Enhanced recovery after surgery: the role of the PACU & Pre-op

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Learning Objectives

1. Review the evolution and origins of Enhanced Recover after surgery (ERAS) programs and the role of the PACU within them

2. Discuss the future implications of ERAS on the PACU & pre-op areas and on peri-operative practice
Disclosures

None
Acknowledgements

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Michigan Medicine

Dr. Scott Ellis Regenbogen
Associate Professor of Surgery, Colon & Rectal Surgery
Michigan Medicine

Dr. Andrew Gray Urquhart
Associate Professor, Orthopedic Surgery
Michigan Medicine

Dr. Paul Hilliard
Assistant Professor, Anesthesia & Pain
Michigan Medicine
Enhanced Recovery after surgery (ERAS)

What is ERAS anyway?

Multidisciplinary bundles of care

Aim to hasten recovery and shorten stay
What is ERAS?
Where did ERAS begin?

Prof. Henrik Khelet MD PhD
Colorectal surgeon
Hvidovre Hospital (post 2004 Rigshospitalet København)
Pre-emptive analgesia - epidurals and nitrogen balance
Evolved to “fast track” surgery mid 1990’s
ERAS born 2001
Figure Legend:
Henrik Kehlet, M.D., Ph.D., recipient of the American Society of Anesthesiologists 2014 Excellence in Research Award.
Kenneth Fearon
MBBCh (Hons.), MD, FRCPS (Glasgow), FRCS (Edinburgh), FRCS (England)

Royal Infirmary of Edinburgh
Founding member of ERAS group
Chairman ERAS Society
1960-2016
ERAS Societies
ERAS USA, the ERAS Society USA Chapter, held its founding meeting October 16, 2016, at the Marriott Marquis Hotel in Washington, DC.

“Starting in the preoperative setting, we advise patients to improve their overall health with nutrition, exercise, smoking cessation, and alcohol cessation. Patient education about the surgical process and recovery further brings the patient to the center of their care.”

http://erasusa.org/
ERAS USA Meetings

Calendar of Events

Please contact ERAS®USA to add meetings or events of interest.

**February, 2018**

**Enhanced Recovery After Surgery Symposium: Avoiding Complications, Avoiding Opiates 2018**
February 2-3, 2018
Mayo Clinic, Phoenix, Arizona

**Enhanced Recovery After Surgery Symposium: Implementing Change and New Standard of Care in Surgery**
February 12-13, 2018
The University of Texas MD Anderson Cancer Center, Houston, Texas
Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery

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 oral analgesia/NSAIDs
Early mobilization
Stimulation of gut motility
Audit of compliance and outcomes

Postoperative

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

Preoperative

Acta Anaesthesiologica Scandinavica
Volume 59, Issue 10, pages 1212-1231, 8 SEP 2015 DOI: 10.1111/aas.12601
Guidelines for patients undergoing surgery as part of an Enhanced Recovery Programme (ERP)

Step one: Referral from primary care: involvement of your GP

Step two: Pre-operative care by the hospital team

Nutrition: A key part of enhanced recovery is keeping you well fed. Most pathways include the offer of carbohydrate nutritious drinks to be drunk before you arrive at the hospital. These drinks taste sweet and are designed to help prepare you for surgery.

Step three: Admission to hospital

Admit on the day of surgery: To help keep you relaxed and confident before your operation, the enhanced recovery team would like you to be at home for as long as possible before surgery. Having a good night’s sleep the night before is much more likely in your own bed.

Step four: Care during the operation by the surgeon and the anaesthetist

Minimally invasive surgery.

Individualised fluid balance therapy

Modern anaesthesia and pain relief.

Minimal use of drains and tubes.

Step five: Post-operative care in the hospital

Getting up and about within 24 hours:

Early return to eating and drinking.

Step six: Follow-up – rehabilitation and going home

Healthcare professional support: The high level of planning that lies behind an enhanced recovery care pathway means that all the practical support you need at home should be in place. Whether you need a raised toilet seat (hip surgery) or a visit from a continence advisor (operations on the prostate) it will be in place, whether you are discharged on a weekday, at the weekend or at a holiday period. You will also know how to use any aids that you need such as crutches, a stoma or a catheter.

Discharge planning

24 hour telephone helpline

https://www.rcoa.ac.uk/erp
Why bother with ERAS?

