

Haematological patients in the ICU 2018-2022

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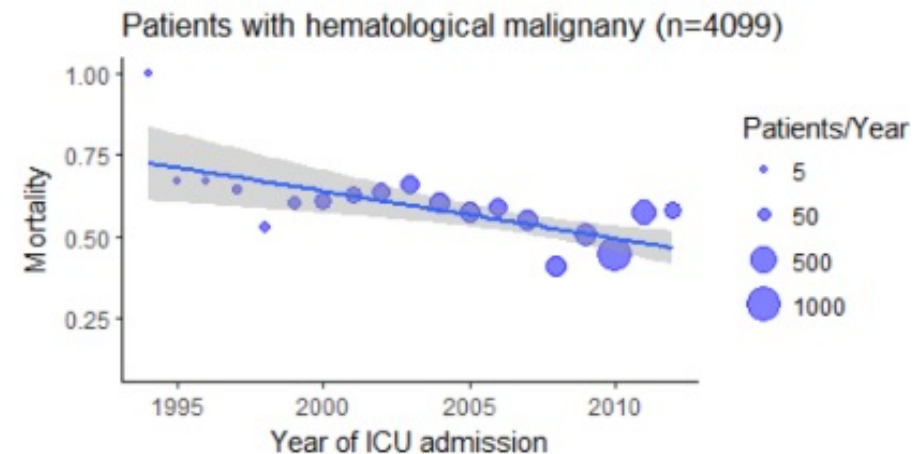
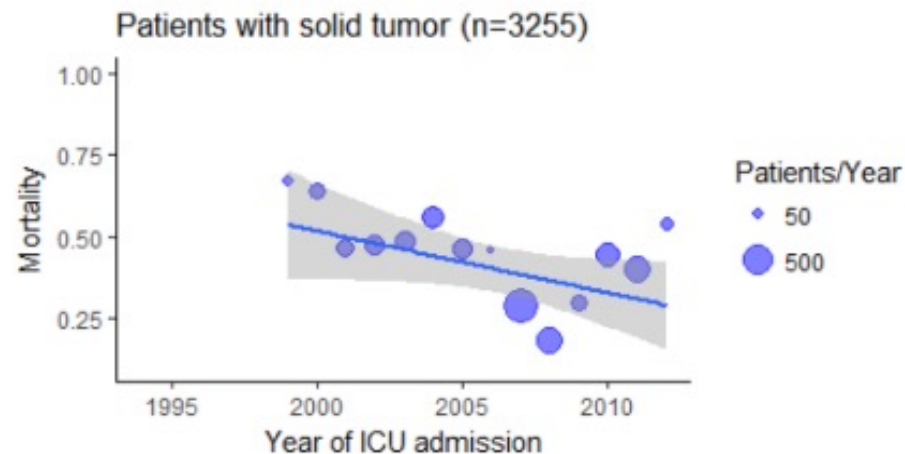
Importance of the topic

- Cancer is the 2nd most common cause of death
- Haematological malignancies - no longer incurable fatal diseases
- Role of intensive care in the treatment of these patients?



Intensive care in cancer patients' population

- Mortality of critically ill cancer patients has substantially decreased over the last 20 years





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Aim of the study

To describe the population of the ICU patients with haematological malignancies at Tartu University Hospital

- Demographics
- ICU outcomes
- Risk factors for mortality

Primary study outcome:

- ICU mortality

Secondary study outcomes:

- Hospital mortality
- One-year mortality



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Study cohort

Adult patients treated in five years, from 01.01.2018 to 31.12.2022

- Haematology department + ICU visit during one hospital stay
- Other haematological patients requiring intensive care

Diagnoses C81-C96 and D45-47

- Malignant haematologic neoplasms

Retrospective data collection from electronic health records and case charts

151 patients, 164 ICU admissions

Diagnoses

ICD-10 codes	Diagnosis	No of pt	%
C83.3; C83.5; C83.7	Aggressive non-Hodgkin's lymphoma	31	20.5%
C92.0; C92.5; C93.0; C94.0; C94.2; C95.0	Acute myeloid leukemia	20	13.2%
C90.0	Multiple myeloma	19	12.6%
C91.1	Chronic lymphocytic leukemia	19	12.6%
	Others	19	12.6%
C93.1; D45; D47.1; D47.3	Chronic myeloproliferative neoplasms	11	7.3%
C81	Hodgkin's lymphoma	7	4.6%
D46	Myelodysplastic syndromes	7	4.6%
C82; C83.0	Indolent non-Hodgkin's lymphoma	6	4.0%
C84.2-C84.5	Peripheral T-cell lymphoma	4	2.6%
C91.0	Acute lymphocytic leukemia	3	2.0%
C92.1	Chronic myeloid leukemia	3	2.0%
C92.4	Acute promyelocytic leukemia	2	1.3%

