Blood and Marrow Transplant
ICU Utilization Project

Stanford BMT

March 2017
Disclosures

- I have nothing to disclose.
Defining the problem

- Appropriate resource utilization is critical with increased costs and scarcity of ICU Beds
- Communication between medical teams is often fragmented resulting in conflicting information to patients and families
- Unclear communication makes it difficult for patients and families to make educated decisions
- These factors can result in over utilization of the ICU for non-beneficial care
Major Findings from Stanford Study

- A desire for improved communication between caregivers, patients, and families

- 47% of families felt they received contradictory messages

- 23% felt they received conflicting recommendations

Communication
Measure & Analyze the problem

Upward trend in BMT ICU LOS in CY2006
Measure & Analyze the problem

Upward trend in % BMT ICU Days vs Total BMT inpatient days in CY 2006
## Improve:
### Project goals and benefits

<table>
<thead>
<tr>
<th>PROJECT GOALS</th>
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<tbody>
<tr>
<td>‣ Develop criteria to help determine when ICU admission and reevaluation is</td>
<td>necessary</td>
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<tr>
<td>‣ Decrease average ICU LOS without negatively impacting mortality</td>
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<tr>
<td>‣ Decrease number of patients admitted to ICU when “No Stay Recommended”</td>
<td>(using new criteria)</td>
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<tr>
<td>PROJECT BENEFITS</td>
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<tr>
<td>‣ Improved patient, family and staff satisfaction</td>
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<td>‣ Consistent evidence-based guidelines and tools for appropriate admission of</td>
<td>BMT patients into ICU</td>
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<td>‣ Clarity of information and communication to patients and families enabling</td>
<td>them to make educated decisions regarding care options</td>
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<tr>
<td>‣ Appropriate utilization of ICU beds for BMT patients, thereby improving ICU</td>
<td>throughput</td>
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<td>‣ Appropriate Resource utilization</td>
<td></td>
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<td>‣ Avoid treating futile conditions that can result in unnecessary treatments</td>
<td>and painful deaths</td>
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IMPROVE
BMT ICU Clinical Admission Guidelines

- **Intensive BMT Care Recommended**
  - Veno-occlusive Disease (VOD)/Sinusoidal Obstructive Syndrome
  - Hypoxemia not requiring intubation especially if volume overload or transfusion related acute lung injury (TRALI)
  - Sepsis without hypotension
  - Hypotension
  - Diffuse Alveolar Hemorrhage (DAH)
  - Cardiac Event
  - Airway Protection

- **Limited ICU Recommended** – reevaluate within three days of ICU admission
  - Severe Sepsis requiring intubation or vasopressors
  - Respiratory Failure requiring intubation

- **No ICU Recommended**
  - Grade 3-4 Graft vs. Host Disease (GVHD) unresponsive to aggressive treatment with respiratory failure
  - Relapsed disease if recurrent treatment is not an option
  - Multi-organ Failure, requiring intubation (2 organs + mechanical ventilation)
IMPROVE
Prognostication in BMT Patients Requiring ICU Care

- Counseling BMT pts with newer data now needs to be predicated on probabilities from recent literature
  - Probability of survival in pts mechanically ventilated ~15-30%
  - Probability of survival in pts mechanically ventilated who require pressors is most commonly <10% and worsens with time
  - Probability of survival in pts mechanically ventilated with hepatic and renal failure is <5% and worsens with time
  - Risk factors: allograft, ICU course >30 days post transplant
  - Pts and/or families should be told ahead of time and informed that re-evaluation at 3-4 days will be important

- Best references from 2003 onwards:
  - Biol Blood Marrow Tx 12:301, 2006
  - Chest 126:1604, 2004
  - Crit Care Med 31:1715, 2003
EOL Discussions & Prognosis: Physicians

- Don’t have the time - 66%
- Not sure the time is right - 60% (not ready for PC or Hospice discussion)
- Not sure what to say - 46%
- No formal training 68%

AS'PEN FACUTY DEVELOPMENT  Sept 2016
Difficult Discussions

- 71% of the time MDs speak & 29% patient/family speaks
  - The more the family speaks the higher they rate the meeting in meeting their needs

- Need to:
  - Listen
  - Answer questions — often we do not directly answer their questions
  - Acknowledge & address emotions
  - Address tenants of palliative care— such as patient preferences, explanations of options, surrogate decision making & we will offer comfort care & won’t abandon them

(White et al, 2010)
Patient and Family Conferences

- The perception of being listened to is one of the greatest predictors of patient and family satisfaction
Improve: 
Process Guidelines for BMT Patients Admitted to ICU

- **ICU Admission**: BMT team utilizes the revised BMT Patient ICU Clinical Admission Guidelines for managing appropriate ICU admissions.

- **ICU Rounding**: BMT and ICU teams meet for daily rounds during the patient’s stay in the ICU.

- **ICU Family Conferences**: BMT and ICU teams meet with the patient or family every 2-3 days during ICU stay to clarify goals of care.