Colorectal example:

- Length of stay – 2.5 days less
- Complications - 50% less in colonic surgery
- Cost - $2,245 per patient

ERAS general recommendations

16 different guidelines

“Do your job well!”

Surgical themes

Anesthesia themes

Perioperative nursing and therapy themes
Surgical themes

Practice asepsis, clean patient in a standard way
Use appropriate prophylactic antibiotics
Minimally invasive surgery
Minimally disruptive preparation
Pre-habilitation of patients
Minimize fasting and mobilize asap
Anesthesia themes

Accommodate fasting times
Multimodal analgesia
Use Neuro-axial / Regional / Local anesthetic
Reduce or avoid opiates
Reduce fluids if possible
Multimodal anti-PONV
Perioperative nursing and therapy themes

Feed asap
Mobilize asap
Therapies asap
Reduce fasting times
Provide aids to get home
Patient and family expectations
Patient education
C'est un effort d'équipe

Check-list pour une opération réussie

AVANT L'OPÉRATION
- UN VERRE D'EAU SUCCÉE
- LE PATIENT BIEN INFORMÉ
- PAS D'IMPRESSÉMENT

PENDANT
- NI DRAIN NI CATHÉTÈRE
- UNE BONNE ANESTHÉSIE
- UTILISER LA LARMÉSCOPIE

L'OPÉRATION
- MOBILISATION RAPIDE
- ANTI-DOULENES SUR MESURE
- BONNE NUTRITION POST-OPÉRATOIRE

APRÈS L'OPÉRATION
- UNE NUTRITION ADAPTÉE
- MOBILISATION RÉGULIÈRE
- ANTI-DOULENES SELON LES BESOINS

À LA MAISON
Barriers to ERAS in the PACU

Early nutrition in PACU – culture change to feed

Mobility in the PACU – space and staff to assist

Reporting back to in room providers – perioperative providers versus intra-operative providers

Lack of a common protocol for ERAS
General surgeon Day 0 problems

Reducing fluid boluses – for low UO

Reducing narcotics – often given PACU or on ward

Starting nutrition
Food in the PACU

“I never feed my patients!”

“I do not feed them if they are out patients.”

“They might puke!”

Personal snapshot survey Michigan Medicine PACU, 12/1/2017
Post op nutrition options
Michigan TKA / THA experience

2012 3.5 days stay

“Dealer’s choice anesthesia” – now standardized

Clear liquids, PCA, pain service referral
Michigan TKA / THA experience

Protocolized experience – 4.5 hour pre-op course

2017 1 day stay (median <24 hours)

Now – physical therapy starts in PACU, neuraxial regional anesthesia, clear liquids
Perceived barriers to Orthopedic protocol

Chicken broth – “6 hours fasting (!?)”

Feeding in the PACU – food versus fear of PONV

Therapy support and space to mobilize in the PACU

PACU holds may delay therapies
Orthopedic analgesic protocol

(Opioid Naïve: Patient on <80mg PO Morphone equivalents daily)

**PRE-OPERATIVE MEDS**
- Celecoxib 400 mg
- Acetaminophen 1000 mg
- Gabapentin 600 mg
- Clonidine patch 0.1 mg
  (not placed if baseline systolic BP <100mmHg or HR<50)

**INTRA-OPERATIVE MEDS**
- Neuraxial anesthesia
- Dexamethasone 4 mg IV
- Periarticular hip injection (by surgeon)
- Ketorolac 30 mg IV (at skin closure)
- If patient has epidural, dose with Duramorph 2.3 mg and remove epidural in O.R.

**TO START POST-OP DAY 0**
- Dexamethasone 10 mg IV Q8 hours x 2 doses (begin 8 hours after end of case)
- Ketorolac 15 mg IV Q6 hours x 3 doses (dose is given at end of case)
- Magnesium gluconate 400 mg daily PRN muscle spasms
- Omeprazole 40mg once daily
- Ondansetron 4 mg Q8 hours PRN nausea
- Oxycodone 5-10 mg Q4 hours PRN pain

**TO START POST-OP DAY 1**
- Celecoxib 200 mg daily
- Gabapentin 100mg PO 3 times daily
- Acetaminophen 500 mg Q4 hours
Orthopedic experience results

