PLENARY DEBATE - WHO SHOULD RUN THE (CV) SURGICAL ICU

“I Prefer Surgeons”

Rakesh C. Arora
Cardiac surgeon/Intensivist
University of Manitoba

Canadian Critical Care Forum
Toronto, Nov. 10, 2013
Disclosures

• None just liabilities
David and Goliath: The True Story...
Making my case

• What is different about the cardiac surgery patient?
• Why surgeons do it better
• Oh really?? – who says
• What is the current lay of the land?
• Data (just a little bit)
Ya gotta have heart!
A short story….

• Intensivist: “Hey, surgeon X, your patient has SAM. I have been dealing this all night (from home).

• Surgeon X: “Ummm…. Okay…. Why do you think he same SAM?

• Intensivist: “I have very competent internal medicine resident describing the hemodynamic and it is textbook SAM! Look, I am not going to discuss this over the phone, you need to go assess the patient and take him back to the OR!”

• Surgeon: “Ummm... Dr. Y, the patient has a mechanical prosthesis”

• Intensivist: “So??!!”

• Surgeon: “There is no subvalvular apparatus”

• Intensivist: “Oh...so why does that mean he can’t have SAM?”
Patients That Come to the CVICU

Low – Risk
- Healthy
- Fast-track Anesthesia

High-Risk
- Complex procedures
- Multi-system issues
• A safe, evidence-based, cost-effective practice with less errors.

Preventable Death in the ICU

**Figure 1.** Summary of results from the implicit surgeon review of isolated CABG deaths (n=347). ICU indicates intensive care unit.

*There may be multiple problems related to death identified by a reviewer in a particular case that may or may not relate to the preventability of the death.*
What the medical emergencies in the postoperative patient?

• Bleeding
• Tamponade
• Arrhythmias
• Ischemia
Figure 3. Percentage of deaths judged preventable and/or inappropriate for surgery on primary surgeon review vs patient’s estimated risk of in-hospital death.

*Based on 694 primary reviews of 347 deaths (221 preventable judgments of 694 primary reviews, 52 inappropriate decisions to operate of 694 primary reviews). The denominator at the top of each bar represents the number of patients in that particular risk category as rated by reviewers and the numerator represents the number of patients that were classified by reviewers as an inappropriate decision to operate (grey bar) or a preventable death (black bar).
Cardiac Surgery Patient are Different

- Older, sicker and more frail
- Increasingly complex and high risk procedures
  - E.g TAVI and TEVAR

Application of the Sequential Organ Failure Assessment Score to Cardiac Surgical Patients*

Roberto Ceriani, MD; Maurizio Mazzoni, MD; Franco Bortone, MD; Sara Gandini, MD; Costantino Solinas, MD; Giuseppe Susini, MD; and Oberdan Parodi, MD

Figure 1. SOFA scores (mean ± SD) on days 1 to 10 in survivors and nonsurvivors. *p < 0.05 between the two groups.
Figure 2. SOFA scores (mean ± SD) on days 1 to 10 in survivors and nonsurvivors for each organ system. *p < 0.05 between the two groups.
New Tools in the Modern CVICU
Impella
Resuscitation in congenital heart disease

Peter C. Laussen MBBS FCICM
Department Critical Care Medicine
Hospital for Sick Children
Toronto
Estimated clinical relevance of CHD in the next years

Patients

0 50,000 100,000 150,000 200,000 250,000 300,000 350,000 400,000

Years


- live births with CHD 0,8 % of all live births
- children with CHD 90 % of live births with CHD
- 18-year-olds with CHD 80 % of children with CHD
- adults with CHD

Image source: Competence Network for Congenital Heart Defects
There are hundreds of combinations and permutations of congenital cardiac lesions.
Functional repair: Cavo-Pulmonary connection
Positive pressure ventilation
European Resuscitation Council Guidelines for Resuscitation 2010
Section 1. Executive summary

Jerry P. Nolan, Jasmeet Soar, David A. Zideman, Dominique Biarent, Leo L. Bossaert, Charles Deakin, Rudolph W. Koster, Jonathan Wyllie, Bernd Böttiger, on behalf of the ERC Guidelines Writing Group.
• High Survival Rates
• IF...
• Goal of chest open in 5 mins
“the right operator, with the right information, making the right decision to use the right tool to perform the right task at the right time in the right manner.”

Really??? Who Says So????
THE WORLD ACCORDING TO AMERICANS

AMERICA!!!!1
WE R #1!!!!

MORE AMERICA!!
uninhabited

santa!!

more evil-doers

more evil-doers

they do our laundry

cold!

coffee comes from here i think

they make our stuff

tvs and cameras

kangaroos

bombs go here

cruise ships go here
Who Says?
• “...to reemphasize that critical care has always been a core component of ABTS certification”

• “Our Diplomates have been trained in critical care management of thoracic surgical patients and they have successfully completed both written and oral examinations, which cover the critical care aspects of thoracic surgical patient management.”

