Cost containment and patient safety

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State Health Centre, Military Hospital,
Budapest

WFSICCM Seoul, 2015.
Intensive care reimbursement practices: results from the ICU FUND survey

CONCLUSION:

• Those doctors, who receive detailed financial information were significantly more satisfied with their funding system (p=0.0104).
Steady increase on health expenditure

WHO: www.who.int/nha/en

WFSICCM Seoul, 2015.
No change in proportion of intensive care costs

- Critical care medicine costs vs. national health expenditure indexes in USA.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
<th>Total Percentage Change From 2000 to 2005</th>
<th>Average (sd) of Annual Percentage Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>National CCM costs, $ billions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCM</td>
<td>56.6</td>
<td>81.7</td>
<td>44.2</td>
<td>7.6 (1.6)</td>
</tr>
<tr>
<td>National cost indexes, $ billions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>417</td>
<td>611.6</td>
<td>46.7</td>
<td>7.9 (0.3)</td>
</tr>
<tr>
<td>NHE</td>
<td>1,353</td>
<td>1,988</td>
<td>46.8</td>
<td>8 (0.9)</td>
</tr>
<tr>
<td>GDP</td>
<td>9,817</td>
<td>12,456</td>
<td>26.9</td>
<td>4.9 (1.7)</td>
</tr>
<tr>
<td>National CCM costs/national cost indexes, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCM/HC</td>
<td>13.6</td>
<td>13.4</td>
<td>-1.6</td>
<td>-0.3 (1.6)</td>
</tr>
<tr>
<td>CCM/NHE</td>
<td>4.2</td>
<td>4.1</td>
<td>-1.8</td>
<td>-0.4 (1.3)</td>
</tr>
<tr>
<td>CCM/GDP</td>
<td>0.58</td>
<td>0.66</td>
<td>13.7</td>
<td>2.6 (2.5)</td>
</tr>
</tbody>
</table>

CCM, critical care medicine; HC, hospital care; NHE, national health expenditures; GDP, gross domestic product.


WFSICCM Seoul, 2015.
Cost-effectiveness of adult intensive care in the UK

- Primary outcome: cost per QALY gained from treatment in ICU vs. no treatment.
- Mortality risk (OR), if refusing ICU admission: 2.09
- NHS reference cost for intensive care: £ 1364/day, (...vs. hospital ward: £ 195/day).
- Life expectancy surviving ICU: 11.1 years.
- Quality of life following ICU: 0.66
- Hospital costs and lifetime care costs included.

RESULTS:
Cost per QALY gained for ICU vs. no ICU: £ 7010


WFSICCM Seoul, 2015.
Statins vs. intensive care in UK

Spending on statins:
£ 738 million / year

Cost per QALY gained:
£ 10 000-17 500
or
£ 9 000-119 000

Intensive care cost:
£ 719 million / year

Cost per QALY gained:
£ 7 010

This is 1% of NHS budget!

Statins vs. intensive care in Hungary

Spending on statins:
- £738 million / year
- Cost per QALY gained:
  - £10 000-17 500
  - or
  - £9 000-119 000

Intensive care cost:
- £719 million / year
- Cost per QALY gained:
  - £7 010


WFSICCM Seoul, 2015.
Per Capita health spending in Hungary (2008): 1 506 US$
How can you expect the same level of care...?

WFSICCM Seoul, 2015.
Innsbruck vs. Miskolc: same size?

Universitätsklinik, Innsbruck, Austria:
• 1400 beds
• 5300 employees 😊

County Hospital, Miskolc, Hungary:
• 1400 beds
• 3200 employees ☹
Reduction of blood product requirement by introducing target-controlled coagulation management

FFP use was reduced by 2957 units!

Innsbruck vs. Miskolc: same price?

- Cost of 1 unit RBC:
  - 85 Euro
- Cost of 1 unit FFP:
  - 65 Euro

Based on Innsbruck data, the annual saving in FFP would be: 104,926 Euro

- Cost of 1 unit RBC:
  - 23.6 € (=7,319 HUF)
- Cost of 1 unit FFP:
  - 35.5 € (=11,000 HUF)
What could this buy in Hungary?

104,926 Euro/year saving would be enough to:

• Pay full-time salary of 18 nurses…
• Pay full-time salary of 9 doctors…
• …
• Buying a 95 m² flat in Budapest😊, but only a 27 m² studio in Seoul😊😊…

This calculation is based on one county hospital data only!
Patient safety measures in cost containment vary between countries.
Adequate number of nurses may save lives, the lack of it...

(A 5-year retrospective survey)

Róth A., Mikor A., Leiner T., Tóth I., Molnár Zs.

- 8 bedded university ITU.
- No of nurses was increased from 16 to 31 in 2003.
- Multi organ failure patients (MODS>2) were selected and their outcome was analyzed between 2001 and 2005.
- Multivariate regression analysis for predictors of multi organ failure (MOF).