<table>
<thead>
<tr>
<th></th>
<th>RAMP Protocol</th>
<th>Traditional Protocol</th>
<th>P Value</th>
<th>CI, 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Stay (days)</td>
<td>2.1</td>
<td>2.89</td>
<td>&lt;0.01</td>
<td>-1.1 to -0.4</td>
</tr>
<tr>
<td>IV morphine equivalents (mg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraoperative</td>
<td>5.29</td>
<td>10.14</td>
<td>&lt;0.01</td>
<td>-7.3 to -2.4</td>
</tr>
<tr>
<td>PACU</td>
<td>2.99</td>
<td>4.54</td>
<td>0.1</td>
<td>-3.4 to 0.3</td>
</tr>
<tr>
<td>General Floor (Oral)</td>
<td>31.83</td>
<td>48.93</td>
<td>&lt;0.01</td>
<td>-29.8 to -4.36</td>
</tr>
<tr>
<td>General Floor (IV)</td>
<td>1.59</td>
<td>23.89</td>
<td>&lt;0.01</td>
<td>-30.4 to -14.9</td>
</tr>
<tr>
<td>Combined opioid consumption</td>
<td>41.35</td>
<td>87.5</td>
<td>&lt;0.01</td>
<td>-65.4 to -26.9</td>
</tr>
</tbody>
</table>

LESS READMISSIONS – NOW 9% (from 36%)
Michigan ERAS - Donor Nephrectomy

With thanks to Dr. Seth Waits – transplant surgeon

Data from Dr. Paul Hilliard
Pre Op

Smoking Cessation

Carbohydrate Drink

Acetaminophen (1 gram PO in holding area)
Intra Op

Post Induction TAP block

Standard fluid administration

Ketorolac IV at end of case
Post Op

Scheduled non-narcotic pain medications

Early Ambulation

Early Regular Diet

Improved Discharge Planning
Less time in PACU; less time overall

![Bar chart showing time in PACU and time to incision for standard therapy and ERP with TAP block with sample sizes n = 40 and n = 31 respectively.](chart.png)
Less opioid use

- PCA use (mg morphine)
- Total opioid use (including PO) during hospitalization

- ERP with TAP n = 31
- Standard therapy n = 40
Faster discharge from hospital
Similar pain scores in the PACU

Post-operative Pain Scores
Less post operative pain on ward

- Average VAS with ERP
- Average VAS with standard therapy
ERAS and Pre-op

Concept of “batching” patient arrivals and procedures

e.g. >1 patient may have an epidural placed; most effective has their operation 1st

Implications on pre-op holding load and staff

Letting patients drink in pre-op
Why change to adopt ERAS?
Why change to adopt ERAS?

Why change to adopt ERAS?

## Value Based Purchasing timetable

<table>
<thead>
<tr>
<th>FY</th>
<th>Applicable Domains &amp; Weights</th>
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</thead>
<tbody>
<tr>
<td>2016</td>
<td>Clinical Process of Care (10%)</td>
</tr>
<tr>
<td></td>
<td>Patient Experience of Care (25%)</td>
</tr>
<tr>
<td></td>
<td>Outcome (40%)</td>
</tr>
<tr>
<td></td>
<td>Efficiency (25%)</td>
</tr>
<tr>
<td>2017*</td>
<td>Patient and Caregiver-Centered Experience of Care/Care Coordination (25%)</td>
</tr>
<tr>
<td></td>
<td>Safety (20%)</td>
</tr>
<tr>
<td></td>
<td>Clinical Care (30%)</td>
</tr>
<tr>
<td></td>
<td>• Clinical Care – Outcomes (25%)</td>
</tr>
<tr>
<td></td>
<td>• Clinical Care – Process (5%)</td>
</tr>
<tr>
<td></td>
<td>Efficiency and Cost Reduction (25%)</td>
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<tr>
<td>2018</td>
<td>Patient and Caregiver-Centered Experience of Care/Care Coordination (25%)</td>
</tr>
<tr>
<td></td>
<td>Safety (25%)</td>
</tr>
<tr>
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<td>Clinical Care (25%)</td>
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<tr>
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<td>Efficiency and Cost Reduction (25%)</td>
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Why change to adopt ERAS?

