Recovery After Critical Illness
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Objectives
• To describe the long-term effects of critical illness
• To define PICS
• To introduce our ICU Recovery Clinic
• To describe the SCCM’s THRIVE Initiative -> CAIRO

Critical Illness
• >5.7 million people are admitted annually to ICUs
• 2 of the most common reasons for admission are Acute Respiratory Distress Syndrome (ARDS) and sepsis

ARDS
• Acute, diffuse, inflammatory form of lung injury
• Results in severe oxygenation impairments

ARDS
Normal Lung

Problems After ARDS
• Common:
  • Physical Impairment
  • Cognitive Impairment
  • Neuropsychiatric Problems: Anxiety, Depression, PTSD

Matthay J Clin Invest 2012
### Problems after ARDS

- **Other:**
  - Weight loss, malnutrition
  - Dysphagia, hoarseness
  - Chronic pain
  - Sexual dysfunction
  - Rashes, hair loss
  - Sleep disturbance

- **New Reports:**
  - High Rates of Incident Diabetes
  - Development of significant chronic co-morbidities

### Morbidity/ Mortality after ARDS

- **Quality of Life (Dowdy):**
  - Physical Function

- **Loss of Work (Herridge):**
  - 48% Return to work at 1 year
  - 65% Return to work at 2 years

- **Healthcare Utilization (Ruhl):**
  - 10% Re-hospitalized at 1 month
  - 40% re-hospitalized within 1 year

- **Mortality**
  - ICU Discharge: 20-30%
  - 1-2 Month: 40-55%
  - 1 Year: 50-66%

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### Sepsis

*Image of the Sepsis kills campaign.*

- **Sepsis:**
  - Mortality 11%
  - Severe Sepsis:
    - Mortality 37%
  - Septic Shock:
    - Mortality 42%

### Morbidity/ Mortality after Sepsis

- **Decreased Quality of Life**
- **Loss of Work:** 50% unemployed at 1 year
- **Healthcare Utilization**

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### Problems after Sepsis

- **Common:**
  - Physical Impairment
  - Cognitive Impairment
  - Neuropsychiatric Problems: Anxiety, Depression, PTSD

### Morbidity/ Mortality after Sepsis

*Images showing morbidity and mortality rates after Sepsis and ARDS.*

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*References:*

- Dowdy ICM 2006
- Herridge NEJM 2011
- Ruhl ICM 2017
- Prescott Thorax 2017
- Gaieski CCM 2013
- Prescott AJRCCM 2014
- Winters CCM 2010
- Iwashyna JAMA 2010
Morbidity/ Mortality after Sepsis

- Long-Term Mortality

Complex Care of Sick Patients

A call to Arms

What's in a Name?

Post-Intensive Care Syndrome
Wake Forest ICU Survivor’s Clinic

• Reasons:
  • Wanted to see if we could help bridge a perceived gap in care
  • Wanted to learn what problems our patients faced after critical illness

• Simultaneous Research Agenda

Background of ICU Recovery Clinics

• 1998: Reading, UK
  • “Intensive After-Care After Intensive Care”

• 2006 UK Survey:
  • 30% of hospitals in UK, many nurse-led
  • all felt under-resourced

Our ICU Recovery Clinic Structure

Visit to Clinic
• Pharmacy Assessment – BCCP or resident pharmacist
• Physician Visit: Attending +/- fellow
  • Physical function
    • Includes SPPB, handgrip as standard of care
  • Memories from ICU
  • Assessment of resolution of organ failures
  • Need for referrals, prescriptions, and management of gaps in care
  • Explanation of expected recovery from critical illness

• Study Participation if consented (after year 1 of ICU RC)

Implementation

Bakhru et al 2018

Waldmann Curr Anaesthesia & Crit Care 1998
Griffiths Anaesthesia 2006
### Year 1 Cohort: Characteristics

<table>
<thead>
<tr>
<th>Baseline Patient Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, average, years</td>
<td>64.5 (27.5)</td>
</tr>
<tr>
<td>Sex, Male (%)</td>
<td>19 (53%)</td>
</tr>
<tr>
<td>BMI, median (IQR)</td>
<td>27.4 (11.7)</td>
</tr>
<tr>
<td>APACHE II (at admission)*, median (IQR)</td>
<td>28.5 (8.0)</td>
</tr>
<tr>
<td>Charlson comorbidity index, median (IQR)</td>
<td>4.0 (3.3)</td>
</tr>
<tr>
<td>Diagnosed with ARDS, n (%)</td>
<td>9 (25%)</td>
</tr>
<tr>
<td>Required RRT, n (%)</td>
<td>5 (14%)</td>
</tr>
<tr>
<td>In-hospital cardiac arrest, n (%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Received steroids, n (%)</td>
<td>17 (47%)</td>
</tr>
<tr>
<td>Received neuromuscular blockade§, n (%)</td>
<td>5 (14%)</td>
</tr>
<tr>
<td>Days on ventilator, median (IQR)</td>
<td>3.0 (4.3)</td>
</tr>
<tr>
<td>Hospital LOS, median (IQR)</td>
<td>13.0 (10.3)</td>
</tr>
</tbody>
</table>

