Active Pharmacist Participation in Practice Optimization to Decrease Length of Stay:
Enhanced Recovery Pathway

Presented by Jenna K Lovely, PharmD, RPh, BCPS
Learning Objectives

• Apply the main principles of Enhanced Recovery Pathway to any area you work
• Outline phases of Implementation Science
• Characterize how active pharmacist participation in Practice Optimization leads to achieved improvements in patient care
• No disclosures
System Thinking and Organizational Learning for Practice Optimization

• Medication Safety
• Optimal Medication Management
• Efficiency in work
• Data → Knowledge → Actionable Improvements
Continuous Learning
Discharge Criteria for Colorectal Surgery

• Pain controlled with oral medications
• Tolerating solids and no IV fluid needs
• Independently ambulatory (or back to baseline)
• Patient has had stool
• No suspicion of complications
Practice Optimization

- Start with WHY

- Framework for Implementation
  - Evidence to bedside
  - Make it work
  - Master the Process
  - Align incentives
  - Set your Goals (SMART) and Measurement plan
  - Test Diffusion
  - Set for Scale and Sustainability

- Culture of Safety – Team Collaboration
- Align with Leadership / Enterprise roadmap
Principles of Enhanced Recovery Pathway

• Patient (and team) expectations
• Multimodal Pain Management
• Minimal NPO; Early oral feeding
• Euvolemia
• Ambulation (early goals back to baseline)
• Overall optimization of streamlined standards
# Accelerated Pathway differences

## Table 1 Differences in care elements of fast-track and enhanced recovery pathways

<table>
<thead>
<tr>
<th>Pathway component</th>
<th>Fast-track pathway</th>
<th>Enhanced recovery pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative analgesia</td>
<td>None</td>
<td>Celecoxib 400 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gabapentin 600 mg</td>
</tr>
<tr>
<td>Postoperative nausea prophylaxis</td>
<td>Recommended based on risk factors</td>
<td>Standardized based on risk factors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dexamethasone 4–8 mg i.v. + 5HT-3 antagonist</td>
</tr>
<tr>
<td>Fluid balance</td>
<td>No target rates in the operating room Postoperative rate 80–125 ml/h i.e.</td>
<td>Fluids at 500 ml/h unless hypovolemic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Postoperative rate 40 ml/h then saline lock at 08.00 hours on day after surgery</td>
</tr>
<tr>
<td>Intraoperative analgesia</td>
<td>Per Anaesthesia</td>
<td>Intrathecal analgesia injection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV ketorolac (end of case)</td>
</tr>
<tr>
<td>Postoperative analgesia</td>
<td>i.v. PCA</td>
<td>Oral oxycodone as needed for pain score ≥ 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scheduled acetaminophen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scheduled NSAIDS IV and oral</td>
</tr>
<tr>
<td>Diet</td>
<td>NGT removed postop. Day 1 Postop.</td>
<td>Regular diet started 4 h after procedure</td>
</tr>
<tr>
<td></td>
<td>Day 1: full liquid diet</td>
<td>Encourage 2000–2500 ml/ day fluids/supplements</td>
</tr>
<tr>
<td></td>
<td>Day 2: soft diet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Day 3: normal diet</td>
<td></td>
</tr>
<tr>
<td>Ambulation</td>
<td>Encouraged immediately</td>
<td>Encouraged immediately</td>
</tr>
</tbody>
</table>
Initial Colorectal Surgery Outcomes

- Decreased LOS
- Decreased cost
- Same or equivalent complications
- Decreased post operative opioid requirements
Fluid management under ERP

<table>
<thead>
<tr>
<th>Fluid Management</th>
<th>ERP</th>
<th>FTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean OR volume</td>
<td>2404</td>
<td>3780</td>
</tr>
<tr>
<td>Mean PACU volume</td>
<td>396</td>
<td>716</td>
</tr>
<tr>
<td>Mean Unit volume</td>
<td>975</td>
<td>3245</td>
</tr>
</tbody>
</table>

