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Expanding the Whipple Accelerated Recovery Pathway (WARP) To All Patients Undergoing Pancreaticoduodenectomy (PD)

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(*) indicates primary project advisor
(**) indicates another student who is declaring the same project as primary for SI

- Background:
  - PD is a high-risk, complex abdominal procedure with high rates of peri-operative morbidity. Prolonged hospital stay increases the risk of debility and increases cost to patients
  - Whipple Accelerated Recovery Pathway (WARP)- developed for highly selected patients
    - Limited comorbidities
    - Firm pancreas texture
    - Resectable disease
  - Randomized Control Trial published in 2018 by *Yeo et al.,* showed WARP can safely decrease hospital length of stay (LOS) and time to adjuvant therapy (TTAT) in selected PD patients without increasing readmission risk/rates as compared to the traditional control pathway

- Rationale:
  - If WARP was so successful for low-risk patients, how well would higher-risk patients do on the pathway compared to the standard post-operative pathway?
  - Can WARP be applied to **all-risk** patients undergoing PD similarly resulting in decreased LOS, TTAT, and risk of readmission?

- **Research Question**
  - Can the WARP be expanded to WARP-eligible (WEPs) and WARP-ineligible patients (WIPs) undergoing pancreaticoduodenectomy (PD) to improve the post-operative course?

- **Hypothesis**
  - The WARP can be expanded to all patients undergoing PD, which results in lowered length of stay (LOS), post-operative complications (POC), time to adjuvant therapy (TTAT), and readmission rates (RR)

Before surgery

Stomach
Bile duct
Gallbladder
Body and tail of pancreas
Pancreas tumor
Duodenum
Small intestine

After surgery

Bile duct attached to small intestine
Remaining pancreas attached to small intestine
Stomach attached to small intestine

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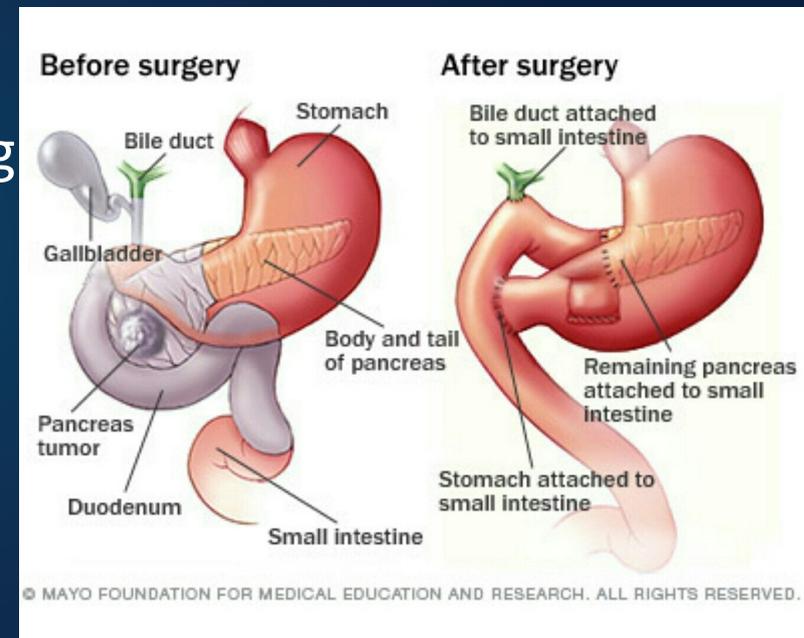
Approach & Results

- **Study design**
  - Single-institution, retrospective chart review
- **Population / study sample**
  - 281 patients who underwent PD between 2017-2020
    - 230 (81.9%) patients had malignant etiologies
    - 51 (18.1%) patients had benign etiologies
    - 119 (42.3%) were WARP-eligible under the initial criteria vs. 162 (57.7%) WARP-ineligible
- **Intervention**
  - WARP (5 day pathway) in **ALL patients** vs. Jefferson's traditional 7 day pathway
- **Outcome**
  - Primary endpoints: LOS, TTAT, RR, POC
- **Data source and collection**
  - Epic- retrospective chart review
- **Rationale for Approach**
  - Jefferson is a major center for PD in the region
  - Access to hundreds of patients in Epic that have undergone PD

Approach & Results

- Analysis:
  - Univariate/Multivariate analysis with logistic regression
- Retrospective Analysis Findings:

	WARP-Eligible (WEPs)	WARP-Ineligible (WIPs)	P value
Post-Op Complications (POCs)	28 (23.5%)	73 (45.1%)	<0.05
Length of Stay (LOS)	5 days	6 days	<0.05
Time to Adjuvant Therapy (TTAT)	55 days	63 days	<0.05
Readmission Rate (RR)	12.6%	23.5%	<0.05

POCs: Delayed Gastric Emptying (DGE) & Post-Op Pancreatic Fistulas (POPF) occurred in higher rates in WIPs (DGE: 10.2% vs. 26.2%, p<0.05; POPF: 5.1% vs. 21%, p<0.05)

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- **Conclusions:**
  - WARP may be expanded to all-risk patients <u>but</u> WIPs may benefit from some additional mitigation strategies to help lower RRs and POC while still minimizing LOS
  - Ex:
    - WEPs- WARP is acceptable, target 4-5 day LOS
    - WIPs- WARP-modification: target lower RR, lower POPF, lower DGE while minimizing LOS (5 days)

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- Next Steps:
  - Continue to analyze patients prospectively that are on the WARP pathway post-PD
  - Work to develop additional mitigation strategies for WIPs to help lower POC, LOS, and RRs on the WARP pathway
  - Develop and pursue additional projects off of the established database

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