New Developments in the Endovascular Management of Vascular Injuries: How can A Hybrid Suite be Helpful

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External Industry Relationships *	Company Name	Role
Equity, stock, or options in biomedical industry companies or publishers	None	
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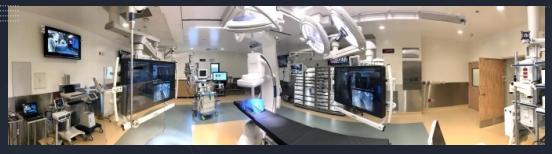
Introduction

- Surgical management of trauma is primarily a matter of hemorrhage control
- Increasingly, hemorrhage control is achieved through endovascular means
- However, other aspects of surgical care are open in nature

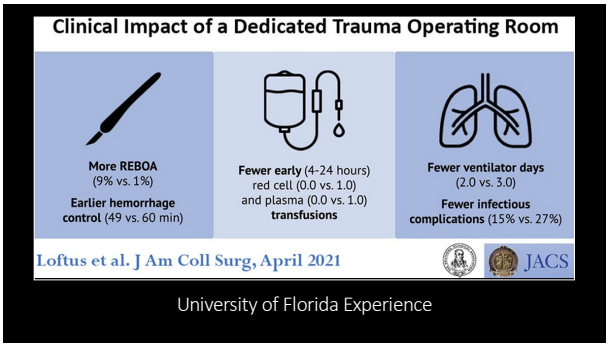
- 50 year-old male with a motorcycle collision
  - Severe TBI requiring decompression
  - Open book pelvic fracture
  - Splenic laceration with pseudoaneurysm
  - Severe blunt thoracic aortic injury
- What is the sequence of events?
- Where do those events occur?



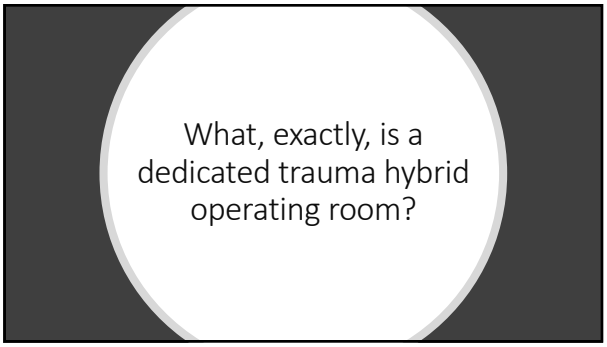
Proposed Benefits

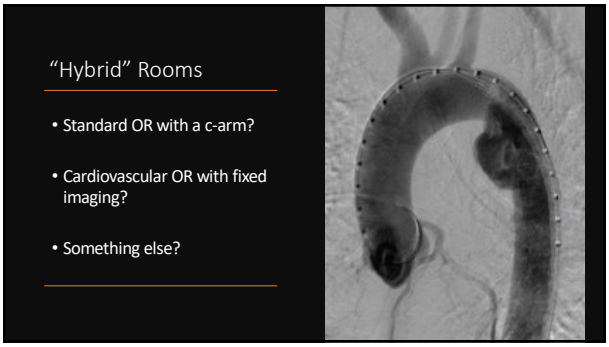
- Minimize delays to intervention
- Quicker hemorrhage control
- Minimize patient transportation
- Streamlines complex care

Do dedicated trauma hybrid rooms improve outcomes?



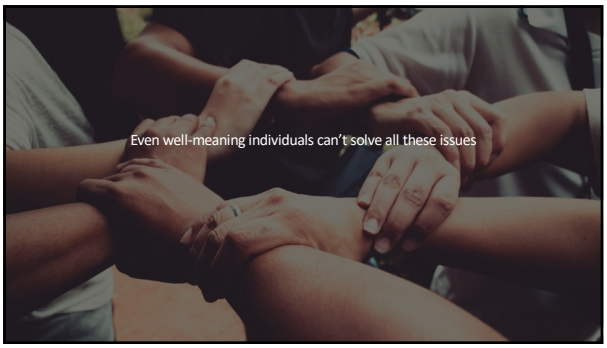
University of Florida Experience





Considerations

- Who decides if an elective case is bumped?
- What are the criteria for hybrid room activation?
- Are we staffed to cover this room?



