1. Rationale & evidence for early mobility
2. Background for the CCPM&R program:
   - Description of MICU Rehab QI project
3. CCPM&R program – discussion of the registry

Why interest in Physical Medicine & Rehabilitation in the ICU?

Global Assessment of Outcomes
Herridge NEJM 2003

Lost 18% of body weight in ICU

Improving ICU mortality → focus on long-term outcomes

Functional Outcomes
Herridge NEJM 2003

6MWD improved over 1 year, but still abnormal due to:
- muscle wasting & weakness, foot drop, joint immobility
Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial

**Design:** RCT at U of Chicago & U of Iowa

**Subjects:** 104 MICU patients require MV

**Intervention vs. Control:**
- PT & OT (7d/wk – on ICU & ward) starting at Day 1-2
- “Usual care” PT & OT starting at Day 6 -10

**Intervention**

- PROM
- AAROM
- AROM
- Bed Mobility
- Transfers (sitting)
- Sitting balance
- ADLs
- Transfers (standing)
- Ambulation

**Benefit is from receiving PT/OT EARLY while on mech. ventilation**

**Intervention**

<table>
<thead>
<tr>
<th>N=49</th>
<th>N=55</th>
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<tbody>
<tr>
<td>Median duration of therapy:</td>
<td></td>
</tr>
<tr>
<td>After MV (minutes/day)</td>
<td>13 [5 to 20]</td>
</tr>
<tr>
<td>During MV (minutes/day)*</td>
<td>19 [10 to 29]</td>
</tr>
</tbody>
</table>

* p<0.0001

**How to Start Early Mobility?**

**The JHH MICU Experience**

Exposure to rehab in JHH MICU is low:
- PT & OT in only 17% & 20% of ARDS pts

→ opportunity for Quality Improvement

**Key starting point**

Pronovost, Berenholtz, & Needham BMJ 2008

**Model for Knowledge Translation**

**Barriers to Activity in ICU**

- Time requirements and adequate staffing
- Need for staff training
- Need for team work and coordination
- Over-sedation of ICU patients
- Dislodgement of devices (CVC, ETT, feeding tubes)
- Worsening gas exchange
- Unstable hemodynamics
- Inadequate patient comfort, pain control
QI Project Description

Multi-faceted QI focused on ventilated pts in MICU:
- dedicated OT & PT in MICU (pilot test)
- OT, PT, RN & MD training & education
- guidelines for consultation of OT and PT in ICU
- PM&R MD consults in MICU
- neurology consults +/- EMG/NCS in weak pts
- decrease over-sedation via prn vs. infusions

JHH Experience: Feasibility

During 4 month period (May – Aug 2007)
• 2 - 4x incr in PT & OT consult & Tx (vs prior yr)
• Of all PT d OT treatm ents
  – 68% while ventilated
  – 24% with ETT
  – 13% with femoral line
• New PM&R consults on weak patients
• Increase in neuro consult (4% to 23% of pts, p=0.05)

JHH Experience: Safety

• 4 events (~1% of treatments)
  – feeding/rectal tubes dislodged
  • also occurred with routine RN care

Benefits: Sedation & Delirium

• Median RASS score (scale: 0 to -5): -3 to 0 (p=0.05)
• Median drug dose per day (vs. prior to QI):
  – Morphine 24 vs. 71 mg per day (p=0.01)
  – Versed 15 vs. 47 mg per day (p=0.09)
• Mean daily pain (scale: 0 -10): 0.6 vs. 0.6 (p=0.79)
• Doubled % of ICU days without delirium (21% to 53%, p<0.003)

Benefits: Mobilization

Of 294 PT and OT treatments:
• 77% (vs. 54%, p<0.02) sitting on edge of bed
• 38% (vs. 6 %, p=0.005) transfer bed to chair
• 13% (vs. 4 %, p=0.24) ambulation (median = 73 feet)
Potential Benefits to Hospital
Why so many empty MICU beds?