• **ABTS will write a letter** on behalf of the Diplomate to the specific credentials committee if the Diplomate is not able to care for his or her patients in the intensive care unit.

What does this mean to me?

- What data is there?
What is the “lay of the land”?
Research

**Intensivists' base specialty of training is associated with variations in mortality and practice patterns**

Emma O Billington¹, David A Zygun², H Tom Stelfox² and Adam D Peets³

<table>
<thead>
<tr>
<th>Measures</th>
<th>Patients cared for by a single Intensivist during ICU stay</th>
<th>p value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>IM</td>
</tr>
<tr>
<td>ICU Mortality (%)</td>
<td>19.9</td>
<td>21.8</td>
</tr>
<tr>
<td>Median ICU LOS in Days (IQR)</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>(0.9 to 2.8)</td>
<td>(0.9 to 2.8)</td>
<td>(0.9 to 2.7)</td>
</tr>
<tr>
<td>Hospital Mortality (%)</td>
<td>33.0</td>
<td>36.5</td>
</tr>
<tr>
<td>Median Hospital LOS in Days (IQR)</td>
<td>8.9</td>
<td>8.4</td>
</tr>
<tr>
<td>(3.3 to 19.0)</td>
<td>(2.8 to 19.2)</td>
<td>(3.8 to 18.9)</td>
</tr>
<tr>
<td>Patients changed from Full Care to DNR (%)</td>
<td>9.6</td>
<td>11.2</td>
</tr>
<tr>
<td>Median Number of Procedures (IQR)</td>
<td>2</td>
<td>(2 to 3)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>(2 to 3)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>(2 to 4)</td>
</tr>
</tbody>
</table>

Mortality in Cardiac Surgery 2-3%

How do you further care is futile?

• PrICULOS was defined as any total stay in the ICU after cardiac operation exceeding 7 days.
  - Median length of stay was 20 days vs. 1 day without PrICULOS

• In-hospital mortality in patients with prICULOS was 37.2% compared with 1.7% in those without.

Effect of base specialty in cardiac disease

• “Non–ST-segment elevation acute coronary syndrome patients primarily cared for by a cardiology inpatient service more commonly received evidence-based treatments and had a lower risk of mortality…”

• “…elderly patients with myocardial infarction from cardiologists to primary care physicians... may also cause decreased survival…”
The Impact of the Manitoba Model of 24 Hour In-House Intensivists On A Dedicated Cardiac Surgery ICU

ICU Model (SICU)

8:00 - 17:00
In House Attending
Junior Resident House staff

17:00 - 8:00
Junior Resident

Preamble
ICU Models in Manitoba
Study Design
Study Results
Discussion
ICU Models (CICU)

- Cardiac Anesthesia
- Intensivist
- In-House Intensivist
- General Ward
- HOME

8:00 – 18:00
18:00 – 8:00
Study Design

- Retrospective cohort study
  - Single tertiary center
    - St. Boniface General Hospital
- MB. Cardiac Surgery Database and the MB. Critical Care Database
- As it was not possible to randomly assign the model of ICU care, a propensity analysis was undertaken
Propensity Matched Postoperative Outcomes Related to the Model of ICU Care

<table>
<thead>
<tr>
<th>ICU outcomes</th>
<th>SICU</th>
<th>CICU</th>
<th>(p) Value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical ventilation on admission, n</td>
<td>620 (66.5%)</td>
<td>408 (43.7%)</td>
<td>&lt;0.001</td>
<td>0.39 (0.33, 0.47)</td>
</tr>
<tr>
<td>Median ICU LOS, days (IQR)</td>
<td>0.96 (0.82, 1.83)</td>
<td>0.98 (0.85, 1.93)</td>
<td>0.02</td>
<td>—</td>
</tr>
<tr>
<td>ICU recidivism, n</td>
<td>38 (4.07%)</td>
<td>29 (3.11%)</td>
<td>0.26</td>
<td>0.76 (0.46, 1.24)</td>
</tr>
<tr>
<td>ICU mortality, n</td>
<td>14 (1.50%)</td>
<td>12 (1.29%)</td>
<td>0.69</td>
<td>0.86 (0.39, 1.86)</td>
</tr>
</tbody>
</table>

| Postoperative outcome                          |            |            |              |                    |
| Reoperation for bleeding, n                    |            |            |              |                    |
| Perioperative myocardial infarction, n         |            |            |              |                    |
| Postoperative atrial fibrillation, n           |            |            |              |                    |
| Postoperative renal dysfunction, n             |            |            |              |                    |
| Postoperative cerebrovascular event, n         |            |            |              |                    |
| Postoperative infections (all), n              |            |            |              |                    |
| Median hospital LOS, days (IQR)               | 7.0 (5.0, 9.0) | 6.0 (5.0, 8.0) | <0.001 | —                  |
| Thirty-day mortality, n                        | 20 (2.14%) | 16 (1.71%) | 0.50         | 0.80 (0.41, 1.55)   |

