margin Status		
Moderately Differentiated	1.4	(1.14, 1.72)	Negative	Ref	
Poorly/Undifferentiated	2.46	(1.97, 3.08)	Positive	2.04	(1.83, 2.26)
Unknown	1.55	(1.21, 1.98)			

Note. Regression model adjusted for age, sex, race/ethnicity, insurance status, patient distance from hospital, year of diagnosis, hospital annual pancreatectomy case volume, hospital region, and percent of hospital patients using Medicaid. Multilevel model includes hospitals as random intercepts.

Table 2. Hospital-Level Characteristics of Intermediate-Term Mortality Rate Grouped by Quintile, ANOVA

	Quintiles of 3 to 6-Month Mortality Rate										
	Lowest (n=118)		2 (n=126)		3 (n=106)		4 (n=120)		Highest (n=112)		P-Value
3 to 6-Month Mortality Rate, mean (SD)	0.5	-1	4.3	-0.7	6.3	-0.6	9	-0.9	14.2	-3.8	<0.001
Patient Characteristics											
Age (yr), mean (SD)	65.9	-3.1	66.4	-2.5	66	-2.8	66.3	-2.4	66.8	-3.1	0.13
Female, mean % (SD)	47.5	-12.8	49.1	-8.2	47.5	-8.6	48.6	-10.1	49.8	-10.3	0.35
NH White, mean % (SD)	77.7	-18.2	77.8	-19	77.6	-18.5	77.2	-19.4	70.1	-22.6	0.01
Private, mean % (SD)	40.4	-18	35	-13.8	35.5	-11.6	32.9	-11.8	29.8	-12.1	<0.001
Medicare, mean % (SD)	50	-16	54.8	-13.1	53.8	-13.1	54.4	-13	56.1	-15.2	0.01
Medicaid, mean % (SD)	5.5	-7.9	5.4	-5.7	5.8	-5.6	6	-6.9	7.1	-11.2	0.47
Uninsured, mean % (SD)	2.1	-4.4	2.4	-5.3	2.9	-8.4	3.3	-5.8	4.2	-9.5	0.14
Clinicopathologic Characteristics											
No Comorbidities, mean % (SD)	67.2	-17.5	63.1	-13	65	-12.4	64.7	-14.6	61.6	-15.3	0.049
Stage 1 Tumor , mean % (SD)	13.3	-8.2	12.7	-6.1	13.3	-7.6	13.3	-8.6	13.5	-8.6	0.93
Stage 2 Tumor, mean % (SD)	81.3	-10.6	82.7	-7.1	81.5	-9.4	81	-8.9	80.7	-10.3	0.53
Stage 3 Tumor, mean % (SD)	4.1	-4.9	3.9	-3.9	3.7	-4.5	4.4	-3.7	4.6	-5	0.55
Poor/Undifferentiated Histology, mean % (SD)	29.1	-13.7	30.1	-12.2	31.3	-12.9	31.5	-14.6	29.8	-13.4	0.6
Treatment Characteristics											
Partial Pancreatectomy, mean % (SD)	17.4	-10.2	15	-8	17.2	-7.3	16.3	-8.3	17	-11.4	0.22
Whipple, mean % (SD)	58	-16.9	62.8	-16	61.2	-15.4	59.5	-15.4	60.4	-16.6	0.18
Total Pancreatectomy, mean % (SD)	15.8	-13	13.6	-10.2	13.1	-10.7	14.4	-11.2	14	-10.7	0.45
Extended Pancreatectomy, mean % (SD)	6.1	-6.6	6.6	-6.8	5.7	-6.6	6.9	-7.3	5.9	-6.9	0.68
Neoadjuvant Chemo and/or Radiation, mean % (SD)	21.7	-16.5	19.5	-13.4	20.7	-15.2	18.2	-15.6	13	-11.7	<0.001
Adjuvant Chemo and/or Radiation, mean % (SD)	71.1	-16.1	64.6	-12.6	61.6	-15.6	62.3	-16	60.1	-17	<0.001
Positive Surigcal Margins, mean % (SD)	21.5	-11.3	22.3	-9.4	21.2	-10.4	25	-11.9	24	-10.8	0.03

Note. 582 total hospitals included for analysis.

Results

- Of 37,619 patients at 582 hospitals, 4,474 (11.9%) died within 6 months of surgery, 2,377 (53.1%) who died in the intermediate term.

- Patients were less likely to die in the intermediate term if treated with neoadjuvant therapy (OR: 0.85, 95% CI: 0.74-0.97) and adjuvant therapy (OR: 0.27, 95% CI: 0.24-0.30) [Table 1].

- Oncologic factors most predictive of intermediate-term mortality were stage (III vs. I, OR: 2.8, 95% CI: 2.1-3.7), grade (high vs. low, OR: 2.5, 95% CI: 2.0-3.1), and positive surgical margins (OR: 2.0, 95% CI: 1.8-2.3) [Table 1].

- Hospital-level intermediate-term mortality varied, from 0.5% (n=118) to 14.2% (n=112) between lowest and highest quintiles (p<0.001) [Table 2].

- Patients at high intermediate-term mortality hospitals were less likely to have private insurance (29.8% vs. 40.4%, p<0.001), receive neoadjuvant therapy (13.0% vs. 21.7%, p<0.001) or adjuvant therapy (60.1% vs. 71.1%, p<0.001), and were more likely to have positive margins (24.0% vs. 21.5%, p=0.03) [Table 2].

Limitations

- Potential selection bias for patients deemed surgical candidates

- NCDB has limited detail on post-operative course including complications.

Conclusions

- Nearly 12% of pancreatectomy patients for pancreatic adenocarcinoma died within 6 months of surgery, over half of those occurring in the intermediate term.

- Treatment and oncologic factors were most predictive of intermediate-term mortality. Wide hospital variation was observed.

- These data should be considered when discussing the role of curative-intent pancreatectomy for cancer.