European standard for 1:1 nursing: 6 FTE/bed...

WFSICCM Seoul, 2015.
Adequate number of nurses may save lives, the lack of it...
(A 5-year retrospective survey)

Róth A., Mikor A., Leiner T., Tóth I., Molnár Zs.

<table>
<thead>
<tr>
<th>n=449</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAPS II (átlag±SD)</td>
<td>49 ± 24</td>
<td>45 ± 21</td>
<td>51 ± 22</td>
<td>48 ± 21</td>
<td>51 ± 22</td>
</tr>
<tr>
<td>Mortalitás MOF (%)</td>
<td>92,8</td>
<td>89,9</td>
<td>84</td>
<td>75,3 *</td>
<td>65,4 *</td>
</tr>
</tbody>
</table>

- Independent predictors of outcome:
  - SAPS II (beta -0.246; p<0.001)
  - Number of nurses (beta 0.220; p<0.001)
  - Age (beta -0.114; p=0.021)

WFSICCM Seoul, 2015.
The number of nurses per patient does matter, but also, their education!
AIM:

- assess whether differences in patient to nurse ratios and nurses’ educational qualifications affect outcome (300 hospitals in 9 European countries).

METHODS:

- discharge data for 422,730 patients aged 50 years or older who underwent common surgeries.
- surveys of 26,516 bedside care professional nurses.

_Lancet, 2014; 383:1824._

ESICM, Barcelona, 2014.
RESULTS:

These associations imply that:

patients in hospitals in which 60% of nurses had bachelor’s degrees (and nurses cared for an average of six patients) would have almost 30% lower mortality than patients in hospitals in which only 30% of nurses had bachelor’s degrees.


ESICM, Barcelona, 2014.
Do we have the same benefit for doctors?
Effect of closed unit policy and appointing an intensivist in a developing country

Arzu Topeli, MD; Franco Laghi, MD; Martin J. Tobin, MD

Crit Care Med 2005 Vol. 33, No. 2

• Hacettepe University Hospital, Turkey

WFSICCM Seoul, 2015.
Effect of appointing an intensivist in a developing country

- During the early and late closed periods, patients were sicker than during the open period.

Topeli, Crit Care Med, 2005;33:299
Effect of appointing an intensivist in a developing country

- Factors influencing hospital mortality (n=559):

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical ventilation Policy</td>
<td>13.3 (6.7–26.2)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Open vs. late closed</td>
<td>5.0 (2.3–10.8)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Open vs. early closed</td>
<td>4.5 (2.1–9.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Early closed vs. late closed</td>
<td>1.1 (0.6–2.1)</td>
<td>.71</td>
</tr>
<tr>
<td>Central venous catheterization</td>
<td>3.7 (2.3–6.1)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Admission diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis vs. pulmonary</td>
<td>3.9 (1.9–8.2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sepsis vs. nonpulmonary</td>
<td>2.3 (1.2–4.2)</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Nonpulmonary vs. pulmonary</td>
<td>1.7 (0.9–3.3)</td>
<td>.08</td>
</tr>
<tr>
<td>APACHE II score (increase in 1 point)</td>
<td>1.1 (1.1–1.2)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

- The standardized mortality ratio decreased from 1.34 to 0.95 between the open and early closed period!

*Topeli, Crit Care Med, 2005;33:299*
What are our highest cost drivers in ICU?
Economic Burden of Ventilator-Associated Pneumonia Based on Total Resource Utilization

Infection during ICU stay!
Premier’s Perspective Comparative Database

This is the largest independent drug utilization database. Includes complete billing and coding history of more than 45 million hospital inpatient discharge in USA.

WFSICCM Seoul, 2015.
Prevalence and economic impact of hospital-acquired infections in intensive care units: retrospective analysis from a USA hospital database

- Patients with hospital-acquired infection have:
  - 4x higher mortality.
  - 2x longer length of stay: 8.1 days vs. 15.8 days.
  - ICU ”share” of hospital-acquired infections: pneumonia (16.9%), blood-stream (14.5%).
  - Hospital-acquired infections add an extra $16,000 to each ICU stay.

WFSICCM Seoul, 2015.

ECCMID abstract, 2012.
## Comparison of VAP in PROSAFE database

<table>
<thead>
<tr>
<th></th>
<th>ITALY</th>
<th>HUNGARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of VAP cases</td>
<td>1247/30995 (4%)</td>
<td>68/1612 (4%)</td>
</tr>
<tr>
<td>Incidence of VAP</td>
<td>8.79 (CI 95%: 8.11-9.49)</td>
<td>11.0 (CI 95%: 7.62-14.99)</td>
</tr>
<tr>
<td>Incidence/1,000 ventilator days</td>
<td>Mean: 9.6 (IQR 4-12)</td>
<td>Mean: 6.4 (IQR 3-7)</td>
</tr>
<tr>
<td>Hospital mortality of patients with VAP</td>
<td>523/1247 (42%)</td>
<td>38/68 (56%)</td>
</tr>
<tr>
<td>Ventilation days before VAP</td>
<td>Median: 7 (IQR 4-12)</td>
<td>Median: 4 (IQR 3-7)</td>
</tr>
</tbody>
</table>