CI = confidence interval; CICU = cardiac surgery intensive care unit; ICU = intensive care unit; IQR = interquartile range; LOS = length of stay; SICU = traditional, mixed surgical intensive care unit.
Blood component transfusion
ICU Outcome Data

% of patients transfused units of RBCs

Units of RBCs transfused

SICU
CICU
Limitations

- Not an RCT
- “System” changes occurred at the same time.
- Era effect?
What about patient and family satisfaction?
Phenotypic differences between male physicians, surgeons, and film stars: comparative study
Antoni Trilla, Marta Aymerich, Antonio M Lacy, Maria J Bertran

- “on average, senior male surgeons are significantly taller and better looking than senior male physicians.”
- It also shows that film stars who play doctors are significantly better looking than real surgeons and physicians.

BMJ (Clinical research ed.), 333(7582), 1291–3.
The Cardiac Critical Care Perspective

- The delivery of high-quality critical care medicine is vital to the success of cardiac surgery

How do we know we are improving?

• Currently, there is no universal standard means by which ICU performance is measured and reported.
  • Participation in multicenter ICU collaborations

“I won’t lie to you Mr. Williams, you’re in a critical condition.”
The CANCARE Society

(CANadian CARdiovascular critical CARE) Society

Goals: To advance the care of critically-ill cardiovascular patients using interdisciplinary expertise in a cooperative model.

www.cancaresociety.com
info@cancaresociety.com
The CANCARE Society Investigator Group

• Inaugural Meeting - Ottawa, May 12, 2012
Developing a National Strategy for Addressing Delirium in the Postoperative Cardiac Surgery Patient
Preoperative Optimization

Accountability for Longitudinal Results

Improvements in Intraoperative Techniques

Innovation in the postoperative phase
Ya gotta have heart!
Do you recognize this?
How about this...
But how about this?
Or this?
How do you respond to this?

• “We were surgically meticulous, however it’s obvious he has a coagulopathy...”
Summary

• Physician staffing for post-cardiac surgery ICUs remains variable.

• The relative roles of Cardiac Surgeons and Intensivists in the CTS critical care unit have become unclear
  • Safety remains an issue in health care
What’s best for the patient?

- **Knowledgeable**, competent, and highly skilled in understanding the anatomic, developmental, physiologic, pathophysiologic basis for cardiac, vascular, and pulmonary disease processes.

- A comprehensive understanding and **adequate hands-on** experience in the operative management of such diseases.

- The **CARDIAC surgeon (or cardiac specialist) intensivist** as a leader of a multidisciplinary team should be emphasized, as opposed to a clinical “turf war.”
THANK YOU
Discussion Slides
YOU KNOW YOU WON AN ARGUMENT...
WHEN THE OTHER PERSON RESPONDS WITH "WHATEVER"
• 123 ICUs in 100 U.S. hospitals.

• 101,832 critically ill adults.

• “…odds of hospital mortality were higher for patients managed by critical care physicians than those who were not…”

Facts about Patient Safety

• Estimates that 1 in 10 patients are “harmed” while receiving hospital care

• Problems associated with surgical safety account for 50% of avoidable adverse events that result in death in disability

http://www.who.int/features/factfiles/patient_safety/en/
The Trainee Factor

• Interns spent 12% of their time in direct patient care

• 64% in indirect patient care, 15% in educational activities, and 9% in miscellaneous activities.

• Computer use occupied 40% of interns' time.

• 2011 duty hour regulation-compliant models were associated with:
  • increased sleep duration during the on-call period
  • deteriorations in educational opportunities, continuity of patient care, and perceived quality of care.
• “....advances have not been in improved hemodynamic monitoring, pharmacologic therapy, or understanding the pathophysiology of the diseases unique to our patients, but rather improvement in the system of medical care delivery such as using checklists and improving teamwork.”
• Lower postoperative complication rate (OR 0.33, 95% CI 0.15–0.73; \(P=0.006\))

• Shorter hospital length of stay (MD - 2.44, 95% CI -4.03 to -0.84; \(P<0.003\)).
Twenty-four-Hour Intensivist Presence
A Pilot Study of Effects on Intensive Care Unit Patients, Families, Doctors, and Nurses

Allan Garland¹, Dan Roberts¹, and Lesley Graff¹

• “...was better for intensivists and had no detrimental effect on outcomes for patients, families, or ICU nurses...”
Nighttime Intensivist Staffing and Mortality among Critically Ill Patients

David J. Wallace, M.D., M.P.H., Derek C. Angus, M.D., M.P.H., Amber E. Barnato, M.D., M.P.H., Andrew A. Kramer, Ph.D., and Jeremy M. Kahn, M.D.