All significantly different p<0.001
## Length of Stay (LOS) Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>ERP (n=66)</th>
<th>FT (n = 66)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge on second day after surgery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Rate</td>
<td>20 (43.9 %)</td>
<td>5 (7.6 %)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hospital length of stay (days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>3.26 (1.63)</td>
<td>4.52 (3.00)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>3 (2-10)</td>
<td>4 (2-2.3)</td>
<td></td>
</tr>
</tbody>
</table>
Results of Case Match ERP vs. FT

- Patients achieved two day LOS (44% ERP vs. 8% FT p<0.001)
- Average LOS statistically shorter in ERP group
- 30 day complications were not statistically different between groups
- Readmissions were not statistically different between groups
- Opioid requirements were less in the ERP without increased pain scores
Practice Optimization

• Start with WHY

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• Test Diffusion
  • Set for Scale and Sustainability

• Culture of Safety – Team Collaboration
  • Align with Leadership / Enterprise roadmap
Measurements after Diffusion:

• November of 2009-Feb 2010 all MIS patient on 2 surgeon services were enrolled in ERP
  • 66 ERP case matched to 66 FTP patients
    • Case matched:
      • Surgeon, operation, age

• January through July 2011 all MIS surgery at Mayo
  • Prospective monthly reviewed data base
  • 396 ERP compared to 177 FTP
Enhanced recovery pathway (ERP)

- Data included all ERP colorectal surgery patients in 2011 with research authorization (n=535)
  - Minimally invasive surgery
- ERP elements
  - Pre-op (analgesia)
  - Intra-op (analgesia, fluid balance)
  - Post-op (analgesia, diet and fluid management, optimal pain control, ambulation)
## Compliance in 2011, Minimally Invasive Surgery (MIS)

<table>
<thead>
<tr>
<th>ERP pathway elements</th>
<th>Compliance; overall % (range across surgical teams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabapentin (n=420)</td>
<td>92.9 (87-96)</td>
</tr>
<tr>
<td>Celecoxib (n=349)</td>
<td>82.5 (69-87)</td>
</tr>
<tr>
<td>Intrathecal</td>
<td>83.9 (76-93)</td>
</tr>
<tr>
<td>NSAIDS</td>
<td>87.1 (79-93)</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>99.3 (98-100)</td>
</tr>
<tr>
<td>Diet management</td>
<td>85.6 (78-93)</td>
</tr>
<tr>
<td>Postoperative fluid management</td>
<td>82.4 (71-95)</td>
</tr>
</tbody>
</table>

Compliance with individual ERP pathway elements
NSAIDs, Non-Steroidal Anti-inflammatory Drugs

Submitted for publication Larson and colleagues 2013
Patient Complexity

Comorbidities

- Cardiovascular
- COPD
- Diabetes
- Hypertension
- Chronic renal
- Weight <50
- Age >65
- ASA 3 or 4
- Obese
- IBD
GI recovery and LOS: ERP vs. FT

Initial: 66 vs 66 pts
- Return of Bowel function: 1 vs. 2 days, p<0.001
- LOS Median (days): 3 vs. 3, p<0.001
- LOS Mean (days): 3.1 vs. 4.4, p<0.001
- DC on day 2: 44% vs. 8%, p<0.001

Larger Trial: 396 vs 177 pts
- Return of Bowel function: 2.1 vs. 2.5, p<0.04
- LOS Median: 3 vs. 4, p<0.01
- LOS Mean: 3.8 vs. 4.75, p<0.01
- DC on day 2: 38% vs. 5%, p<0.001
## Complications: ERP vs. FT