Versus same 4-month period in 2006:
• 20% increase in MICU admissions
• 10% reduction in hospital mortality
• 30% (2.1 day) reduction in MICU LOS
• 18% (3.1 day) reduction in hosp LOS

Critical Care Physical Medicine & Rehab Prg

• Started July 1, 2008
• Staff (as FTE):
  – 2.25 PTs with 6 d/week coverage
  – 1 tech
  – 1 program coordinator (Rasha)
  – 1 program assistant (Preeya)
  – Medical Director (Dale) + MICU faculty

Registry Data collection

• Baseline: demographics, co-morbidities
• ICU:
  – medications, sedation & delirium
  – PM&R consults, PT treatments
• Hospital administrative data:
  – No. of ICU re-admissions
  – Hosp & MICU LOS

Process of data collection

• Daily monitor of ICU admits & discharges
• Daily update of PT log book (see next slide)
• Create Form 1 for a new MICU admit
  – Record adm date, Dx, pt demographics
• Create Form 3 for any MICU readmit
  – Record re-adm date, Dx, d/c date
• Create Form 2 for all MICU pts
  – Record daily sedation, PT activities, RASS/CAM data

PT log book

Form 1

<table>
<thead>
<tr>
<th>Patient</th>
<th>Date</th>
<th>Time</th>
<th>Dx</th>
<th>Rx</th>
<th>Sedation</th>
<th>RASS</th>
<th>Other</th>
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Form 1:
- Hospitalization data
- MICU admission diagnosis
- Consults in MICU
- MICU discharge & death information
- Readmission in JHH MICU
- Hosp discharge & death
Operations Manual for Data Collection

- OM for Forms 1, 2 & 3
- Used for training and quality control
- Update OM with new changes

Tracking Status of Data Collection

- "Patient follow-up excel" is a tracking log
  - updated daily with pts that
    - Enter MICU
    - D/C from MICU
    - D/C from Hospital
- Track completion status for Form 1, 2, & 3
- Provides basic statistics on ASAP basis
  - # of pts, demographics, mortality, LOS
Pt. follow up excel

- Age, sex, race, and initial
- Hosp & MICU admission date
- Status of completion of form 1, 2 and 3 (if any)
- MICU & hospital D/C date
- Death date
- Posted days

Data Entry Process

- Weekly data entry Forms 1, 2, 3
- Duplicate data entry: for QA purpose
  - Use SAS to check for entry errors
- “Data entry excel!”
  - track status of data entry

Data entry excel - summary

<table>
<thead>
<tr>
<th>Data entry summary 2009-2010</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
<th>Aug-09</th>
<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
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<th>Apr-10</th>
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Database Management

- Microsoft Access
- On Dept of Med. shared network
- Daily back up of data
- Electronic security per M-Net

Data Cleaning

- Data cleaning every 3 months
  - Pull data from DB
  - Paste into data cleaning excel template
    - Automated logic checks for potential errors in data collection or entry
      - E.g. MICU adm date ≤ MICU d/c date

Registry Reports

- Weekly
  - Status of data collection & data entry
- Monthly
  - PM&R report
  - Sedation/delirium report
- Quarterly
  - Metrics report
MICU PM&R Report

• Source of data: PT log book

• Outcomes measured
  – % of ICU days with PT
  – Reason for no physical therapy
  – % days sitting at edge of bed or greater
  – # of critical events

Sedation/Delirium Report

• Data from daily Form 2

• Outcomes measured
  – % of missed RASS & CAM assessments
  – % days with benzo & narcotic infusions
  – % of patients/ICU days:
    • sedated
    • delirious
  – Average pain score

Metrics Report

Data from Forms 1, 2 & 3

• pull data from DB, paste into the Metrics Report excel

Outcomes measured

• Demographics & source of admission to MICU
• Admission diagnosis; lung transplant indicator
• Sedation medications and status
• Rehabilitation consultations, e.g. PT, OT, SLP
• Highest level of activity at MICU admission & discharge
• Events during PT
• LOS & mortality for ICU and hospital stay
Help from CTSA?
Data Capture from EMR

Disadvantages of paper CRF:
• Errors with data collection & entry
• Costly (staff resources)
• Time consuming
  – Creates limited time to use data and implement improvement programs

Advantages EMR Data
• Reduce data collection & entry errors
• Efficient
  – Time
  – Cost
  – Space

Future
Meeting with David Thiemann (11/17/10)
• discussed electronic data collection
• discussed feasibility of data extraction for MICU rehab project

Data Extraction
• Able to extract
  • Patient demographics
  • Hosp admission & discharge location
  • MICU admission & discharge location
  • Rehab orders
  • Dialysis
  • Medication dosage
  • Sedation & delirium status

Data Extraction
• Unable to extract
  • Admission Dx
  • Location & activity level prior to admission
  • Pressure ulcers
  • Posted days
  • Withdrawal of care
  • Mech ventilation and trach status at D/C or death
• ??Next step
  – Moving forward with electronic data collection

Conclusions
Early mobility in ICU
• Appears safe & feasible
  – Changes ICU outcomes (sedation, mobilization)
  – Improves LOS

Successful QI project → Critical PM&R program
- Registry aspects of the program were reviewed

Want to start data abstraction from EMR