### Table 4. Odds Ratio for Death in ICUs with Nighttime Intensivist Staffing in the APACHE and PHC4 Cohorts.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>No. of Patients</th>
<th>Low-Intensity Daytime Staffing</th>
<th>High-Intensity Daytime Staffing</th>
<th>Interaction Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Odds Ratio (95% CI)</td>
<td>P Value</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>APACHE†</td>
<td>65,752</td>
<td>0.62 (0.39–0.97)</td>
<td>0.04</td>
<td>1.08 (0.63–1.84)</td>
</tr>
<tr>
<td>Patients with active treatment on admission</td>
<td>44,420</td>
<td>0.59 (0.36–0.97)</td>
<td>0.04</td>
<td>1.15 (0.71–1.88)</td>
</tr>
<tr>
<td>Patients who underwent mechanical ventilation‡</td>
<td>29,498</td>
<td>0.60 (0.37–0.96)</td>
<td>0.03</td>
<td>1.36 (0.86–2.15)</td>
</tr>
<tr>
<td>Patients admitted at night§</td>
<td>29,088</td>
<td>0.51 (0.32–0.82)</td>
<td>0.01</td>
<td>1.01 (0.71–1.44)</td>
</tr>
<tr>
<td>Patients in highest third of acute physiology score</td>
<td>21,522</td>
<td>0.56 (0.38–0.82)</td>
<td>&lt;0.01</td>
<td>1.15 (0.75–1.79)</td>
</tr>
<tr>
<td>Patients with sepsis¶</td>
<td>5,816</td>
<td>0.46 (0.29–0.74)</td>
<td>&lt;0.01</td>
<td>0.88 (0.58–1.33)</td>
</tr>
<tr>
<td>Alternative definition of nighttime staffing: nighttime intensivist or resident physician</td>
<td>65,752</td>
<td>0.42 (0.29–0.59)</td>
<td>&lt;0.01</td>
<td>0.47 (0.34–0.65)</td>
</tr>
<tr>
<td>PHC4 cohort†</td>
<td>107,319</td>
<td>0.83 (0.69–0.99)</td>
<td>0.049</td>
<td>0.97 (0.67–1.39)</td>
</tr>
</tbody>
</table>

In-house, overnight physician staffing: A cross-sectional survey of Canadian adult and pediatric intensive care units*

(Crit Care Med 2006; 34:1674–1678)

<table>
<thead>
<tr>
<th>ICUs with in-house physicians</th>
<th>Physician type</th>
<th>Available No. (%)</th>
<th>Available (%)</th>
<th>In-House Overnight No. (%)</th>
<th>In-House Overnight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICUs with in-house physicians</td>
<td>53</td>
<td>53</td>
<td>100</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Physician type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interns</td>
<td>22 (42)</td>
<td>17 (32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residents</td>
<td>40 (75)</td>
<td>37 (70)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCM fellows</td>
<td>25 (47)</td>
<td>16 (30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical assistants</td>
<td>27 (51)</td>
<td>26 (49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical scholars</td>
<td>6 (11)</td>
<td>3 (6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU staff physicians</td>
<td>53 (100)</td>
<td>13 (25)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ICU 2020: Five Interventions to Revolutionize Quality of Care in the ICU

Kristy A. Bauman, MD and Robert C. Hyzy, MD

- Evidence-based best practice
- Participation in multicenter ICU collaborations
- Employing state-of-the-art information technology, (including point-of-care)
- Diagnostic testing
- Efficient organization of ICU care delivery
# Critical care specialists’ base specialty of training is associated with variations in mortality and practice patterns

Emma O Billington¹, David A Zygun², H Tom Stelfox² and Adam D Peets³

<table>
<thead>
<tr>
<th>Physician characteristics by base specialty of training</th>
<th>Overall</th>
<th>Internal Medicine</th>
<th>Pulmonary</th>
<th>AGSEM</th>
<th>p value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of physicians</td>
<td>26</td>
<td>12</td>
<td>8</td>
<td>6</td>
<td>n/a</td>
</tr>
<tr>
<td>Median years since critical care medicine certification (IQR)</td>
<td>12 (5 to 16)</td>
<td>9 (4 to 15)</td>
<td>15 (12 to 18)</td>
<td>7 (3 to 10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean weeks of service per year (± SD)</td>
<td>14.5 (5.8)</td>
<td>15.5 (6.0)</td>
<td>15.4 (5.5)</td>
<td>8.8 (2.0)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>