ELDERLY PATIENTS: WHO SHOULD BE ADMITTED TO INTENSIVE CARE AND WHO SHOULD NOT?

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Matti Reinikainen: DISCLOSURES

• Economic conflicts of interests: none
• Positions of trust:
  ✓ 1st secretary, Finnish Society of Intensive Care
  ✓ Chairman, Finnish Intensive Care Consortium
ELDERLY PATIENTS: WHO SHOULD BE ADMITTED TO INTENSIVE CARE AND WHO SHOULD NOT?

- the change in age distribution will increase the demand for intensive care in Finland by 25% between the years 2004-2030


- the growth in the need for intensive care (ICU bed-days) in Norway will be between 26.1 – 36.9% between the years 2008-2025
Data from the Finnish Intensive Care Consortium

8% aged > 80 yrs, 40% aged > 65 yrs
The age and gender distribution of the Finnish population in 2011
AT ITS BEST, INTENSIVE CARE CAN BE VERY BENEFICIAL

• When the underlying cause for the danger to life is temporary and
• The patient has capacity to benefit from aggressive interventions
AT ITS WORST, INTENSIVE CARE CAN BE VERY HARMFUL

• It may prolong the dying process and increase the amount of suffering
• It may separate the dying patient from his/her family
BASIC PRINCIPLE

- Admit patients who are temporarily at danger to life and who have capacity to benefit from active treatment
- Do not admit patients who are in the terminal phase of an incurable disease or who are otherwise too sick to benefit
“...refuse to treat those who are overmastered by their disease, realising that in such cases medicine is powerless.”

Hippocrates
IN PRACTICE, OLD AGE IS ASSOCIATED WITH REFUSAL OF ICU ADMISSION

- In a French study, there were 1426 patients aged 80 years or over who met at least one of predefined ICU admission criteria
- emergency room physicians referred only 31% of these for ICU admission, and ICU physicians admitted 52% of those referred

AMERICA IS DIFFERENT

- A comparison of the use of intensive care during terminal hospitalisations in England and the USA
- Of all deaths, the proportion that involved intensive care during terminal hospitalisation was 5.1% in England and 17.2% in the USA
- Of all decedents aged 85 years or over, the proportion receiving intensive care during terminal hospitalisation was 1.3% in England and 11.0% in the USA

FACTORS AFFECTING THE RISK OF DEATH IN ELDERLY ICU PATIENTS:

✓ Age itself
✓ Underlying diagnosis
✓ Severity of acute illness
✓ Multiple organ dysfunctions
✓ Surgical vs. non-surgical diagnosis
✓ Chronic co-morbidities
✓ Premorbid functional status
FACTORS AFFECTING THE RISK OF DEATH IN ELDERLY ICU PATIENTS: AGE ITSELF


n = 69,321

![Graph showing the relationship between age and hospital mortality rate](image)
Table 4. The independent effect of age group on hospital mortality

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-39</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>40-59</td>
<td>2.05</td>
<td>1.84-2.29</td>
</tr>
<tr>
<td>60-69</td>
<td>3.17</td>
<td>2.83-3.55</td>
</tr>
<tr>
<td>70-74</td>
<td>4.14</td>
<td>3.68-4.66</td>
</tr>
<tr>
<td>75-79</td>
<td>5.41</td>
<td>4.81-6.10</td>
</tr>
<tr>
<td>80 and older</td>
<td>7.08</td>
<td>6.26-7.99</td>
</tr>
</tbody>
</table>

Logistic regression with adjustment for severity of illness (as measured with SAPS II scores without age points), intensity of care (mean daily TISS scores), gender, year of admission and the effect of individual departments; OR = odds ratio; CI = confidence interval. $P < 0.001$ for each age group.
Table 3. Hospital mortality rates in subgroups.