### Definition of VAP in PROSAFE:


Unpublished data, Csomos

WFSICCM Seoul, 2015.
Evidence-based patient safety measures to prevent nosocomial infections

- Use of maximum sterile barriers during central venous catheter (CVC) insertion.
- Use of antibiotic impregnated catheters.
- Use of real-time ultrasound for CVC insertion.
- Appropriate use of antibiotic prophylaxis for surgery.
- Continuous aspiration of subglottic secretions.
- Use of pressure-relieving bedding materials.

*Leape, JAMA, 2002;288:501.*

WFSICCM Seoul, 2015.
Sales data on SUCETT™ (Suction Above the Cuff Tracheal Tube) in Hungary

<table>
<thead>
<tr>
<th>Indication</th>
<th>Code No</th>
<th>2008</th>
<th>2010</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term (2-6 hours) ventilation</td>
<td>100/199</td>
<td>27 009</td>
<td>18 890</td>
<td>21 009</td>
</tr>
<tr>
<td>Prolonged (&gt;6 hours) ventilation</td>
<td>100/166</td>
<td>2 403</td>
<td>2 350</td>
<td>2 080</td>
</tr>
<tr>
<td>SUCETT</td>
<td>100/189</td>
<td>N/A</td>
<td>30</td>
<td>223</td>
</tr>
</tbody>
</table>

Permission from Replant Cardo Ltd, Hungary

WFSICCM Seoul, 2015.
Can we measure the activities taken for patient safety?
Workload for patient safety (Japan)

- It has all started in 1999 after several medical accidents – ideal base year for incremental assessment.
- Strong governmental support was given.
- Incremental activity was defined as the additional patient safety provided in a hospital in a given year – compared to 1999.
- There were 7 hospitals surveyed by:
  - Measuring time spent for patient safety
  - Using specially designed questionnaire

*Hayashida, BMC Health Services Research, 2007;7:140.*
Measuring activities for patient safety

1. Staff assignment
2. Meetings and conferences
3. Internal review and walk round
4. Internal and external education and training
5. Standard manual development
6. Incident reporting
7. External audit
8. Maintenance of medical equipments
9. Management of medications
10. Other

WFSICCM Seoul, 2015.
Staff activities for patient safety

Hayashida, BMC Health Services Research, 2007; 7:140.

WFSICCM Seoul, 2015.
# One Full Time Equivalent work for patient safety

<table>
<thead>
<tr>
<th>Study</th>
<th>Location</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hayashida, 2007</td>
<td>Japan</td>
<td>1 : 315 beds</td>
</tr>
<tr>
<td>Kluytman, 2007</td>
<td>Netherlands</td>
<td>1 : 178 beds</td>
</tr>
<tr>
<td>Morrison, 2004</td>
<td>Canada</td>
<td>1 : 167 beds</td>
</tr>
<tr>
<td>Haley, 1985</td>
<td>USA</td>
<td>1 : 250 beds</td>
</tr>
</tbody>
</table>

*It is nursing and clerical time!*
What is the cost of one Full Time Equivalent?

Cost of intensive care in Europe:

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>UK</th>
<th>Hungary</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU cost per day</td>
<td>957 €</td>
<td>1396 €</td>
<td>144 €</td>
</tr>
<tr>
<td>Fixed costs</td>
<td>67.2 %</td>
<td>67.5 %</td>
<td>41.3 %</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>UK</th>
<th>Hungary</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTE medical staff</td>
<td>82 317 €</td>
<td>119 360 €</td>
<td>16 441 €</td>
</tr>
<tr>
<td>FTE nursing staff</td>
<td>35 531 €</td>
<td>51 520 €</td>
<td>7 445 €</td>
</tr>
</tbody>
</table>

WFSICCM Seoul, 2015.
We are back to „best standard care” 😊

Mervyn Singer: Less Is More in Sepsis
By JOE | Published: DECEMBER 27, 2010

01A-0940 Less Is More – in Sepsis

This entry was posted in Critical Care, Emergency Medicine and tagged 2010, ICCS 2010, Mervyn Singer, Sepsis. Bookmark the permalink. Both comments and trackbacks are currently closed.
Summary

1. Intensive care services are cost-effective at every level of care.
2. There are huge differences in ICU bed availability and resources; therefore, generalized recommendation can not be made.
3. The largest impact on cost and patient outcome is almost certainly providing adequate number of nurses.
4. Cost saving by reduced length of stay can be achieved if measures are taken to prevent nosocomial infections.

WFSICCM Seoul, 2015.
Thanks for your attention!

WFSICCM Seoul, 2015.