Transfer to ICU: hematological malignancies and intensive care support

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ICU Mantra

I will come for consultation, but there is nothing to manage, patients with hematological malignancies all die.
History: ICU mortality

- 1988: n=60: 79%
  Lloyd-Thomas et al BMJ 296:1025

- 1989: n=40 (pneumonia): 98%
  Denardo et al Crit Care Med 17(1):4

- 1993: 2=28: ventilated patients: 96%
  Paz et al Chest 104:527
IC support: hematological malignancies

- Does it make sense?
  - Which patients?
    - Prognostic factors?
      - Time of admission?
        - For how long?
          - Goal of treatment?
            - Time of discharge?
              - When to withdraw support?
                - ...........and so on ........
Incidence of hematological malignancies in The Netherlands

![Incidence chart showing numbers for different years and types of hematological malignancies.](chart.png)
Swedish cancer registry group: 5-years survival of AML

Decreasing ICU mortality: 35-60%

- **2009:**
  n= 3147 patients, 198 ICUs in European countries
  Taccone et al Critical Care 13(1):R15

- **2009:** ICNARC data (1995-2007):
  n=7689 admissions in 178 UK ICUs
  Hampshire et al Critical Care 13: R137

- **2012:** cancer ICU (2004-2009):
  n=199 patients
  Bird et al Brit Journal of Anaesthesia 108(3):452
Trends in survival of hematological malignancies in the Netherlands

Years of diagnosis

Survivors

- **AML**
  - 1-year
  - 3-years
  - 5-years
  - 10-years

- **MM**
  - 1-year
  - 3-years
  - 5-years
  - 10-years

- **CML**
  - 1-year
  - 3-years
  - 5-years
  - 10-years

- **CLL**
  - 1-year
  - 3-years
  - 5-years
  - 10-years

[Graphs showing survival rates for each type of hematological malignancy over different years from 1989 to 2011]
Indications for ICU admission

- Cancer-related
  (critical organ infiltration)

- Treatment-related
  (sepsis, drug toxicity)

- Co-morbid illnesses
  (kidney disease, heart failure, COPD)
## Reason for ICU admission [n (%)]

<table>
<thead>
<tr>
<th>Reason</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>67</td>
<td>33.7</td>
</tr>
<tr>
<td>Cardiac</td>
<td>14</td>
<td>7.0</td>
</tr>
<tr>
<td>Renal</td>
<td>16</td>
<td>8.0</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>6</td>
<td>3.0</td>
</tr>
<tr>
<td>Neurology</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Postoperative</td>
<td>40</td>
<td>20.1</td>
</tr>
<tr>
<td>Sepsis</td>
<td>42</td>
<td>21.1</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td>3.0</td>
</tr>
</tbody>
</table>
### Organ support on ICU [n (%)]

<table>
<thead>
<tr>
<th>Treatment</th>
<th>n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive mechanical ventilation</td>
<td>95</td>
<td>51.9</td>
</tr>
<tr>
<td>Renal replacement therapy</td>
<td>79</td>
<td>40.9</td>
</tr>
<tr>
<td>Vasopressors</td>
<td>87</td>
<td>51.5</td>
</tr>
<tr>
<td>Inotropes</td>
<td>13</td>
<td>8.1</td>
</tr>
</tbody>
</table>
Australian retrospective study (1999-2010, n=505): newly diagnosed AML patients admitted to the ICU during chemotherapy

83 patients (16.4%); 92 admissions

Jackson et al., Leukemia & Lymphoma, January 2014; 55(1): 97–104
French multicenter study (1997-2004, n=1753 patients, n=28 ICUs): ICU mortality related to the number of organ failures

Organ failures:
- hematological (neutropenia)
- renal (replacement therapy)
- respiratory (invasive ventilation)
- cardiovasculair (vasopressor use)
- neurological (coma)
French prospective study of cancer patients (n=188; hematological malignancies n=132): changes in organ dysfunction scores at ICU

Variables predictive for in-hospital mortality in multivariate analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive mechanical ventilation</td>
<td>3.03</td>
<td>1.33 – 6.90</td>
</tr>
<tr>
<td>Failure of ≥2 organ systems</td>
<td>5.62</td>
<td>2.30 – 13.70</td>
</tr>
</tbody>
</table>

Neutropenia, transplantation status and APACHE II score were not predictive

Bird et al Brit Journal of Anaesthesia 108(3):452
Australian retrospective study (1999-2010): long-term outcome of newly diagnosed AML patients admitted to ICU during chemotherapy

350 patients received 578 chemotherapy cycles

Jackson et al., Leukemia & Lymphoma, January 2014; 55(1): 97–104
Spanish prospective observational study (June 2007-September 2008); n=62): prognostic factors after ICU discharge

ECOG score at discharge

Pre-planned treatment

Bernal et al. Critical Care 2013, 17:R302 ; ECOG: Eastern Cooperative Oncology Group
Dutch retrospective study (2008-2010): Health related quality of life (HRQoL) of patients with hematological malignancies: 18 months after ICU discharge

responders of questionary: n=269
Mortality by clinical condition estimated by the intensivist at triage

Too well, n=47
20%

Too sick, n=54
75%

ICU admission, n=105
45%

Log-rank $P < .0001$

Time (days) After the ICU Admission Request

Thiéry et al. JCO 2005;23:4406-4413
Mortality by survival time estimated by the intensivist at triage

Thiéry et al. JCO 2005;23:4406-4413
French retrospective study (1998-2008): newly diagnosed AML without organ failure

Early-ICU = admission at presentation; Late-ICU = admission from hematological ward

French prospective study (2005-2007): survival of cancer patients according to time between respiratory symptoms onset and ICU admission

84% of the patients had hematological malignancies

Mokart et al. Leukemia & Lymphoma, August 2013; 54(8): 1724–1729
Cancer patients admitted to ICU: (2010): outcomes between early- (n=100; ≤ 1.5h) and late-intervention (n=99; > 1.5h) groups

<table>
<thead>
<tr>
<th></th>
<th>Early intervention % (n)</th>
<th>Late intervention % (n)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICU mortality</td>
<td>10 (10)</td>
<td>52 (51)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>32 (32)</td>
<td>73 (72)</td>
<td>&lt; 0.001</td>
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</table>

n=95 hematological malignancies; n=104 solid tumors

Medical emergency team strategy:
1. Call for help using a score system
2. <10 minutes arrival
3. <30 minutes assessment and treatment plan

Some truths about cancer patients needing ICU support

• Short-term survival after critical illness has improved

• Subgroups of patients continue to have high mortality

• 3-days of ICU-trial is warranted before making a final decision.

• Early admission to ICU is recommended.

• A balance between noninvasive treatments and avoiding delays in optimal therapies should be made

• Close collaboration need to be developed between intensivists and hematologists in the management of patients.

ICU advances in the management of critically ill cancer patients

- Less restrictive admission policies
- Use of noninvasive mechanical ventilation
- Diagnostic strategy in acute respiratory failure
- Management of acute kidney injury
- Advances in antifungal agents
- Recognizing drug-related organ toxicities
Treatment decision model: hematological malignancies and ICU support

HOVON and Netherlands Society of Intensive Care

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  M. van Vliet, nurse-specialist Radboudumc Nijmegen
  Dr. D.J. van Westerloo, intensivist LUMC Leiden

Acknowledgements: workgroup hemato-oncological malignancies and ICU support