A Tale of Two Trauma Programs

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Objectives:
• Discuss differences experienced in resident vs AP run series
• Review processes for efficiency and quality
Objectives

• Compare and contrast trauma programs in Utah and North Carolina

• Define best practice and how it can be used to provide the best patient care

• Review of literature

• Research by Carolinas Medical Center
Background

• Graduate of University of Utah
• Post-graduate residency at Intermountain Medical Center
• Carolinas Medical Center- Trauma and Surgical Critical Care

• ACP, AP, APC, PA, NP
Introduction

- Optimal management of severely injured patients - round the clock commitment
  - Demands of trauma service are unique
- Smaller hospitals unable to care for higher acuity patients, transfer to larger tertiary centers
- Increase in trauma volume 15% annual - (Gillard)
  - IMC: ~9% increase selective quarters in 2014
  - CMC: 10% increase 2014 (4400 → 4800)
- Staffing is an increasing issue in trauma systems
- No increase in resident numbers

JAAPA. 2011. Gillard, J
Work Hour Restrictions And Challenges That Ensue

• Medical training relies on comprehensive direct patient care experience, and pattern recognition

• New 2003 guidelines limited hours for patient safety concerns (ACGME)
  – “Shift” type work schedules and night float systems

• Physical and emotional well being of medical residents

• Patient safety concerns, as well as concerns for continuity

https://www.acgme.org/acgmeweb/tabid/271/GraduateMedicalEducation/DutyHours.aspx
...Challenges That Ensue

• Work hour restrictions created a new problem- lack of human resources to care for inpatients at academic hospitals
  – Decrease in manpower in the form of residents
  – Aforementioned increase in patient numbers
  – 24/7 coverage
  – Continuity challenges
Advanced Practitioners To The Rescue

• Support for PAs and NPs as general solution to work hour restriction void

• 2008 from Journal of Hospital Medicine- showed no difference in outcomes with Hospitalist + PA run team vs. Hospitalist alone- Inpatient mortality, ICU transfers, readmissions and patient satisfaction without significant differences.

• Further in 2009 American Journal of Medical Quality- combination of PA + Hospitalist met clinical inpatient needs with outcomes equivalent
  – All care mortality actually lower

*J Hosp Med. 2008, Roy CL
Am J of Med Qual. 2009, Dhuper S*
Comparative Review Of Use Of PA’s Level I Trauma Center

• Level II trauma center compared Resident run service in 1998 with a PA- dedicated trauma program in 1999
• Assess transition to trauma program without Residents → No decrease in mortality
• Regression analysis after senior surgical resident reinvolve focused analysis in 2002:
  – Statistically significant decrease in LOS from ED → floor admissions
  – 2.54+/−4.65 compared to 3.4+/− 5.81
  – Focused analysis showed 100% participation of PA’s during trauma alerts compared to 51% by residents

Utilization Of PA’s And NP’s At A Level I Trauma Center

St. Luke’s Hospital, Bethlehem, PA

Compared PA/NP with limited assistance to Residents (Pre) with PA/NP coverage expanded for unrestricted assistance to Residents (Post)

• Dwell time in ED shorter post MLP for both trauma alerts and trauma transfers
  – 136 min → 83 min    125 min → 105 min
• Daily admission number significantly higher
• Discharge numbers significantly higher
• No change in LOS or ICU LOS Statistically sig.

2011 JAAPA, Gillard et. al.
The Influence Of Unit-based NP On Hospital Outcomes

Philadelphia, PA

• Unit Based NP vs. Resident Run
• Only statistically significant difference UBNP clinic diagnosed more DVT \( (p=0.02) \)
• Not statistically significant- LOS decrease 6.5 vs. 7 RR.
• Equated to > 1300 fewer patient care days
• Clinically relevant to off set cost to meet demands

Trauma Acute Care Surg. 2012 Morris et. al.
Wave Of The Future

New Options for Trauma Service Structures

Trauma program options to be run:

- Resident run vs. AP run vs. both
  - Many combinations
  - Academic centers
  - Available FTE’s for APC’s

- Trauma bay choreography and roles
  - Differ with each institution
  - Staffing availability
Unique Skills Of APC

- OR, ICU, shift preferences
  - can fill gaps in staffing
- Meet demands of ED, versatility in specialties within the specialty
- Education and previous experience

- Recruitment and retention
- Comfort, development and increasingly refined skills
- Perform independently
- Bridge the gap between nurses, visiting residents, staff surgeons