- **BMT Patient Review**: BMT Monitoring Tool utilized to monitor adherence to admission criteria. All ICU patients are reviewed monthly at the BMT review meeting.
### Results

**Decrease in BMT ICU LOS**

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</thead>
<tbody>
<tr>
<td>ICU Days</td>
<td>4.19</td>
<td>4.84</td>
<td>6.89</td>
<td>11.88</td>
<td>6.52</td>
<td>9.61</td>
<td>5.83</td>
<td>7.07</td>
<td>5.29</td>
<td>6.67</td>
<td>7.37</td>
<td>5.46</td>
<td>7.07</td>
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Data Updated: 2/20/16
Source: (CY's: BMT Admin) (FY 2008-2016: ICU Utilization Tool)
Results

Total BMT ICU Days per year

BMT ICU Utilization
#ICU Days each year

FY 2016: 435
FY 2014: 307
FY 2013: 292
FY 2012: 290
FY 2011: 215
FY 2010: 210
FY 2009: 180
FY 2008: 307
CY 2006: 442

Data Updated: 2/20/16
Source: (CY 2006: BMT Admin) (FY 2008-2016: ICU Utilization Tool)
Results:
BMT Project Utilization Impact: FY 2016

<table>
<thead>
<tr>
<th>ICU Admission Criteria</th>
<th>BMT Cases Transferred to ICU</th>
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<tbody>
<tr>
<td>Limited ICU Recommended</td>
<td>CY 2006: 15</td>
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<tr>
<td></td>
<td>FY 2008: 21</td>
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<td></td>
<td>FY 2009: 24</td>
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<td>FY 2010: 24</td>
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<td>FY 2011: 20</td>
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<td>FY 2012: 18</td>
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<td>FY 2013: 16</td>
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<td>FY 2014: 19</td>
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<td>FY 2015: 12</td>
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<td></td>
<td>FY 2016: 11</td>
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<tr>
<td>ICU Recommended</td>
<td>CY 2006: 24</td>
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<td></td>
<td>FY 2008: 21</td>
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<td>FY 2009: 21</td>
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<td>FY 2010: 16</td>
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<td>FY 2011: 16</td>
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<td>FY 2012: 23</td>
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<td>FY 2013: 23</td>
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<td>FY 2014: 12</td>
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<td>FY 2015: 3</td>
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<td></td>
<td>FY 2016: 3</td>
</tr>
<tr>
<td>No ICU Recommended</td>
<td>CY 2006: 2</td>
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<td></td>
<td>FY 2008: 2</td>
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<td>FY 2009: 3</td>
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<td>FY 2014: 3</td>
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<tr>
<td></td>
<td>FY 2015: 0</td>
</tr>
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<td>FY 2016: 3</td>
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</tbody>
</table>

More patients that were recommended for the ICU went to the ICU
RESOURCES/COST SAVINGS

- ___ patients were admitted to the ICU who did not meet the criteria (1 was admitted twice).
  - Total of ___ ICU days were associated with the ___ patients
  - Mean ICU LOS was 4.4 days
  - Average charge per day in the ICU was 2.1 times that the cost of care on the BMT unit.
Decrease in % of ICU days to Inpatient BMT days

% Total ICU Days to Total Inpatient Days

Data Updated: 2/20/16
Source: (CY’s: BMT Admin) (FY 2008-2016: ICU Utilization Tool)
Stanford’s ICU Utilization Rate

- In 2013, United Healthcare Consortium (UHC) ICU utilization rate for HCT recipients was 29.6%
- Stanford is below 4% for past 6 years
Results

ICU BMT mortality rate decreased to 33%
ICU Mortality

- Hospital mortality for patients requiring mechanical ventilation and vasopressor support was 71%.

- Patients not requiring mechanical ventilation and vasopressor support was 24% (P < .0005).

- A hematopoietic cell transplantation comorbidity index (HCT-CI) was available for 71.3% of the patients.
  - No significant difference between low index (0-3) score and high index (4-8) score
  - Comorbidity did not effect outcomes
Length of Stay (LOS)

- Significant relationship between LOS and death.
  - Patients with ICU LOS < 5 days had a mortality of 33%
  - Patients with ICU LOS > 15 days had a mortality of 60%
After adjusting for all variables (age, gender, race, product, preparative regimen, donor, GVHD, mechanical ventilation and/or vasopressor)

- Only 2 variables were significantly associated with mortality
  - Age >55 years
  - Combination of mechanical ventilation with vasopressor support
Project Benefits

- Appropriate admission of BMT patients into the ICU based on criteria from recent literature and probability of survival

- Appropriate utilization of ICU beds for BMT patients which results in better resource utilization and avoiding futile care

- Consistent rounding between BMT and ICU facilitates communication among physicians, with the care teams involved, and with the family

- Consistent communication ensures accurate information to patients and families enabling them to make educated decisions regarding care

- Increased satisfaction for patients, families and staff
Summary

- DATA
- Clear Communication
  - Critical for making informed decisions
  - Essential for managing valuable resources and the appropriate utilization of the ICU
Collaborating with Palliative Care - future ideas

- Letter project trial with BMT patient to see if increase in Advance Directive & effect on EOL decision/outcome

- Consistent Palliative Care APP who rounds with BMT & develops relationship with both BMT team & patients

- Requiring Advanced Directive (or Letter) for all BMT patient coming to transplant.

- All high risk BMT patients get an automatic referral to Palliative Care - need triggers

- Others?