Applying Results of Randomized Trials to a Clinical Practice

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VARIATION IN CARE

- Documented benefits in avoiding wide variation in care
  - Improved Efficiency
  - Cost-Effectiveness
  - Superior Outcomes
Example of Variation - Empyema

2001-2005

- Hospitalist A read a journal article that fibrinolysis is superior to chest tube alone
  - Refer to interventional radiology

- Hospitalist B read a journal article that primary VATS is superior to chest tube alone
  - Refer to surgery

CONFLICT WITHIN OUR HOSPITAL
VATS STUDY POPULATION

Inclusion Criteria
VATS STUDY POPULATION

Inclusion Criteria
12 Fr tube placed by IR or surgery in procedure room

4mg tPA in 40ml NS given into tube on insertion and each day for 3 doses

Thoracoscopic debridement with chest tube left behind on – 20 cm H₂O suction
VATS STUDY PROTOCOL

Primary Outcome Measure

Time to discharge after intervention
### VATS STUDY RESULTS

#### Outcomes

<table>
<thead>
<tr>
<th></th>
<th>VATS</th>
<th>tPA</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS (Days)</td>
<td>6.89</td>
<td>6.83</td>
<td>0.96</td>
</tr>
<tr>
<td>O2 tx (Days)</td>
<td>2.25</td>
<td>2.33</td>
<td>0.89</td>
</tr>
<tr>
<td>PO Fever (Days)</td>
<td>3.1</td>
<td>3.8</td>
<td>0.46</td>
</tr>
<tr>
<td>Analgesic doses</td>
<td>22.3</td>
<td>21.4</td>
<td>0.90</td>
</tr>
<tr>
<td>Proc Charges</td>
<td>$11,660</td>
<td>$7,575</td>
<td><strong>0.01</strong></td>
</tr>
</tbody>
</table>

16.6% failure rate for fibrinolysis
2007-Present ➔ UNIFORM PROTOCOL

EMPYEMA
(Loculations or > 10,000 WBC/µL)

12 Fr chest tube with 3 doses of tPA

Drainage decreased without clinical improvement

Ultrasound or CT

Persistent pleural space disease

No pleural space disease

VATS

Continue Antibiotics
Example of Variation
Perforated Appendicitis

2001 - 2004

- Some surgeons utilized triples
- Some surgeons utilized rocephin/flagyl
  - Some surgeons didn’t care

- Variation in definition of perforation, NG tubes, TPN use, discharge criteria, use of home antibiotics, wound management
RETROSPECTIVE REVIEW

Overview

- Retrospective - 250 patients w/perforated appendicitis
- Those treated with rocephin/flagyl were compared to those treated with triple antibiotic coverage
- Parameters included temperature curves for the first 5 post-operative days, abscess rate, length of hospitalization, length of intravenous antibiotic treatment and medication charges
## RETROSPECTIVE RESULTS

### Outcomes

<table>
<thead>
<tr>
<th></th>
<th>RO/FLAG</th>
<th>TRIPLES</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC ($\times 10^3$)</td>
<td>9.8 +/- 0.5</td>
<td>11.6 +/- 0.4</td>
<td>0.10</td>
</tr>
<tr>
<td>LOS (Days)</td>
<td>6.8 +/- 0.4</td>
<td>7.9 +/- 0.2</td>
<td>0.03</td>
</tr>
<tr>
<td>IV Tx (Days)</td>
<td>7.2 +/- 0.5</td>
<td>8.6 +/- 0.4</td>
<td>0.05</td>
</tr>
<tr>
<td>Abscess (%)</td>
<td>8.8%</td>
<td>14.2%</td>
<td>0.37</td>
</tr>
</tbody>
</table>
RESULTS

Medication Charges

<table>
<thead>
<tr>
<th>RO/FLAG</th>
<th>TRIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ of Course</td>
<td>$546.01 +/- $29.34</td>
</tr>
</tbody>
</table>

P Value < 0.0001

NOT SO FAST, MY FRIENDS!!
WHY A TRIAL?

Weaknesses

- Retrospective
- Uneven numbers between groups
- Recent experience vs historical experience creates bias
  - Far more laparoscopy in recent cohort (Rocephin/Flagyl)
    - (47% in Ro/Flag group vs 2% in Triples group)
  - Experience with laparoscopy improved
  - Pressures to discharge sooner in recent cohort independent of medication regimen
ABX STUDY POPULATION

**Inclusion Criteria**

- Under 18 years of age
- Perforated appendicitis at the time of appendectomy
  - Stool in the abdomen
  - Hole in the appendix

**Exclusion Criteria**

- Known allergy to one of the medications
MANAGEMENT

- All patients receive 5 days IV abx
- Diet begins after flatus
- WBC drawn on POD 5
- If elevated, draw again on POD 7, then if elevated, draw on POD 10 and obtain CT
- Nl WBC count and tolerating PO’s w/o fever meets d/c criteria
- No abx on D/C
### RESULTS

#### Outcomes

<table>
<thead>
<tr>
<th></th>
<th>RO/FLAG</th>
<th>TRIPLES</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC (x10^3)</td>
<td>9.4 +/- 3.9</td>
<td>9.9 +/- 4.4</td>
<td>0.56</td>
</tr>
<tr>
<td>LOS (Days)</td>
<td>6.27 +/- 2.5</td>
<td>6.20 +/- 3.2</td>
<td>0.85</td>
</tr>
<tr>
<td>IV Tx (Days)</td>
<td>6.0 +/- 1.5</td>
<td>6.2 +/- 1.1</td>
<td>0.48</td>
</tr>
<tr>
<td>Abscess (%)</td>
<td>20.4%</td>
<td>16.3%</td>
<td>0.79</td>
</tr>
</tbody>
</table>
# RESULTS