- MLP can accomplish up to 80% of nonoperative daily work duties
  - Free up Attending to focus on most complex tasks and still remain in control of patient care
Experience At Carolinas Medical Center

Carolinas Medical Center:
874 beds, 141 ICU beds
2014: 4800 trauma activations, 7000-8000 overall ED trauma patients

48% of volume are transfers from other facilities

• Daily Services
  – Trauma Floor
  – Trauma ICU
  – Surgical Critical Care
  – Emergency General Surgery
  – General Surgery
  – ACS
Experience At Carolinas Medical Center

- 14 Acute Care Surgeons
- 13 ACPs, ACP fellow 1-2
- 1 Surgical Critical Care Fellow
- Residency Program- 4 Categorical /year
  - 2-3 resident on trauma floor covering days and nights- Interns
  - 2-3 on ICU covering days and nights- PGY2
  - Trauma Chief (occasionally)
  - 2 ACPs fully staffed 8-5, Float ACP
  - Resident pool: Surgical, Ortho, ED, Pediatric ED Fellow

- Schedule Challenges
  - Conference coverage Thursdays

- Trauma Bay
  - Blunt trauma vs. penetrating approximately 80:20
  - Volume of admissions- approximately 60% Friday night to Monday morning
  - Trauma bay: Primary survey, odd even days for procedures, Higher level resident in ED runs trauma vs. Attending
  - No ED physician at head of bed
Experience At Carolinas Medical Center

• How rounds run
  – Computerized charting
  – Physician order entry

• Clinic
  – ACP clinic Friday
  – Resident/ACP clinic Wednesdays
Experience At Intermountain Medical Center

IMC: 452 beds
Acute Care Surgeons 5
APC’s 11
ACP fellow 1-2
1-2 ED Residents

- 1-2 residents on floor vs. ICU, night call
- APC function as Chief and form continuity

- Clinic- once weekly by APC
Experience At Intermountain Medical Center

Trauma Bay
- ED physician at head
- APC completely runs code
  - Flow
- Procedures performed in bay
- Penetrating trauma ~90:10

- How rounds run
  - Paper charting
  - Carry charts
  - Discharges
  - Multi-professional
Areas To Improve For Best Patient Care

- Choreography and trauma bay survey differences
- Location of evaluation and diagnostics
- APs function as “Chief”
- Availability of consultants
- ED Physician at head of bed
- Resident availability for education
  - use as adjunct instead of “staff”
- Video in trauma bay
- Handoff communication-automated lists
- Computerized charting
- FTE’s available
Location, Location, Location

• Ideal trauma bay location—near OR, diagnostics and IR
• Hybrid OR
• CMC less than ideal, IMC built for trauma
• Time is money—brain, extremity, tissue
  – Transport matters
Perceptions Of Resident’s Educational Experience

- MLP and residents
- Believe reduced workload with adequate communication and collaboration
- MLP>Residents believe MLP contribute to education
- Both believe role of MLP is clearly defined- difference in perceptions about where MLP falls within surgical hierarchy
  - 75% MLP believe function at seniors resident level or above
  - 90.5% residents believe MLP function at intern level or below (p<0.001)

Resident And APC Interaction

• Clearly identify that APs do not work for Resident, but for the service line
• AP functions under the supervision of Attending Physician
• AP conduct orientation to service line
• APs are a resource
• Provider responsible for patient gets first rights to procedures
Research At CMC

Comparison of procedural complications between resident physicians and advanced clinical providers. Journal of Trauma 2014. Massanu Sirleaf, NP

• Presented at EAST 2014
  – compare complication rates from surgical procedures performed by resident physicians (RP) versus Advanced Clinical Providers (ACP) in critical care setting
  – Retrospective review of all procedures from January to December 2011 in our Trauma and Surgical ICU’s
  – Procedures consisted of arterial lines (A-line), central venous lines (CVL), bronchoalveolar lavage (BAL), thoracostomy tubes (TT), percutaneous endoscopic gastrostomy (PEG) and tracheostomies
  – Complications were assessed by post procedure radiography and operative notes
  – Data included demographics, APACHE III scores, complications, and outcomes; and were divided into RP vs. ACP groups.
Division Of Services

- SCC
- 2 ACP day shift
- 1 ACP night shift
- Service admissions subspecialties: HPBS, Ortho-Spine, Obstetrics, Surgical Oncology, Minimally Invasive surgery, Vascular, ENT, Plastics, Neurosurgery
- All procedures performed by ACP

- TICU
- 2 PGY2 day shift (Emergency Medicine or or Surgical resident)
- 1 PGY2 night shift
- Service admissions: Trauma Patients
- All procedures performed by Residents on service