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<thead>
<tr>
<th>Age group (years)</th>
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<th>0-39</th>
<th>75-79</th>
<th>80 and older</th>
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<tr>
<td><strong>Males</strong></td>
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<td></td>
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<tr>
<td></td>
<td>15.9%</td>
<td>6.3%</td>
<td>25.4%</td>
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<td><strong>Females</strong></td>
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<td>16.0%</td>
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<td>6.2%</td>
<td>9.5%</td>
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<td>Unscheduled surgical</td>
<td>13.7%</td>
<td>3.9%</td>
<td>19.0%</td>
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- 15 640 ICU patients aged ≥ 80 yrs
- Hospital mortality 24% (vs. 7.1% for patients < 40 yrs)
- For patients aged ≥ 80 years compared with those aged 18-40 years, the adjusted OR for in-hospital death was 5.4, 95% CI 4.9-5.9
- Factors associated with increased risk of death:
  - Severity of acute illness
  - Non-surgical diagnosis
  - Prolonged ICU stay
  - Chronic diseases
  - Admission from a chronic care facility
UNDERLYING DIAGNOSIS

- According to the APACHE studies: Crude mortality rates are particularly high (over 40%) in the following groups:
  - post cardiac arrest
  - cardiogenic shock
  - hepatic failure
  - severe sepsis of gastrointestinal or pulmonary origin
UNDERLYING DIAGNOSIS

• After adjustment for other factors, the following major diagnostic categories are the strongest independent predictors of poor outcome:

  • non-operative diagnoses:
    ✓ pulmonary fibrosis
    ✓ parasitic / fungal pneumonia
    ✓ respiratory cancer
    ✓ intracerebral haemorrhage
    ✓ subarachnoid haemorrhage
    ✓ gastrointestinal ischaemia
    ✓ post cardiac arrest
    ✓ cardiogenic shock

  • post-operative diagnoses:
    ✓ head trauma
    ✓ non-traumatic intracranial haemorrhage
    ✓ gastrointestinal ischaemia
UNDERLYING DIAGNOSIS

• The presence of an underlying ”fatal diagnosis” is a strong predictor of poor outcome


SEVERITY OF ILLNESS

• For any age, the risk of death increases with increasing severity of the acute illness
• The severity of illness can be quantified with scoring systems (e.g. APACHE, SAPS) that are based on the level of abnormality of physiological parameters
• Severity scores can be converted into a probability of in-hospital death
• Useful when considering admission? – not really
Probabilities of death make sense when used as an aggregate measure of risk – they are not intended for decision-making regarding individual patients.

**ORGAN DYSFUNCTIONS**

- SOFA score describes quantitatively the presence and degree of organ dysfunctions
- 6 organ systems (CNS, respiratory, circulatory, renal, hepatic, hematologic)
- For each system, 0 = normal function; 4 = most severe dysfunction / failure
- Mortality > 90% among patients with a SOFA score > 15, but < 10% in patients whose SOFA$_{\text{max}}$ was < 7


- 882 ICU patients > 65 yrs, 1995-2000
- “All elderly patients with day-1 SOFA scores > 15 died during the ICU stay.”
  - SOFA 16 p, for example:
    - Severe ARDS, PaO\textsubscript{2}/FIO\textsubscript{2} < 100 mmHg → 4 p
    - Severe circulatory failure, need for noradrenaline > 0.1 ug/kg/min → 4 p
    - Urine output < 200 ml/d → 4 p
    - In addition at least moderate impairments in level of consciousness, hepatic function and/or thrombocytopenia
Case presentation

• 86-year-old woman, lives with her daughter
• Chronic disease: hypertension
• Carcinoma uteri diagnosed 2 yrs earlier; refused surgical treatment; hormonal treatment going on, no metastases detected so far
• To hospital because of gastric pain and vomiting
• Dg: cholangitis; *Enterobacter* species in blood cultures
• Quickly deteriorating condition
• aB-pH 7,11, BE -12,3 mmol/l, lactate 5,8 mmol/l

• SHOULD THIS PATIENT BE ADMITTED TO THE ICU?
• Quickly deteriorating condition
• aB-pH 7,11, BE -12,3 mmol/l, lactate 5,8 mmol/l
• Sudden collapse, respiratory arrest and cardiac arrest
• Primary rhythm PEA
• Resuscitation, 7 min to ROSC
• To the ICU, mechanical ventilation, vasoactive drug support etc.
Severe circulatory failure
Severe oxygenation problem
Renal and hepatic problems

Cumulative urine output during first 24 hrs: 282 ml
In addition

- Worsening thrombocytopenia, ad 56 E9/l
- Poor level of consciousness
Prognosis?