<table>
<thead>
<tr>
<th></th>
<th>Initial: 66 vs 66 pts</th>
<th>Larger Trial: 396 vs 177 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>All complications</td>
<td>36% vs. 45% P=NS</td>
<td>30% vs. 40% P&lt;0.05</td>
</tr>
<tr>
<td>ARF</td>
<td>1% vs. 1% P=NS</td>
<td>1% vs. 1% P=NS</td>
</tr>
<tr>
<td>Ileus</td>
<td>9% vs. 12% P=NS</td>
<td>13% vs. 13% P=NS</td>
</tr>
<tr>
<td>Leak/abscess</td>
<td>2.3% vs. 1.9% P=NS</td>
<td>3% vs. 1.9% P=NS</td>
</tr>
<tr>
<td>Re-admission</td>
<td>15% vs. 7.6% P=NS</td>
<td>10.8% vs. 12.3% P=NS</td>
</tr>
</tbody>
</table>
Pain control with ERP

- First study
  - ERP achieved Goal Pain Score
    - 80 vs 60% of the time
    - 38 OME/day vs 182 OME/day

- Larger study in 2011
  - ERP achieved Goal Pain Score
    - 80 vs 55% of the time
    - 161 OME/Day vs 301 OME Day

All statistically significant p<0.01, <10% of patient required a PCA
Colorectal Surgery
Length of Stay

Observed Rate: 17.74%
Expected Rate: 17.63%
O/E Ratio: 1.01
Status: As Expected
Colorectal Surgery
Length of Stay

Observed Rate: 14.67%
Pred. Obs. Rate: 16.46%
Expected Rate: 20.99%
Odds Ratio: 0.71
Status: Non-Outlier
We published our results…

**Original article**

**Outcomes after implementation of a multimodal standard care pathway for laparoscopic colorectal surgery**

D. W. Larson¹, J. K. Lovely², R. R. Cima¹,³, E. J. Dozois⁴, H. Chua¹, B. G. Wolff⁴, J. H. Pemberton¹, R. R. Devine¹ and M. Huebner⁴

*BJS 2014; 101: 1023–1030*
Which is NOT a key principle of Enhanced Recovery Pathway?

a. Multimodal Pain Management
b. Early feeding
c. Dehydration
e. Ambulation (early goals back to baseline)
c. Dehydration is NOT a principle of Enhanced Recovery Pathway

EUVOLEMIA is the key principle related to fluid management.
Practice Optimization

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- Culture of Safety – Team Collaboration
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Improvements continued

Figure 3: Length of stay categories in the MTR registry by Complication

- No complication: n=379
- With complication: n=84
Enhanced Recovery Pathway 2013

Figure 1: Mean LOS for MTR All patients [95% CI]
Multiple PDSAs used in Team Huddles where Opportunities exist

- Data reviewed for timeframe
- Areas for Improvement agreed to by team
- Expectations set or reset for team members
- Coaching and Case based learning examples shared.
- Examples: Diet, Fluid overload, Scheduled meds omitted
Optimal pain management – Lessons learned

• Patients with optimal pain management recover better
  • LOS lower
  • Opioid requirements lower
  • Complications lower and/or recognized sooner
• Comfort goal for every patient helpful
• If the ERP standards are not meeting the patients needs
  • Re-assessment by team
  • Follow through needs to occur until either new diagnosis and/or patient satisfaction needs met
Example of Ongoing Expectation Setting

- Within Enhanced Recovery Pathway
  - 60% of patients will only require 30 mg oral morphine equivalents in first two days
  - 50% of MIS patients are candidates for dismissal on Day 2 (30% for open)
  - 90% of MIS patients are candidates for dismissal by Day 3 (65% for open)
- When patients seem ‘off’ pathway, investigate
Three days and beyond...

