Enhanced recovery after pancreatic surgery

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Enhanced Recovery After Surgery

- Multimodal perioperative care pathway designed to achieve early recovery for patients undergoing major surgery
- First proposed by Prof Henrik Kehlet 1990s in Copenhagen
- ERAS principles first applied in colorectal surgery
  - Reduce hospital stay by up to 30%
  - Reduce post-operative complications by up to 50%
ERAS protocol

PREOPERATIVE
- Preadmission counseling
- Fluid and carbohydrate loading
- No prolonged fasting
- No/selective bowel preparation
- Antibiotic prophylaxis
- Thromboprophylaxis
- No premedication

POSTOPERATIVE
- Mid-thoracic epidural anesthesia/analgesia
- No nasogastric tubes
- Prevention of nausea and vomiting
- Avoidance of salt and water overload
- Early removal of catheter
- Early oral nutrition
- Non-opioid analgesia/NSAIDs
- Early mobilization
- Stimulation of gut motility
- Audit of compliance and outcomes

INTRAOPERATIVE
- Short-acting anesthetic agents
- Mid-thoracic epidural anesthesia/analgesia
- No drains
- Avoidance of salt and water overload
- Maintenance of normothermia (body warmer/warm intravenous fluids)
Nutritional Aspects of ERAS

- Avoidance of nil by mouth (NBM)
- Appropriate fluids
- Preoperative carbohydrate loading
- Early postoperative nutrition

**ERP should include…**
- Screening for risk of malnutrition
- Preoperative nutritional support for those at risk
Malnutrition

• 1 in 5 patients admitted to hospital malnourished (higher rates reported in surgical patients)
  – Increased LOS
  – More infections
  – More antibiotics

• Multifactorial

• Cachexia in cancer patients

Malnutrition and Surgery

- 3x as many post operative complications
- 4x greater risk of peri-operative death
- Increased infection
- Poor wound healing
- Depression
What can we do?

- Screen at Preop & OPD
- Malnutrition Universal Screening Tool (MUST)
- Management guidelines
- Dietetic referral
- Preoperative sip feeds
Surgery & Fasting

Catabolism

Hyperglycaemia
Loss of fat & protein stores
Insulin resistance
Patient discomfort
CHO loading

- 50g glucose polymer + 400mls water
- 2 servings night before surgery
- 1 Serving 2 hours before surgery
- Block metabolic changes to starvation
- Safe (ESPEN 2006 Grade A)
- PreLoad – Vitaflo
- PreOp - Nutricia
CHO loading

- Decreased catabolism
- Decreased hyperglycaemia
- Preserved muscle mass
- Improved grip strength
- Reduced LOS
- Reduced Anxiety
LOS Study meta-analysis

- Meta-analysis of 3 RCTs
- Preoperative CHO vs overnight fast
- 20% reduction in LOS
- Preop CHO beneficial to all patients undergoing major surgery (ESPEN Grade B)

Ljungqvist et al 1998 Clin Nutr 17;Suppl1:3
Sodium

- Excess sodium
  - Oedema
  - Bowel oedema
  - Delayed bowel function
  - Ileus

Lobo et al 2002, Lancet 25;359, 1812-8
Early Post Operative Nutrition

• Promote gut function
• Attenuate stress response
• Prevent bacterial translocation
• Immune function - GALT
• Reduced anastamotic dehiscence
• NICE – Grade A evidence in malnutrition
Enhanced Recovery after Pancreatic Surgery

- High-risk surgery
- Mortality ~5%
- Morbidity 30-60%
- Prolonged hospital stay 2-3 weeks
- High incidence of malnutrition / cachexia
- Little data on Fast-track surgery for pancreas
Incidence of cancer cachexia