Pay for performance model

Quality valued over quantity

CMS removes knee replacements from 'inpatient-only list'—here's what it means for your hospital

9:33 AM on November 2, 2017 By Austin Terry and Tracy Walsh

Yesterday, CMS released the Final Hospital Outpatient Prospective Payment System (OPPS) Rule for 2018 which removes total knee arthroplasties (TKAs) from the inpatient only list. This move will allow Medicare to reimburse TKAs performed on an outpatient basis, likely resulting in a shift of thousands of procedures from inpatient to outpatient.
C'est un effort d'équipe = Team effort
How to move ERAS forwards

Local and regional collaboration – UK example
Meetings and education – national and international
Audit to collect data of successful implementation
Work on barriers from staff – fasting, analgesia, modes of anesthesia
Work on patient education & expectation – key to success
Eras® Society

Many different sets of guidelines

Commercial products exist to help implement ERAS

8 month program

Colorectal
Bladder surgery
Breast surgery
Gastrectomy
Bariatric
Upper GI
Gynaecological
Head and neck
Pancreaticoduodenectomy
Rectal and pelvic

http://erassociety.org.loopiadns.com/guidelines/list-of-guidelines/
ERAS® Implementation Program (EIP)

4 interactive workshops over 8 months

Seminar 1
Introduction to ERAS®
Current status
Start data entry
Strategies for implementation
(Leader & Nurse)

Seminar 2
Report of results (pre-ERAS®)
Goals, measures and outcomes
Planning for local ERAS® implementation
(full team)

Seminar 3
On Line Reporting results
Summary of experience
Planning for the future
(full team)

Seminar 4
New Situation
Reporting results
Summary of experience
Planning for the future

Develop methods to enter data into EIAS
Work group meetings
Support by Coach

Progressively start using ERAS® on patients
Work group meetings, develop new way of auditing
Support by Coach

Routine use of ERAS® for all patients
Work group meetings for regular interactive audit
Support by Coach

3 active working periods at home

Follow Up

https://www.encare.net/healthcare-professionals/products-and-services/eras-implementation-program-eip
ERAS Implementation process (UK)

Hospital steering groups
Audit current practice
Milestones agreed
Education plan
Implement
Re-audit

### All ERAS procedure patients admitted from August 2009 - July 2010 against November 2010 to April 2011

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Indicator based on procedure OPCS4 codes</th>
<th>Pre-ERAS Median</th>
<th>Post-ERAS Median</th>
<th>Bed days required with baseline LOS</th>
<th>Bed days required with ERAS LOS</th>
<th>Reduction in Annual bed day requirement if the full year ERAS effect is achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gynaecology Oncology</td>
<td>% of patients with a length of stay of 3 days or less</td>
<td>13.4%</td>
<td>5%</td>
<td>254</td>
<td>1392</td>
<td>138</td>
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<tr>
<td></td>
<td>Patients mean length of stay</td>
<td></td>
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<tr>
<td>Gynaecology Benign</td>
<td>% of patients with a length of stay of 3 days or less</td>
<td>6.0%</td>
<td>4.4%</td>
<td>277</td>
<td>1037</td>
<td>185</td>
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<td>Patients mean length of stay</td>
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<tr>
<td>Hepatobiliary Surgery</td>
<td>% of patients with a length of stay of 6 days or less</td>
<td>15.7%</td>
<td>9.4%</td>
<td>70</td>
<td>661</td>
<td>149</td>
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<td></td>
<td>Patients mean length of stay</td>
<td></td>
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<tr>
<td>Upper GI Surgery</td>
<td>% of patients with a length of stay of 9 days or less</td>
<td>15.7%</td>
<td>12.4%</td>
<td>1356</td>
<td>722</td>
<td>624</td>
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<td>Patients mean length of stay</td>
<td></td>
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<tr>
<td>Colorectal Surgery</td>
<td>% of patients with a length of stay of 4 days or less</td>
<td>53.3%</td>
<td>43.8%</td>
<td>163</td>
<td>700</td>
<td>424</td>
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<td>Patients mean length of stay</td>
<td></td>
<td></td>
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<tr>
<td>Urology</td>
<td>% of patients with a length of stay of 3 days or less</td>
<td>11.2%</td>
<td>7.9%</td>
<td>234</td>
<td>719</td>
<td>185</td>
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<td>Patients mean length of stay</td>
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**Total:** 1715 hospital days saved
ERAS is a continuum

The OR and perioperative experience is only 1 small part of it

It starts with the H&P at clinic
Behavior modification, training and nutrition
Hospital stay including anesthetic
Rehabilitation & nutrition
Post operative mobility & support
Questions?