Perioperative Goal
Directed Therapy
Improving the Quality of Care for Our Surgical Patients

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Disclosure

- Edwards Lifesciences, Speakers Bureau
- American Society for Enhanced Recovery, Board of Directors
Overview

Perioperative Goal Directed Therapy (PGDT)

Enhanced Recovery (ER)

The Norton Audubon Experience

CRNA opportunities within Enhanced Surgical Recovery Programs
Goal of Intraoperative Fluid Management

Maintain
- Intravascular Fluid Volume
- LV Filling Pressures
- BP/CO
- Oxygen Delivery

Manage
- Preoperative Status
- Surgical Considerations
- Postoperative Needs

Euvolemia
1 liter Normal Saline
Fluid Administration Gone WRONG

Traditional Fluid Therapy

- Knowledge and Experience
- Dogma/Clinicians
- Vital Signs

Crude Markers of Hypovolemia:
- BP
- HR
- UOP
- EBL
Blood Pressure = Late Indicator

**Assumption:**
MAP = CO
- If $\downarrow$ BP = $\downarrow$ CO
- If $\uparrow$ BP = $\uparrow$ CO

Pressure $\not\equiv$ FLOW
Traditional Fluid Therapy

Provider Variability

Knowledge and Experience

Dogma/Clinicians

Vital Signs
Variability of Providers

The strongest predictor of corrected crystalloid infusion was the anesthesia providers regardless of patient factors.

Lillot BJA 2014
Perioperative Fluid Utilization Variability and Association With Outcomes in Sample US Surgical Populations

Julie K.M. Thacker, MD, William K. Mountford, PhD, Frank R. Ernst, PharmD, Michelle R. Krukas, MA, and Michael (Monty) G. Mythen, MBBS, MD, FRCA, FFICM, FCAI (Hon)

Annals of Surgery 2015

Colon Surgery

- Significant Variability in DOS fluid admin

- Variability leads to poor outcomes
Evolution of Fluid Management

Perioperative Goal-Directed Therapy

- Conventional
- Liberal
- Restrictive

Frank-Starling Curve

Stroke Volume

Preload

Michard F. Changes in arterial pressure during mechanical ventilation. Anesthesiology. 2005; 103: 419-28
GOAL Directed Fluid Therapy

ABP
Continuous NON/MINvasive

CO
Cardiac Output/ Index

SV
Stroke Volume/ Index

SVV
Strove Volume Variation (SVV)
Parameters of FLOW
Cardiac Output/ Index
Stroke Volume

Diastolic

Ejected wave

Reflected wave

(Systolic Phase)  (Diastolic Phase)

Systolic peak

Dicrotic notch
Stroke Volume Variation

A calculated percentage of variation between the Stroke Volumes…

\[ \% SVV = \frac{SV_{max} - SV_{min}}{SV_{mean}} \]
Preload Dependence Optimization

SVV $< 13\%$

High Resp Variation = Fluid responsiveness

Low Resp Variation = Decreased Fluid responsiveness

Fluid Bolus

0

Preload

Stroke Volume

J. Bloomstone M.D. 2011
Limitations of SVV

**SVV STOPS**

- Spontaneous Ventilation
- Tidal Volume (<8cc/Kg)
- Open Chest
- Pneumoperitoneum
- Sustained Cardiac Arrhythmias
Nice/Kuper Protocol

Kuper et al BMJ. 2011; 342:d3016
WHO?

ALL Surgical Patients!
Degree of intervention-Pathway/Patient dependent

ASA 1 • Procedure Specific

ASA2/3 • Procedure Specific
       • NON Invasive

ASA>4 • Procedure Specific
       • Critical State
       • NON→ Min-Invasive
WHEN

PreOP Optimization

IntraOP Pre/Post Incision

Post Op Rescue/ Tx
Perioperative Goal Directed Therapy

Real-Time Hemo-Dynamic Data

• Cont BP
• CO
• SV
• SVV

Clinical Judgement

• Knowledge
• Experience

Fluid Therapy Protocols

• Evidenced Based

ACTION
Don’t Get Caught up in the “NUMBERS”
Knowledge and Experience
Optimization using GDFT

Fluid intake

Complications

Hypoperfusion
Organ dysfunction
Adverse outcome

Edema
Organ dysfunction
Adverse outcome

Hypovolemic

OPTIMAL

Overloaded

Volume Load
PGDT

Reduces Complications
Evidence: 30+ positive RCTs, 14+ meta-analyses

- 32-55% reduction in Post-Surgical Complications
- Reduction by 1-2 (avg. days) in Length of Stay
- 30+ positive RCTs

PGDT

Reduces Complications

Reduces Variance

Improves Outcomes

Successful Recovery
The Norton Audubon Experience

ERAS IMPLEMENTATION OVER 2 YEARS
ERAS in the BLUEGRASS
## Clinical Effectiveness ERAS Report – Colorectal Procedures
### Baseline 2014/ Improvement 2015-2016

<table>
<thead>
<tr>
<th>Variable</th>
<th>Improvement 2015</th>
<th>Improvement 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average per patient</td>
<td>Std dev</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>5.14</td>
<td>3.68</td>
</tr>
<tr>
<td>Direct Cost</td>
<td>$6,261</td>
<td>$2,951</td>
</tr>
</tbody>
</table>

This table compares the baseline 2014 metrics with the improvements in 2015 and 2016 for colorectal procedures. The highlighted metrics show significant improvements in Length of Stay and Direct Cost.
Variable Direct Cost Buckets

- Room and Board: $2,400
- Blood Products: $500
- Pharmacy: $700
Norton Audubon Results

$344,000 Savings
CRNAs role in PGDT Initiative

HOW CRNAs IMPROVE INTRAOPERATIVE CARE
CRNAs leading the PGDT/ER Movement

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has.
“The way to get started is to quit talking and begin doing.”

- Walt Disney
Where to Begin

- Lit. review
- Current Practice?
- Ask for DATA
The Face of ESR
Enhanced Surgical Recovery in your Practice

Change is Constant

PGDT = ESR

Standard Of Care

CRNAs as Leaders

ESR = BEST PRACTICE!
Quality is never an accident; it is always the result of intelligent effort.

John Ruskin
English art critic
1819-1900