Tinsdale 1999, Gibney 2005
## Published studies

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>No. of patients</strong></td>
<td>80</td>
<td>91</td>
<td>255</td>
<td>252</td>
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<tr>
<td><strong>Mortality</strong></td>
<td>1 (1%) [both]</td>
<td>1 (1%) [30 day]</td>
<td>5 (2%) [In hosp]</td>
<td>9 (3.6%) [?]</td>
</tr>
<tr>
<td><strong>Readmission</strong></td>
<td>9 (11%)</td>
<td>7 (8%)</td>
<td>9 (3.5%)</td>
<td>18 (7.1%)</td>
</tr>
<tr>
<td><strong>Length of stay (median)</strong></td>
<td>12</td>
<td>7</td>
<td>10</td>
<td>13</td>
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<tr>
<td><strong>Morbidity</strong></td>
<td>56 (70%)</td>
<td>34 (37%)</td>
<td>105 (41.2%)</td>
<td>119 (47.2%)</td>
</tr>
<tr>
<td><strong>Reoperations</strong></td>
<td>-</td>
<td>-</td>
<td>23 (9%)</td>
<td>17 (6.7%)</td>
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‘Cost and Utilization Impact of a Clinical Pathway for Patients Undergoing Pancreaticoduodenectomy’

- Standardised, pre-printed pathway for pancreatic resections
  - Pre- and post-operative care
  - Drain management
  - Medication
  - Diet / enteral feeding
  - Laboratory / radiology tests
• 148 patients over 3 years
• Main outcome = reduced hospital costs

<table>
<thead>
<tr>
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<th>Pre-pathway (n=68)</th>
<th>Post-pathway (n=80)</th>
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</thead>
<tbody>
<tr>
<td>Peri-operative death</td>
<td>2 (3%)</td>
<td>1 (1%)</td>
<td>0.87</td>
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<tr>
<td>Readmission</td>
<td>10 (15%)</td>
<td>9 (11%)</td>
<td>0.62</td>
</tr>
<tr>
<td>Length of stay (days - median)</td>
<td>15</td>
<td>12</td>
<td>0.001</td>
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<tr>
<td>Major morbidity</td>
<td>20 (29%)</td>
<td>24 (30%)</td>
<td>0.92</td>
</tr>
<tr>
<td>Minor morbidity</td>
<td>52 (76%)</td>
<td>56 (70%)</td>
<td>0.21</td>
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‘Initiation of a Critical Pathway for Pancreaticoduodenectomy at an Academic Institution - the First Step in Multidisciplinary Team Building’


- Remove NG day 1
- Ambulation day 1
- Clear liquids day 2
- Regular diet day 3
- Drains out by day 5
- 135 patients over 2 years
- Significant increase in case volume pre > post pathway (2.0 > 7.6 / month) – new team

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<thead>
<tr>
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<th>Pre-pathway (n=44)</th>
<th>Post-pathway (n=91)</th>
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<tbody>
<tr>
<td>Peri-operative death</td>
<td>1 (2.3%)</td>
<td>1 (1.1%)</td>
<td>NS</td>
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<tr>
<td>Readmission</td>
<td>3 (7%)</td>
<td>7 (7.7%)</td>
<td>NS</td>
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<tr>
<td>Length of stay (days - median)</td>
<td>13</td>
<td>7</td>
<td>&lt;0.0001</td>
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<tr>
<td>Complications</td>
<td>19 (44%)</td>
<td>34 (37%)</td>
<td>NS</td>
</tr>
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Antibiotic prophylaxis / thrombo-embolic prophylaxis / octreotide
Critical care x 1 night
Epidural or PCA
Oral fluids 6hrs post-op
Metoclopramide + magnesium/lactulose day 1
• 255 patients over 1 year
• No comparison group
• Mixed resections

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<tbody>
<tr>
<td>Peri-operative death</td>
<td>5 (2%)</td>
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<tr>
<td>Readmission</td>
<td>9 (3.5%)</td>
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<td>Length of stay (days (range))</td>
<td>10 (4-115)</td>
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<tr>
<td>Surgical complications</td>
<td>63 (24.7%)</td>
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<td>Medical complications</td>
<td>42 (16.5%)</td>
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<tr>
<td>Re-operation</td>
<td>23 (9%)</td>
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Predictors of early discharge

