Trends in Preoperative Risk Stratification and Postoperative Outcomes in Patients Undergoing Pancreatic Resection

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Introduction

Pancreatic resection may be indicated for pancreatic cancer or chronic pancreatitis. In pancreatic adenocarcinoma, surgical resection is the only potentially curative treatment.[1] **Barriers to operative intervention** include tumor biology and anatomy, patient baseline health status, geographic location, and socioeconomic status. Advances in operative technique and neoadjuvant therapy have broadened operative criteria,[2] and consolidation of these complex operations to high-volume surgeons and high-volume hospitals have also contributed to improved patient outcomes in recent decades.[3] To our knowledge, no previous work has examined the **change in preoperative patient risk stratification** coinciding with these patient care advances, or the effect that changing patient risk profiles have had on **postoperative outcomes.**

We hypothesize that higher-risk patients are undergoing pancreatic resection in recent years and that their post-op outcomes are similar to earlier, lower-risk patients.

Methods

Establishing a study population

- Single-institution, retrospective review of patients undergoing distal or total pancreatectomy or pancreaticoduodenectomy from 2008 – 2021
- Information entered into REDCap database: demographics, presenting symptoms, comorbidities, post-op length of stay, morbidity, and mortality
- Inclusion: Adult patient over 18 years of age undergoing pancreatic resection
- Exclusion: Patients less than 18 years old and patients undergoing a larger cytoreduction with heated intraperitoneal chemotherapy
- Patient stratification:
  - *Early cohort:* January 1, 2008 – December 31, 2014
  - *Late cohort:* January 1, 2015 – December 31, 2021

Quantifying preoperative patient risk and postoperative outcomes

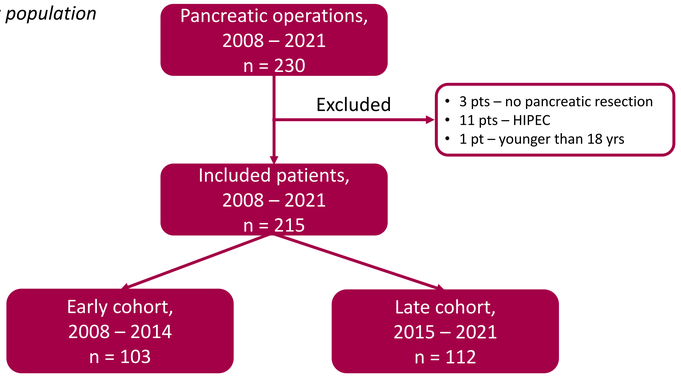
- American College of Surgeons National Surgical Quality Improvement Program (NSQIP) Risk Calculator[4]: Patient comorbidities used to estimate post-op risk of high-impact outcomes including morbidity, mortality, and hospital length of stay
- Actual rates of post-op complications assessed by review of medical record

Statistical analysis

- Fisher's exact test used to determine differences by cohort
- Average NSQIP risk of each complication calculated by cohort
  - Comparisons with t-test

Results

Study population



Early vs late cohort, baseline characteristics

- No significant differences in patient demographics
- More patients with unintentional weight loss in late cohort *(44.6% v 24.3%, p < 0.01)*
- More patients with diabetes in late cohort *(30.4% v 22.3%, p = 0.05)*

Early vs late cohort, predicted risk

NSQIP RC:

Late cohort – Higher overall predicted risk of multiple post-op complications

Predicted complication	Early cohort	Late cohort	p-value
Any complication	28.0%	30.2%	0.04
Serious complication	25.3%	27.3%	0.03
Death	1.2%	1.9%	< 0.01
Pneumonia	3.8%	4.5%	0.04
Renal failure	1.6%	2.0%	0.05
Readmission	2.9%	17.5%	0.04
Discharge to rehab	11.3%	15.2%	0.02
Sepsis	8.0%	8.8%	0.04

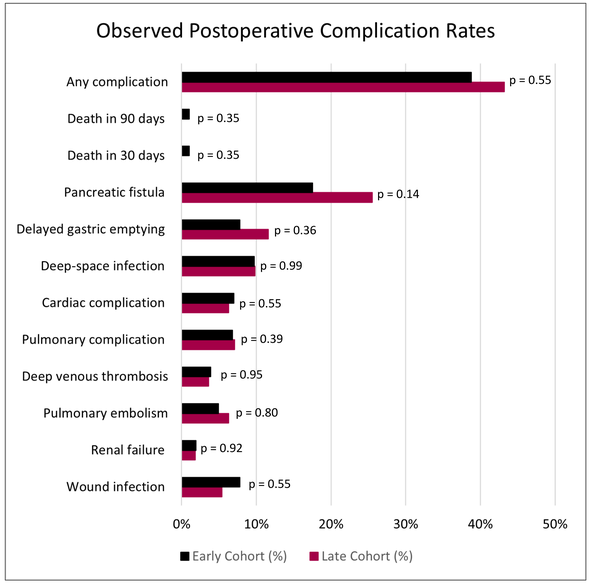
References

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2. Hackert T, Sachsenmaier M, Hinz U, Schneider L, Michalski CW, Springfeld C, Strobel O, Jäger D, Ulrich A, Büchler MW. Locally Advanced Pancreatic Cancer: Neoadjuvant Therapy With Folfirinox Results in Resectability in 60% of the Patients. Ann Surg. 2016 Sep;264(3):457-63. doi: 10.1097/SLA.0000000000001850. PMID: 27355262.
3. Krautz C, Nimptsch U, Weber GF, Mansky T, Grützmann R: Effect of hospital volume on in-hospital morbidity and mortality following pancreatic surgery in Germany. Ann Surg 2018; 267: pp. 411-417.
4. American College of Surgeons National Surgical Quality Improvement Program Risk Calculator. Available at: https://riskcalculator.facs.org/RiskCalculator/index.jsp

Results

Early vs late cohort, observed post-op outcomes

- **No significant differences in observed post-op complications between cohorts**



- **Late cohort – Shorter than predicted hospital LOS**
  - Early cohort, NSQIP predicted hospital LOS: 8.9 days
  - Late cohort, NSQIP predicted hospital LOS: 9.7 days — p = 0.02
  - Late cohort, observed hospital LOS: 8.7 days — p = 0.04

Discussion

- Patients undergoing pancreatic resection in the **late cohort** (2015-2021) had **higher predicted operative risk** than patients in the early cohort (2008-2014).
- Despite the higher risk, **no significant differences were seen** in observed complication rates between patients in the early cohort and those in the late cohort.
- Patients in the late cohort had **shorter hospital length of stay** than predicted and a shorter hospital LOS than their early cohort counterparts.