## Medication Charges

<table>
<thead>
<tr>
<th>RO/FLAG</th>
<th>TRIPLES</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Meds</strong></td>
<td>$3370</td>
<td>$3817</td>
</tr>
<tr>
<td><strong>IV Abx</strong></td>
<td>$1412</td>
<td>$1940</td>
</tr>
<tr>
<td><strong>% of Med Charges</strong></td>
<td>4.5%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>
Inclusion Criteria

- Under 18 years of age
- Perforated appendicitis at the time of appendectomy
  - Stool in the abdomen
  - Hole in the appendix

Exclusion Criteria

- Severe concomitant process
IV GROUP

- Receive 5 days IV rocephin/flagyl
- WBC drawn on POD 5
- If elevated, draw again on POD 7, then if elevated, draw on POD 10 and obtain CT
- Nl WBC count and tolerating PO’s w/o fever meets d/c criteria
- No abx on D/C
IV/PO GROUP

- Receive scheduled IV rocephin/flagyl
- Diet begins after flatus
- When tolerating diet, go home to complete 7 day course with oral augmentin
## RESULTS

### Outcomes

<table>
<thead>
<tr>
<th></th>
<th>5 Days IV</th>
<th>IV/PO</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reg diet (hrs)</td>
<td>68 +/- 35</td>
<td>61 +/- 32</td>
<td>0.36</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>6.1 +/- 2.0</td>
<td>4.8 +/- 2.6</td>
<td>0.01</td>
</tr>
<tr>
<td>Total visits</td>
<td>3.1 +/- 1.4</td>
<td>3.1 +/- 1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Abscess (%)</td>
<td>19%</td>
<td>20%</td>
<td>1.0</td>
</tr>
</tbody>
</table>

58% Stayed 5 Days
## Definition of Perforation

<table>
<thead>
<tr>
<th></th>
<th>Definition (n=388)</th>
<th>No Definition (n=292)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERFORATED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abscess Rate</td>
<td>18%</td>
<td>1.7%</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>7.4 +/- 8.8</td>
<td>1.9 +/- 1.3</td>
</tr>
<tr>
<td><strong>NON-PERFORATED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abscess Rate</td>
<td>0.8%</td>
<td>1.7%</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>1.5 +/- 1.5</td>
<td>1.9 +/- 1.3</td>
</tr>
</tbody>
</table>
IRRIGATION FOR PERFORATION (N=220)

Irrigation Group

- Irrigate with NS from suction/irrigator
- Must irrigate with at least 500 ml

No Irrigation Group

- No bag on the suction/irrigator
- Suction only

All patients managed with the IV/PO antibiotic course
Perforated Appendicitis
2011- Where are we after 3 Trials?

Patient Benefits

- No NG tubes
- No TPN --- No early PICC lines
- Opportunity for early d/c
- No diphenhydramine or ranitidine
- No uncertainty about plan
- Know exact risk of adverse events
Perforated Appendicitis
2011- Where are we after 3 Trials?

Caregiver Benefits

- Know the exact course
- Can answer family/nurse questions with certainty
- No need to run down each individual staff for daily management
Perforated Appendicitis
2011- Where are we after 3 Trials?

Scientific Benefits

- Can use a defined population for a variety of investigations
- Currently have 270 patients enrolled in the past 2 trials with the same IV/PO abx protocol and no difference in abscess rate among the variables studied over those cases
OBSERVATION STUDY

Prior Cohort

- 270 patients with IV/PO antibiotic course

Experimental Group

- If ready to go home early, check a WBC if elevated they go on oral abx, if normal go home with no abx
NON-RANDOMIZED STUDIES

- Attenuated protocol for spleen/liver injury
- Management and outcomes for blunt renal injury
SPLEEN/LIVER PROTOCOL

- Grade 1-2
  - 1 night bedrest

- Grade 3-5
  - 2 night bedrest

- Night is defined as patient in the bed on AM rounds
SPLEEN/LIVER PROTOCOL

- 131 patients
- Mean age 10
- Spleen 55%, Liver 42%, Both 2%
- Bedrest applied to 110 pts (84%)
  - Mean grade 2.6, mean rest 1.6, LOS 2.2 days
- Bedrest limited stay in to 86 pts (66%)
  - Mean grade 2.6, mean rest 1.6, LOS 1.8 day

All management heterogeneity is removed
BLUNT RENAL TRAUMA

Management

- ALL Grades
  - May ambulate in AM
  - Hematuria has no influence on clinical decision making
  - Home when eating and pain controlled
BLUNT RENAL TRAUMA

Outcomes Measures

- Daily UA while in hospital until clear
- F/U at 2 weeks for BP & UA
  - UA every 2 weeks until clear
  - US in 4-6 wks for urinary extravasation on initial CT
- BP every 6 months to 3 years
INSTITUTIONAL BENEFITS OF IMPLEMENTING RCT’s

- Protocols for common conditions homogenize care
  - Consistent care plans for fellows/residents/NP’s
  - Improves communication and expectations with patients, floor nurses, clinic personnel
  - Decrease/eliminate intradepartmental disagreements about practice habits

- Multi-departmental studies
  - Improves working relationship
  - Fosters more collaboration
Appendicitis
Pyloric Stenosis
Blunt Spleen/Liver Trauma
Blunt Renal Trauma
Fundoplication
Burns
HOW DO WE IMPLEMENT PROTOCOLS?

Try

- Agree to disagree
  - Recognize practice can be more evidence based and less art
  - Abandon ego that personal preference is only safe form of care
  - You have the power to monitor the effect
  - Simple protocols are more likely to produce consistent compliance
  - Ask very little of the staff surgeon