✔ Day 1 SOFA score: 19

- Kaarlola et al. *Crit Care Med* 2006: all elderly (> 65 yrs) patients with a day one SOFA score exceeding 15 died in the ICU
Outcome

- 13 days in the ICU, 24 more days in the hospital, good recovery
- Visited the ICU 2 months later in seemingly good health
Key to success?

• Definitive treatment of the underlying problem
• ERCP + stenting of the ductus choledochus, thus relieving the biliary obstruction
ESSENTIAL QUESTION: IS IT POSSIBLE TO TREAT THE UNDERLYING CAUSE FOR THE DANGER TO LIFE?

- Patients admitted after surgery have better outcomes than equally aged patients admitted for medical reasons
FACTORS AFFECTING THE RISK OF DEATH IN ELDERLY ICU PATIENTS: IMPACT OF RENAL FAILURE

• Generally considered to be associated with a poor prognosis

- A study from a medical ICU in France
- 299 patients aged > 80 yrs, SAPS II score 52 ± 22 = very high severity of illness
- Hospital mortality 55%; of the survivors, 53% died within 2 years
- Renal replacement therapy (RRT) was given to 21 patients

- A study from a medical ICU in France
- 299 patients aged > 80 yrs, SAPS II score $52 \pm 22 = \text{very high severity of illness}$
- Hospital mortality 55%; of the survivors, 53% died within 2 years
  ✓ Renal replacement therapy (RRT) was given to 21 patients
  ✓ 19 of these (90%) died in hospital; one patient was still alive at 2 years
Sara Nisula, Suvi Vaara, Meri Poukkanen, …, Ville Pettilä, the FINNAKI study group:
Incidence, risk factors and 90-day mortality of acute kidney injury in Finnish intensive care units: the FINNAKI study

- 5-month period (1.9.2011 – 1.2.2012), 17 ICUs in Finland
- 2901 patients
- 1141 (39.3%) developed AKI (at least AKIN stage 1)
- 296 (10.2%) received RRT; hospital mortality 32%, 90-d mortality 38%

✓ 21 RRT patients were > 80 yrs
✓ Hospital mortality 11/21 (52%), 90-d mortality 13/21 (62%)
PREMORBID FUNCTIONAL STATUS

• in elderly patients, a poor functional status before hospital admission increases the risk of poor outcomes from intensive care regarding both short-term and long-term survival


INDICATORS OF POOR FUNCTIONAL STATUS

• Admission from a chronic care facility
• Moderate-to-severe cognitive impairment
• Dependence on help in basic activities of daily living
INDICATORS OF POOR FUNCTIONAL STATUS

- Admission from a chronic care facility
- Moderate-to-severe cognitive impairment
- Dependence on help in basic activities of daily living
  - Dressing
  - Eating
  - Ambulating
  - Toileting
  - Hygiene
PATIENT’S PREFERENCES


- 4556 adults who had one of several illnesses associated with an average 6-month mortality rate of 50%
- For 25% of the patients, physicians stated that they were unaware of the preferences
- When the physician had a perception about the patient’s wishes, it was incorrect in more than one third of cases
- Increasing age of the patients increased the probability that physicians would erroneously believe that patients did not want life-extending care
PATIENT'S PREFERENCES


- 226 persons aged ≥ 60 years who had a limited life expectancy due to cancer, congestive heart failure or chronic obstructive pulmonary disease
- were asked whether they would want to receive a given treatment; the outcome without treatment was specified as death
- for a low-burden treatment with the restoration of current health, 99% of respondents would want the treatment
- if the anticipated outcome was survival but with severe functional impairment, 74% of the participants would not choose treatment
IF THE ELDERLY PATIENT SURVIVES – IS THERE LIFE AFTER INTENSIVE CARE?

