Welche Strukturen brauchen wir in der Intensivmedizin ?

A. Valentin



Allgemeine u. Internist. Intensivstation 12A Rudolfstiftung, Wien andreas.valentin@wienkav.at



Themen

- Strukturen f
 ür welche Entwicklung ?
- Strukturen für welche Ziele ?
- Strukturen auf verschiedenen Ebenen
 - Station
 - Krankenhaus
 - Region
- Besondere Problembereiche



Abnormal vital signs are associated with an increased risk for critical events in US veteran inpatients

Lighthall GK, Resuscitation 2009

	Patients	Critical events in this group
Abnormal vital signs	16%	35%
Normal vital signs	84%	2.5%



1

Verschiebung der Alterspyramide, EU-27



Quelle: EUROSTAT 2009

Projected incidence of mechanical ventilation in Ontario to 2026: Preparing for the aging baby boomers Needham DM, Crit Care Med 2005



Year

Very old patients admitted to intensive care in Australia and New Zealand: a multi-centre cohort analysis Bagshaw SM, Crit Care 2009

57 ICUs; Pts with age ≥ 80; Increase 5.6% per year



Intensive Care of the elderly in Finland Reinikainen M, Acta Anaesthesiol 2007

1

79.361 admissions to 26 Finnish ICUs



Paradigmenwechsel im Krankenhaus

Patienten

- Multimorbid
- •Älter
- Komplexer
- Symptom überlagerung
- Schwerer Krank

Ärzte & Pflege

Spezialisiert



74 jähriger Pat. st.p AKE, PM, COPD, Hypertonie, IDDM, NI

SAPS 3 Score

Before ICU Admission

- -Previous Health Status
- -Age
- -Comorbidites
- -Location before ICU admission
- -Hospital LOS before ICU admission
- -Use of major therapeutic options before ICU

ICU Admission

- -Reasons for ICU admission
 -Planned or unplanned ICU admission
 -Anatomic site of surgery
- -Surgical status
- -Infection at ICU admission

Acute Physiology

- -Presence
- -Degree -Within 1h before or after ICU admission

Hospital Mortality

Impact of Previous Health Status



SAPS II





Herkunft von Intensivpatienten







Iatrogenic events contributed to 20% of all ICU admissions Mercier E, Int Care Med 2010

Arzneimittel		
	Chemotherapeutika und Immunsupressiva	15
	Medikamente mit Wirkung am ZNS	8
	Kardiovaskuläre Substanzen	8
	Anästhetika und Analgetika	6
	Orale Antikoagulantien	5
	Insulin u. endokrinologische Therapie	4
	Antiinflammatorische Substanzen	4
	Antibiotika und antivirale Medikamente	3
	Röntgenkontrastmittel	1
Komplikationen nach medizinischen u. chirurgischen		
Prozeduren		
	Komplikationen nach medizinischen Prozeduren	11
	Postoperative Infektionen	10
	Postoperative respiratorische Komplikationen	7
	Postoperativer hämorrhagischer Schock	5
	Verschiedene andere Komplikationen	5
Exzessive Verzögerung von Diagnose oder Behandlung		8
Nosokomiale Infektionen		
(exklusive nach chirurgischen Eingriffen)		

Intensivmedizin

- Knappe Resource
- Wirkt besonders bei frühzeitigem Einsatz
- Intensivmedizinische Kompetenz ist nicht
 Ortsgebunden sondern Personengebunden
- Problemorientierung statt Fachorientierung

Resource Limitations & Rationing Survey in 442 ICUs



Zielsetzungen

- Zeitgerechte intensivmedizinische Betreuung f
 ür jeden kritisch kranken Pat.
- Ausreichende Strukturqualität

 Räumlich; Personell; Infrastruktur
- Flexibilität f
 ür unterschiedliche Schweregrade
- Maximale Patientensicherheit
- Steuerung des Patientenflow
- Regionale Koordination