- Age <60
- Benign disease
- Left pancreatectomy
- Operating time <6 hours
- Early extubation
‘Fast-track recovery programme after pancreateico-duodenectomy reduces delayed gastric emptying’

Balzano et al, BJS 2008. Milan

• Epidural analgesia
• Enhanced mobilization out of bed
  – 1 hour day 1, 2 hours day 2, 4 hours day 3
• Free fluids by day 3
• Solid food day 4
• 504 patients over 7 years
• Historical control group

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<th>Pre-pathway (n=252)</th>
<th>Post-pathway (n=252)</th>
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<tbody>
<tr>
<td>Peri-operative death</td>
<td>7 (2.8%)</td>
<td>9 (3.6%)</td>
<td>0.80</td>
</tr>
<tr>
<td>Readmission</td>
<td>16 (6.3%)</td>
<td>18 (7.1%)</td>
<td>0.87</td>
</tr>
<tr>
<td>Length of stay (days - median)</td>
<td>15 (7-102)</td>
<td>13 (7-110)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>148 (58.7%)</td>
<td>119 (47.2%)</td>
<td>0.014</td>
</tr>
<tr>
<td>Re-operation</td>
<td>20 (7.9%)</td>
<td>17 (6.7%)</td>
<td>0.73</td>
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<tr>
<td>Delayed gastric emptying</td>
<td>62 (24.6%)</td>
<td>35 (13.9%)</td>
<td>0.003</td>
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Main post-operative problems

- Delayed gastric emptying
  - Fluids day 1 > solids day 3
  - High incidence of re-insertion of NG tube
- Pancreatic leak
  - Blumgart vs. Cattell-Warren anastomosis
- Mobilisation
  - Out of bed day 1
Lessons from other centres

• Detailed written protocol/pathway to follow
• Early oral intake
• Early mobilisation
• Early return to ward from critical care areas
• Aim for discharge at 10 days
Common factors associated with long stay (8 pts >40 days)

- Duodenal cancer
- Gastric outlet obstruction
- Need for nutritional support
- Alcohol-related liver disease
- Delayed gastric emptying
- Post-operative complications
- Social care needs
Pancreatic Enhanced Recovery

• Detailed written patient pathway
  – Completely revised
  – Input from ALL staff
  – Incorporating ERAS principles

• Dedicated Pancreatic Enhanced Recovery Unit (PERU)
  – Located on 5A
  – 2 x 4-bed bays
  – Staff with pancreatic experience from 5A / 5B
  – Patients on unit from admission to discharge
  – Unit opened 10th April 2012
Current Process

Day -1 → Patient admitted into Surgical bed-base (often outlier)
Patient sent to surgery → Patient admitted into POCCU

Day 0 → Is patient well enough to step down?
Yes → Patient remains in POCCU until ready to step down
No → Move patient to HDU

Day 1 → Is patient well enough to step down?
Yes → Move patient to 5A/5B
No → Patients remain in HDU until ready to step down

Day 3/4 → Move patients to 5A/5B
Progress patient until ready for discharge → Discharge patient

Proposed new process

Day -1 → Patient listed for procedure and admission date confirmed

Day 0 → Patient admitted into PERU
Patient sent to surgery → Patient admitted into POCCU

Day 1 → Is patient well enough to step down?
Yes → Patient remains in POCCU until ready to step down
No → Move patients to PERU

Day 2 → Progress patient until ready for discharge → Discharge patient
Liverpool Protocol

- Physio / OT involved at pre-op assessment
- Pre-operative nutritional support + CHO loading
- Staged increase in oral intake days 1-4
  - aim for solids by day 4
  - NG out day 3
- Avoidance of PCA – longer use of epidural
- Early mobilisation
  - Out of bed day 1
  - Walk day 2
- Early return to ward (enhanced recovery unit)
- Drains out by day 7
- Discharge by day 10
Conclusion

• Enhanced recovery is feasible and safe after pancreatic resection
• Significant reduction in length of hospital stay
• No increase in morbidity, mortality, re-operation rate, readmission rate