Demographics

		No of pt	%	Median	Min	Max
Sex	Male	92	60.9%			
	Female	59	39.1%			
Age				66	21	92
Concomitant chronic heart failure?	Yes	59	39.1%			
Concomitant chronic lung disease?	Yes	25	16.6%			
Concomitant chronic kidney dysfunction?	Yes	44	29.1%			
Concomitant diabetes?	Yes	31	20.5%			

Reasons for ICU admission

Lead reason for ICU hospitalization	No of pt	%
Shock	56	37.1%
Respiratory failure	48	31.8%
Impaired consciousness	10	6.6%
Kidney failure	5	3.3%
Hypotension	3	2.0%
Other	29	19.2%

	Median	Percentile 25	Percentile 75	No of pt
APACHE II	28.00	22.00	33.50	120/151
SOFA	7.00	4.00	10.00	124/151

Neutropenia at admission

	No of pt	%
No neutropenia	72	64.3
Mild neutropenia ($1-1.5 \times 10^9/L$)	5	4.5
Moderate neutropenia ($0.5-1 \times 10^9/L$)	5	4.5
Severe neutropenia ($<0.5 \times 10^9/L$)	30	26.8
Total	112	100.0

Granulocyte colony-stimulating factor use in ICU	No of pt	%
Yes	31/151	20.5%

Infection in the ICU

	No of pt	%
Sepsis at admission	100/151	66.2%
Septic shock at admission	60/151	39.7%
Source of sepsis		
Respiratory tract	52	51.0%
Unknown	16	15.7%
GI tract	15	14.7%
Bloodstream	7	6.9%
Soft tissues	5	4.9%
Urinary tract	3	2.9%
Other	3	2.9%
CNS	1	1.0%

- 15/151 patients had COVID-19 infection

Treatments

	No of pt	%
Vasopressors during first 24h	100	66.2%
Acute respiratory failure diagnosis in ICU	113	74.8%
Maximal respiratory support in ICU		
	Room air	3 2.0%
	Simple oxygen	38 25.2%
	High flow nasal cannula	20 13.2%
	Noninvasive ventilation	11 7.3%
	Invasive ventilation	79 52.3%
Invasive mechanical ventilation during first 24h	72	47.7%
Tracheostomy	13	8.6%
Acute kidney failure diagnosis in ICU	98	64.9%
Renal replacement therapy in ICU	42	27.8%
Extracorporeal membranous oxygenation	2	1.3%



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Limitations of care

In 41/151 patients (27,2%), a decision on limitation of care was made during ICU stay

- Do not resuscitate – 29/151 (19,2%)
- Do not intubate – 14/151 (9,3%)
- Other limitations of care – 37/151 (24,5%)



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Length of stay

Days in the hospital before admission to ICU – median 0 (IQR 0-8)

Median ICU LOS 4 days (IQR 1-9), max 60 days

Long-stayers (ICU LOS >7 days) 43 patients (28,5%)

Readmission to ICU 10 patients (6,6%)



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Outcomes

ICU mortality 33,8% (51/151)

Hospital mortality 41,1% (62/151)