Analyse-Ebenen



Übersicht und Transparenz

esse 🗇 http://ribm4ail.wienkav.at/scripts/ribm.dil/catstatshort.htm?ribmMethod=ribmCatStat								
Hauptmenü		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
Übersicht	AKH	ICU-NFA				IMC-NFA	Stroke Unit	Unfall Schock
Operation		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schock
<u>UCU</u>	AUKHM			A 11 T 1011			070.0115	Schock
ICU ohne	RHR		ILU onne vivist.	ANAHCO	COL	IMG	Stroke	SCHOCK
VwSt.	Unio	ICU	ICU ohne VwSt.	ANĂ-ICU	CCU	IMC	STROKE	Schock
CCU	BHS				CCU			
IMC IMC		ICU	ICU ohne VwSt.	ANĂ-ICU	CCU	IMC	STROKE	Schook
STROKE	DSP	Station 552		Station 532			Neuro Stroke Unit	Schock
Schock		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
	ELIS			444 ⁷ 4844				
I <u>Neo</u>	E O	Interne Intensivet Int	ICU ohne Ywst.	ANA-ICU	660	IMC	STRUKE	Schock
Nur	<u></u>	ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
anfahrbare	HAN				CCU			Schock
Stationen		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
Nur KAV	KAR	2. Med. Intensiv 12A		Anästhesie- Intensiv		2. Med. Intermediärst	Stroke Unit	
		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
Legende	KES	Intensivistation 3/3, Int.	1011 alian bio 01	Intensivistation 3/3, anasth.	0.01	1. Med. Intensiv Uberw.	070045	Colorada
inaktiv offen	KE.I	1 Med Intensivat	ILU onne vvvst.	Anasth Intensivet	5 Med. CCU	4 Med Infektions Überw Stat	Neuro Stroke Linit	SCHOCK
gespent	<u>tu v</u>	ICU	ICU ohne VwSt.	ANĂ-ICU	CCU	IMC	STROKE	Schook
Aviso		4 Med Intercipted Destroying			2 Mod Intercented Ethney	1. Med. Überwachung		
Vorw.Stufe	KHR	3 Med. Intensivst., Beatmung		Anästhesie IBST 1	4. Med. Intensivistation, Überwachung	2. Chir. Überw.st. 2.C	Neuro Stroke Unit	
AVISO-VWSL				4117 1011		2. Med. Uberw. stat		
		100	ICU ohne Vvvst.	ANA-ICU	660	IMC	A4 Stroke Linit	Schock
	NZR		Neurointensiv A.2			85 Neuro. Intermediär	B5 Stroke Unit	
		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schock
	<u>ows</u>		Intensivstation				Stroke Unit	
		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schook
	MBOH	1011	1011 - 1	4117 1011		14.0	emour	Schock
	WIGÖH	Intensivistation	icu onne vivist.	ANA-ICU	ccu	IMC	Stroke Unit	SCHOCK
		ICU	ICU ohne VwSt.	ANĂ-ICU	ccu	IMC	STROKE	Schock
	14.01	2 Mari Harristanski Bashruna	Tovikal Interatio	Anästh, Intensiv	2 Mad Hamintanaki Ühanisaskung		N. Choko Linit Day 20	Cohoolhott
	<u>vvii.</u>	Stated Herbildensik, besending	TOXIKUL INTENSIV	Oper. Intensivstat	3. med. Herzmensik, oberwachono		IN OTORE UTILITIAY, 20	Schockben

Hospital volume and the outcomes of mechanical ventilation. Kahn JM, NEJM 2006



250

350

Annualized Hospital Volume

450

650

550

0.6-

0.4-

0.2-

0.0

0

50

150

	ICU mortality
pts/yr	reduction
87-150	
151-275	25%
276-400	33%
401-617	37%

	Hospital mortality
pts/yr	reduction
87-150	
151-275	14%
276-400	28%
401-617	34%

Analyse-Ebenen



Recommendations on basic requirements for Intensive Care Units

Structural and Organisational Aspects

Andreas Valentin & Patrick Ferdinande on behalf of the ESICM working group on Quality Improvment