- 882 ICU patients > 65 yrs, (and 1827 younger patients), Helsinki UCH 1995-2000
- Cumulative 3-yr-mortality 57% for the elderly, 40% for the younger patients
- 10/2001 a questionnaire investigating health and quality of life was sent to the survivors
- 87% of the elderly responded

- 30% of the respondents rated their health as good or very good, 58% as satisfactory and 12% as poor
- Increasing age was associated with poor values in indices measuring physical functions
- In indices measuring mental health, the elderly had better scores than younger ex-ICU patients

• A study from a medical ICU in France, 2001-2006
• 299 patients aged > 80 yrs, SAPS II score 52 ± 22 = very high severity of illness
• Hospital mortality 55%; of the survivors, 53% died within 2 years
• State of health evaluated in June 2009 (n = 24, median age 89 yrs)
• Physical functions were very limited, but scores for emotional well-being and social function were not much different from those of other octogenarians
IF THE ELDERLY PATIENT SURVIVES – IS THERE LIFE AFTER INTENSIVE CARE?

- YES!
WHAT ABOUT COST-EFFECTIVENESS?
One-year mortality, quality of life and predicted life-time cost-utility in critically ill patients with acute respiratory failure

Rita Linko*1, Raili Suojaranta-Ylinen1, Sari Karlsson2, Esko Ruokonen3, Tero Varpula1, Ville Pettilä4 and the FINNALI study investigators

- Prospective cohort study in 25 Finnish ICUs
- 958 patients with acute respiratory failure
- 90-day mortality 31%, 12-mth mortality 35%
- EQ-5D at 12 months after study entry
- Costs
  - ICU costs
    • Sum of TISS –score x price of one TISS point
  - Hospital costs
    • Post-ICU days x price of hospital day
  - Societal costs not available
The mean predicted lifetime cost-utility for all patients was 1391 euro per QALY.
Long-term outcome and quality-adjusted life years after severe sepsis

Sari Karlsson, MD; Esko Ruokonen, MD, PhD; Tero Varpula, MD, PhD; Tero I. Ala-Kokko, MD, PhD;
Ville Pettilä, MD, PhD; for the Finnsepsis Study Group

- Prospective 6-week cohort study
  - Patients with severe sepsis
- Hospital mortality 28%, mortality at 2 years 45%
- EQ5D at 17 months
- Costs
  - ICU costs
    - Sum of TISS –score x price of one TISS point
  - Hospital costs
    - Post-ICU days x price of hospital day
  - Societal costs not available
Figure 3. Quality-adjusted life years (QALYs) after severe sepsis by age.
Cost effectiveness of severe sepsis treatment, and costs per quality-adjusted life year (QALY) in different age groups.

The calculated mean cost for one QALY was 2139 €
ELDERLY PATIENTS: WHO SHOULD BE ADMITTED TO INTENSIVE CARE AND WHO SHOULD NOT?
Elderly patients have poorer outcomes from intensive care than younger patients. However, prognosis depends more on severity of illness and premorbid functional status than on age itself. Old age alone is not a contraindication for intensive care. A majority of elderly long-term survivors from ICU-treated critical illness consider their quality of life as satisfactory or good. Physical functions are limited, but mental well-being is not worse than for younger survivors from critical illness.

SUMMARY
• When there is uncertainty, it may be wise to start active treatment – that can be withdrawn, if the patient does not respond to treatment
Associated with good outcome

- Independent
- Surgical patient, possible to definitively treat underlying problem
- Dysfunction of few (1-2) organ systems

Associated with increased risk for poor outcome

- Admission from chronic care facility / dependent on help in ADLs
- Medical admission
- High severity of acute illness
- Failure of multiple organ systems
  ✓ > 80 yrs & need for RRT
  ✓ > 65 yrs & SOFA > 15: very poor prognosis