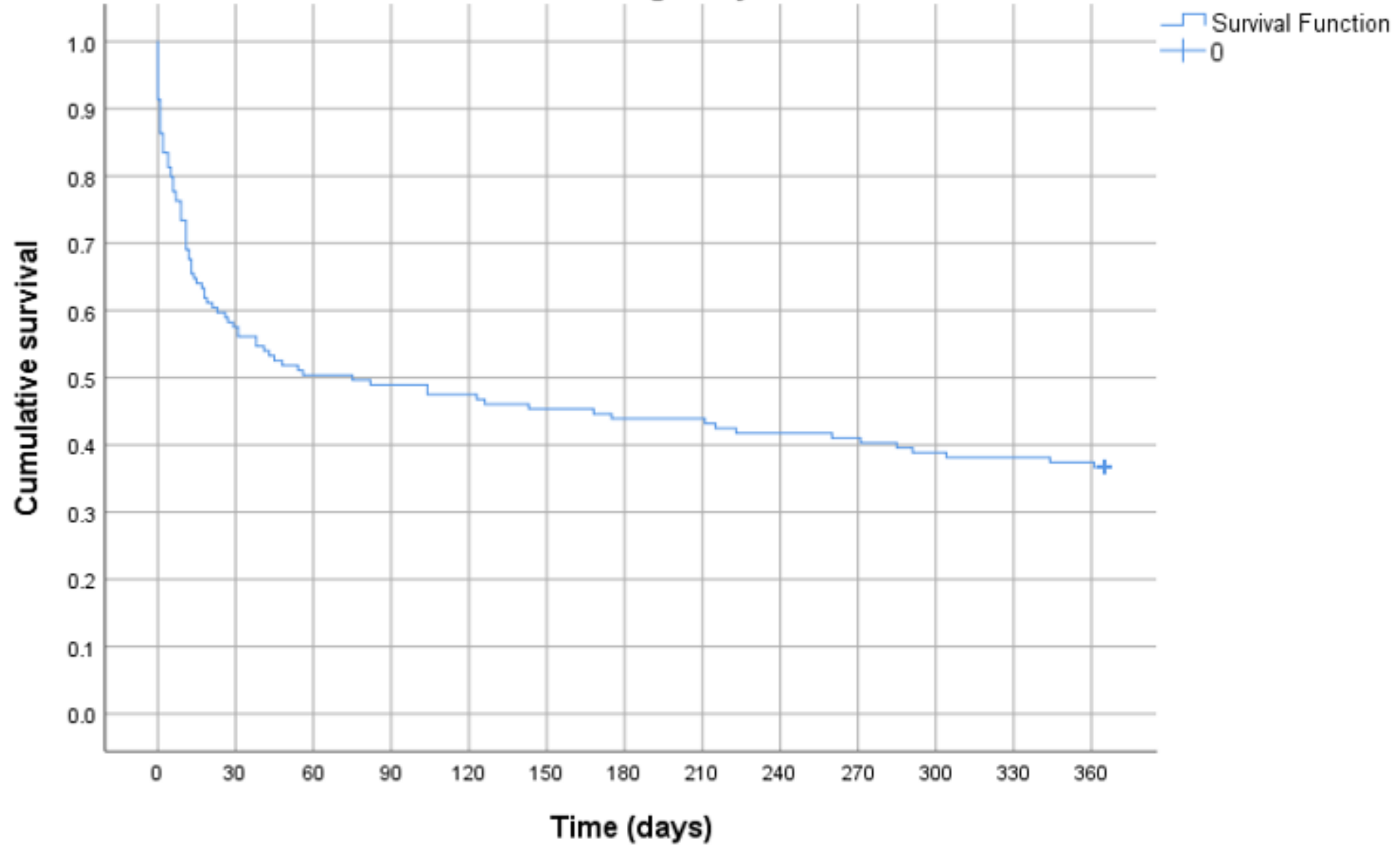
One year mortality 63,3% (88/139)

Similar results for ICU long-stayers!

- ICU mortality 34,9% (15/43)
- Hospital mortality 41,9% (18/43)
- One year mortality 61,0% (25/41)

Study	N	Years	Country	ICU mortality	Hospital mortality	1y mortality
Hampshire et al.	7689	1995-2007	UK	43,1%	59,2%	NA
Bird et al.	199	2004-2009	UK	33,7%	45,7%	NA
Azoulay et al.	1011	2010-2011	France, Belgium	NA	39,3%	43,3%
Maqsood et al.	213	2010-2015	Pakistan	55,9%	62,5%	84,6%
Al-Zubaidi et al.	130	2012-2014	US	24,8%	45,3%	NA
De Vries et al.	1097	2002-2015	Netherlands	NA	NA	62%
Ferreyro et al.	12 247	2006-2017	Canada	19,9%	31,0%	51,8%
Kalicińska E et al.	200	2010-2019	Poland	70,4%	80,6%	NA
Nurk et al.	151	2018-2022	Estonia	33,8%	41,1%	63,3%*

Survival during one year after ICU admission



Risk factors of mortality

Multivariate regression analysis

Significant independent factors predicting ICU mortality:

- Low pH, high lactate, high SOFA, need for vasopressors during the first day
- Invasive mechanical ventilation during the ICU stay a protective factor?

	P-value	OR	95% C.I. for OR	
			Lower	Upper
Vasopressors during first 24h	0.014	6.259	1.457	26.889
Max respiratory support IMV	0.033	0.294	0.096	0.906
pH at admission	0.049	0.011	0.000	0.982
Lactate at admission	0.045	1.211	1.004	1.462
SOFA on admission day	0.000	1.491	1.202	1.851



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Comparison with ICU/haematology total cohort

During 2018-2022

6686 adult patient cases in ICUs, 164 with HM – **2,5%**

8854 adult cases in haematology and bone marrow transplantation department - **1,9%** needed ICU treatment

Overall adult mortality in ICU cohort 2018-2022

- ICU mortality 13,3% (17,3%)
- Hospital mortality 16,0% (21,0%)

Adult HM patients' mortality

- ICU mortality 33,8%
- Hospital mortality 41,1%



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Conclusions

- **Sepsis**, often associated with ≥ 1 organ failure, is the primary reason for ICU admission in patients with hematological malignancies
- Admission to ICU is **not a universally fatal event** for patients with haematological malignancies – 36,7% of patients are still alive one year after intensive care
- Long stayers (>7d) in the ICU have equal chance for survival
- The presence of a hematological malignancy should not limit access to intensive care