### Year 1 Cohort: Physical Function

<table>
<thead>
<tr>
<th>Physical Function</th>
<th>Median</th>
<th>75% Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>3.000</td>
<td>4.000</td>
</tr>
<tr>
<td>Gait</td>
<td>1.000</td>
<td>2.000</td>
</tr>
<tr>
<td>Chair</td>
<td>1.000</td>
<td>2.000</td>
</tr>
</tbody>
</table>

### Year 1 Cohort: Relation between Physical Function and Readmissions/ Mortality

- Mortality at 1 year: OR 0.52, CI 0.27-0.99; p=0.03
- 6 month readmission: OR 0.53, CI 1.11; p=0.07
- 1 year mortality: OR 0.73 CI 0.52-1.04; p=0.053

### Year 1 Cohort: Pharmacy Data

<table>
<thead>
<tr>
<th>Clinical Pharmacist’s Intervention Type (Total n=22)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient education</td>
<td>18 (43%)</td>
</tr>
<tr>
<td>Optimization or correction of drug dosing error</td>
<td>6 (14%)</td>
</tr>
<tr>
<td>Optimization or correction of therapeutic timing error</td>
<td>5 (12%)</td>
</tr>
<tr>
<td>Correction of drug selection error</td>
<td>5 (12%)</td>
</tr>
<tr>
<td>Recommendation for additional laboratory work or monitoring</td>
<td>3 (7%)</td>
</tr>
<tr>
<td>Assistance with cost of medication or supplies</td>
<td>3 (7%)</td>
</tr>
<tr>
<td>Therapeutic recommendation for therapy omission</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Correction of dosage form or route selection error</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total Interventions</td>
<td>42 (100%)</td>
</tr>
</tbody>
</table>

### Clinic Challenges

- No data available.
Every year, millions of Americans survive critical illness; but despite the efforts of their ICU, many are left with ongoing problems. The current healthcare system often does not meet the needs of these survivors, or their families, during their weeks to years of recovery. SCCM seeks to improve patient and family support after critical illness through the 

**SCCM’s THRIVE Initiative**

• We joined the Post ICU Clinic Collaborative in 2017
  • 10 sites total - now a total of 18
• We are working with a variety of sites on advancing care of patients recovering from critical illness.

**Barriers and Facilitators to post-ICU Clinics**

<table>
<thead>
<tr>
<th>FACILITATORS TO LEVERAGE</th>
<th>BARRIERS TO PRE-EMPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interprofessional teamwork</td>
<td>Lack of funding</td>
</tr>
<tr>
<td>Defined operational processes</td>
<td>Lack of space</td>
</tr>
<tr>
<td>Human connection</td>
<td>Identifying appropriate patients</td>
</tr>
</tbody>
</table>

SCCM Thrive Collaboratives
Mediated clinicians
Creative problem-solving

**Mechanisms By Which Post-ICU Clinics Can Improve In-ICU Care**

<table>
<thead>
<tr>
<th>CLINICS</th>
<th>FACTORS TO CONSIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can see patients in my clinic</td>
<td>Driving improvements back into ICU: Follow-up Clinics</td>
</tr>
</tbody>
</table>

**Unpublished data, in manuscript**

**Reasons for Non-Attendance at ICU RC between Jan and June 2016 (n=18)**

<table>
<thead>
<tr>
<th>Reason for Non-Attendance</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not aware of appointment</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>Aware of appointment, but did not attend because:</td>
<td></td>
</tr>
<tr>
<td>I did not have enough money.</td>
<td>2 (11%)</td>
</tr>
<tr>
<td>I did not have a ride.</td>
<td>2 (11%)</td>
</tr>
<tr>
<td>I was worried about insurance bills.</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>The distance to travel was too far.</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (16.5%)</td>
</tr>
</tbody>
</table>
CAIRO
• THRIVE will become an SCCM Committee
• SCCM THRIVE Collaboratives -> CAIRO
• Critical + Acute Illness Recovery Organization

Thanks to everyone!
• Critical Care Research Team:
  • D. Clark Files, Kevin Gibbs, Jessica Palakshappa, Peter Morris
  • James Davidson, Sheetal Gandotra, Alexis Smith
  • Rebecca Bookstaver, Michael Kenes, Kristin Welborn and our ICU Clinical Pharmacy Team
  • Mary LaRose, Lori Flores, Lina Purcell
  • Carolann Young, Shannon Shields
  • Oksana Creech, Alison Bode
  • CTSI Research Coordinator Pool

Post-ICU Recovery
• THRIVE: SCCM initiative to help increase awareness of and research into recovery after critical illness

  • https://www.youtube.com/watch?v=T03palv4mYU
    • THRIVE: Live after the Intensive Care Unit
  • https://www.youtube.com/watch?v=DU7Ax-xaDiw
    • THRIVE: Wellness After the ICU