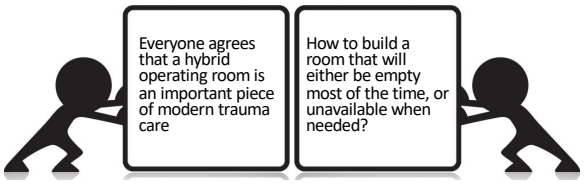
Ideal Trauma Hybrid OR

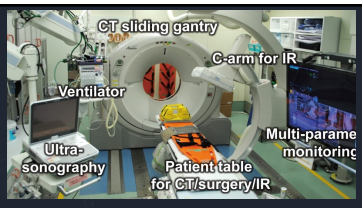
- Functions very well as an open operating room
- Multi-use table
- Table attachments
- Easy to clean
- Durable
- Basic endovascular capabilities

Ideal Cardiovascular Hybrid OR

- Tends to be more focused on endovascular components than open
- Consistent case type and equipment needs
- Complex adjunctive systems that take up space and money
- Hemodynamic monitoring
- Fusion imaging
- Cardiopulmonary bypass

The Problem





Hybrid Emergency Room System (HERS)

- Japan
- Resuscitation
- Diagnostics
- Therapeutic interventions

RESEARCH ARTICLE Open Access

Cost-effectiveness of a hybrid emergency room system for severe trauma: a health technology assessment from the perspective of the third-party payer in Japan

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Abstract

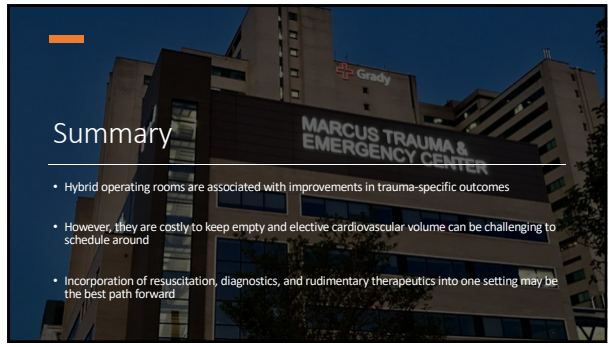
Background: Hybrid emergency room (ER) systems, consisting of an angiography-computed tomography (CT) machine in a trauma resuscitation room, are reported to be effective for reducing death from exsanguination in trauma patients. We aimed to investigate the cost-effectiveness of a hybrid ER system in severe trauma patients without severe traumatic brain injury (TBI).

Methods: We conducted a cost-utility analysis comparing the hybrid ER system to the conventional ER system from the perspective of the third-party healthcare payer in Japan. A short-term decision tree and a long-term Markov model using a lifetime time horizon were constructed to estimate quality-adjusted life years (QALYs) and associated lifetime healthcare costs. Short-term mortality and healthcare costs were derived from medical records and claims data in a tertiary care hospital with a hybrid ER. Long-term mortality and utilities were extrapolated from the literature. The willingness-to-pay threshold was set at ¥4 510 19 per QALY gained and the discount rate was 2%. Deterministic and probabilistic sensitivity analyses were conducted.

Results: The hybrid ER system was associated with a gain of 1.03 QALYs and an increment of ¥23191 lifetime costs compared to the conventional ER system, resulting in an ICER of ¥22522 per QALY gained. The ICER was lower than the willingness-to-pay threshold if the odds ratio of 28-day mortality was < 0.66. Probabilistic sensitivity analysis indicated that the hybrid ER system was cost-effective with a 79.3% probability.

Conclusion: The present study suggested that the hybrid ER system is a likely cost-effective strategy for treating severe trauma patients without severe TBI.

Keywords: HERS, ICER, Markov model, QALY, Utility



Summary

- Hybrid operating rooms are associated with improvements in trauma-specific outcomes
- However, they are costly to keep empty and elective cardiovascular volume can be challenging to schedule around
- Incorporation of resuscitation, diagnostics, and rudimentary therapeutics into one setting may be the best path forward