Coverage of each service by 1 dedicated Acute care surgery attending
Results

- Total 1404 patients
- RP performed 1020 procedures, 21 complications occurred (2%)
- ACP group performed 555 procedures, there were 11 complications (2%)
- No differences in mean ICU and hospital LOS
- Mortality rates were comparable (RP 11% vs. ACP 9.7%)
Results: Complications

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>CVL</th>
<th>A-Line</th>
<th>BAL</th>
<th>TT</th>
<th>Trach</th>
<th>PEG</th>
<th>Complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents</td>
<td>1020</td>
<td>220</td>
<td>164</td>
<td>233</td>
<td>176</td>
<td>153</td>
<td>74</td>
<td>21 (2%)</td>
</tr>
<tr>
<td>ACP’s</td>
<td>555</td>
<td>148</td>
<td>89</td>
<td>142</td>
<td>31</td>
<td>102</td>
<td>43</td>
<td>11 (2%)</td>
</tr>
</tbody>
</table>

- N= number of procedures
- CVL: Central venous line
- BAL: bronchoalveolar lavage
- TT: thoracostomy tube
- Trach: tracheostomy
- PEG: percutaneous endoscopic gastrostomy
# Results: Complications

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Residents</th>
<th>ACP’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central venous lines</td>
<td>4 pneumothoraces</td>
<td>2 pneumothoraces</td>
</tr>
<tr>
<td></td>
<td>2 malposition</td>
<td>2 malposition</td>
</tr>
<tr>
<td>Arterial Catheters</td>
<td>5 local hematomas</td>
<td>2 local hematomas</td>
</tr>
<tr>
<td></td>
<td>3 unable</td>
<td>2 unable</td>
</tr>
<tr>
<td>Bronchoalveolar lavage</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Thoracostomy tube</td>
<td>1 bent tube§</td>
<td>1 bent tube</td>
</tr>
<tr>
<td></td>
<td>1 extra-pleural</td>
<td></td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>2 local bleeding*</td>
<td>2 local bleeding*</td>
</tr>
<tr>
<td></td>
<td>2 revisions†</td>
<td></td>
</tr>
<tr>
<td>Percutaneous Endoscopic Gastrostomy</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Total (%)</td>
<td>21 (2%)</td>
<td>11 (2%)</td>
</tr>
</tbody>
</table>

- § Bent of initial tube necessitating replacement
- *Local bleeding requiring packing
- † operative revisions and coagulation
Take Away

• ACPs can perform ICU procedures with complication rates similar to that of RPs
• Patients in the ACP group were older and had higher severity of disease and comorbidities
• In this study, mortality varied due to injury mechanism and severity of illnesses
• No deaths were directly attributed to procedural complication
• Repeat needed for ACP complication rate after years of retention
Transition To AP Run Service

- Full FTE for every Resident?
- Keys to Staffing
  - Understand needs
  - Understand resources and DOP’s for APs
  - Develop SOP
  - PRIORITIZE coverage needs
  - Ability to “flex”
Best Practice Opinion: Support of AP

- Salaries and FTE availability.
- Skill level and independence increases with time
- Dedication and commitment to vision, service line
- Reimbursement broadened with billing
- Able to generate professional fees under Medicare, Medicaid, blue cross and most third party payers
- Although 85%, it is revenue.
- Capture most billing opportunities
Opportunities For Retention

• Centralized department of AP with own cost center
• Attractive for new grad, cheap labor with post graduate fellowship programs
• Training and development of AP resident/fellow with hire after graduation
• Organized and individual office space- in trauma group-unity
• Chief AP
• Growth and research- engagement
• CME involvement
• Financial support
  – National involvement effort

J Trauma Nurs. 2009 Mikhail J
Final Recommendation

• Billing to capture more opportunities
• Performance is comparable between APs and Residents, non-inferior care
• Clinical ladder to utilize skills and strengths- ICU vs. OR and development and excel at positions
• APC’s fill gaps in systems
• APC supported programs if unable to transition
• Post graduate fellowship programs
• Research and CME opportunities
• Provide excellent patient care
More Keys To Success

• Build a team with functionality similar to the Attending staff or representative service line
• Provide internal education opportunities
• TEAMWORK
• Establish a physician liaison
• Designate a LEAD AP when large enough to need leadership/representation
References


8. Sirleaf M et al., Comparison of procedural complications between resident physicians and advanced clinical providers. J Trauma Acute Care Surg. 2014 Jul;77(1):143-7

Questions?