- Reassessment
  - Dismissal issues and/or what Issue/Complication?
  - Logistics?
  - Examples..
Minimizing Variation led to…

- Tracking of issues to look for actionable patterns
- Prioritized by using Impact Grid for assessment
Goals of Practice Optimization – ERP is one

• Minimize unnecessary variation
  • Minimize delays
  • Minimize waste
  • Improve clear, concise communication

• Minimize ‘surprise’ and ‘chaos’ by maximizing collective knowledge
  • Teach and Train so that every time is not the ‘first time’

• Teach and Train probabilities
  • Be prepared and/or avoid next
  • Once one complication, likelihood for another
Further Diffusion: Scale and Sustainability

• GYN
• Plastics
• Other Surgical and Medical Practice Initiatives
• Provider Network CRS 2015-2016; 8 hospitals
  • Consistent results… lower LOS, lower opioid use…same or fewer complications
• Provider Network GYN 2016-2017; TBD
• Reassessment with CRS Mayo ongoing…
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Framework for Implementation: Make it work

- Refinement of the process in one area
  - Document the methodology
  - Vet it over and over until 1 patient error free and no do overs or prompts required

- Teach others
  - Five people can get to error free with the above methodology without do overs or prompts required

- Audit process for 12 patients at a time
  - Refine until > 95 % accuracy without do overs/prompts
Framework for Implementation: Goal setting

• All workflow actions supported and transparent to the team
  • Awareness of patients that need attention
  • Status of the Enhanced Recovery Pathway and Patient Outcomes
  • Documentation of the principled variation
• Aligned with institutional priorities and roll out plan
• SMART goals with transparent measures
SMART goals as one method

- **S**PECIFIC: state exactly what you want to accomplish (who, what, when, where, why)
- **M**EASURABLE: how will you measure, evaluate and describe to what extent each goal will be met?
- **A**CHIEVABLE: is it possible as a stretch goal? do we have control/influence over it?
- **R**EALISTIC/RELEVANT: is this goal recorded and relevant to the business right now? Can we do it? Link it to overall goals
- **T**IME – BASED: what is a reasonable timeframe to achieve?
Framework for Implementation: Test Diffusion

• Prove it works for more than one group
• Test all aspects of Diffusion
  • Process
  • Training Method
  • Metric / Audit plan
  • Feedback loops

*Trust but verify… R. Reagan*
Framework for Implementation: Sustainability

• Build for Scale, Support and Sustainability
  • Business Plan for Diffusion
  • Business Plan for ‘Sustaining the Gains’
  • Systems thinking Build
    • ‘hard wiring’, ‘systematizing’, making it ‘the way we work’
• Continuous Feedback/Learning System
  • Performance Feedback/Audits for quality
  • Metrics and Monitoring (Control plan)
  • Meaningful action steps from leaders
  • Reassessment plan for Refine/Improve
Scale and Sustainability

• Business plan
  • Expected ROI from lower LOS, reduced med costs, improved outcomes…
  • Pharmacist FTE and corresponding workload stats and changes in Staffing process for ability to be present for rounds

• Process commitment culturally and technically

• Timelines Set

• Ongoing assessments
Do what you can, with what you have, where you are… T. Roosevelt
What are key phases of Implementation Science?

a. Making it work… culture, processes people for taking evidence to bedside

b. Setting your Goals (SMART) and Measurement plan

c. Testing Diffusion

d. Setting for Scale and Sustainability

e. All of the above
Answer:
e. All of the above
Active Pharmacist participation in Practice Optimization achieves improvements in Patient Care

• Decreases in Length of Stay
• Optimizing multimodal pain management and reducing opioid requirements
• Increases transparency on system issues for further improvement
• Increases opportunities for multidisciplinary research, quality improvement publications that further advance the science
Taking this back to your Work Unit

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Questions & Discussion

Thank you for your interest.

Jenna K Lovely, PharmD, RPh, BCPS
lovely.jenna@mayo.edu
Professionalism at Mayo Clinic

“\textit{The best interest of the patient is the only interest to be considered... and in order that the sick may benefit from advancing knowledge a Union of Forces is necessary}”

William J. Mayo, MD
June 1910
What we are still working on…

- Innovation to automate
- Innovation to improve efficiency and outcomes
- Culture around practice optimization and transparency of data
  - Coaching and Mentoring for excellence
  - Understanding and improving feedback loops
- Research for next best practices and other areas of improvements