Structure of the paper

- A. Operational Guidelines
- I. Definition and objectives of an Intensive Care Unit
- **II.Functional Criteria**
- **III.Activity criteria**
- **IV.Management of equipment**

B. Design recommendations I.Planning team II.Floorplan + Connections III.Accomodation IV.Fire safety V.Central services VI.Communications

Operational Guidelines Examples

- Size: minimum 6 beds, optimum 8-12 beds
- Medical staff: 24h coverage
- Nursing staff: according to level of care

LOC	Nurse/patient ratio	Nursing FTE per ICU bed
III	1/1	6
II.	1/2	3
	1/3	2

 The choice to organize a mixed ICU/HDU or rather to opt for two separate units (ICU and HDU) can be made baring in mind the following considerations:

Essentials of an ICU service

- Adequate equipment
- Competent staff
- Predefined procedures and treatment concepts
- Organisation
- Information transfer, communication
- 24-hour availability of diagnostic services & therapeutic interventions
- 24-hour availability of consultant services (other specialities)
- Management structures

Design recommendations Examples

- Area for patient care
 - Single rooms: 25m²
 - Common rooms: 20m² per bed
 - Traffic area beyond the bed area 2.5 m
- Isolation rooms: 1-2 per 10 beds
- Central nursing station
 - Special procedures / therapy room
 - Storage area for consumables: 5m² per bed
 - Offices, staff lounge, physician on call bedroom(s)
 - Labaratory: 15m²
 - Relatives' rooms
 - Conference room: 40m² per bed

Unzugängliche Box



Der Prozess Intensivmedizin







Intensive Care is a time-dependent process



- Golden hour
- Early treatment
- Rapid Response
- Continuity
- 24h/7d

Sebat F, Crit Care Med 2007 A focus on high-risk patients (shock)



The course of critical illness

<∭



Angus DC, adapted from Cook D; Intensive Care Med (2003)

First documented rhythm and clinical outcome from in-hospital cardiac arrest among children and adults. Nadkarni VM, JAMA 2006

1

253 US and Canadian hospitals Adult cardiac arrest (n = 36.902)

	Conditions before cardiac arrest			
		%		
•	Respiratory Insufficency	40		
•	Arrhythmia	32		
•	Renal insufficiency	31		
•	Hypotension and hypoperfusion	27		
•	Metabolic and electrolyte abnormality	18		
•	Baseline depression in CNS function	13		



n=23.097 Patients at risk ?

Young L, Resuscitation 2008

Primary reason for MET call		
Systolic pressure < 90	180	28.4%
Worried	142	22.4%
Decrease in GCS > 2	102	16.1%
Pulse rate > 140	65	10.3%
Respiratory rate > 36	53	8.4%
Cardiac arrest	33	5.2%
Repeated/prolonged seizure	26	4.1%
Pulse rate < 40	20	3.2%
Respiratory arrest	5	0.8%
Respiratory rate <5	4	0.6%
Airway threatened	3	0.5%

23% within 24h after ICU discharge



ICU discharge criteria

Negative discharge criteria

- Acute shortness of ICU beds
- Planned admissions, but full ICU
- Triage: the patient with the lowest risk
- Futility

SOAP STUDY

(Vincent JL, Crit Care Med 2006)





Proportionale Post-ICU Mortalität





ICU vs. Post ICU Mortality: Distribution (%) by <u>risk of death</u> (SAPS II)



Versorgungsqualität Anspruch und Wirklichkeit



Falscher Zeitpunkt, inadäquate Struktur?

Patientenflow



Eingang sollte immer offen sein ! Die Engstelle kommt am Ausgang !

Patientenflow



Fazit

- Intensivmedizin als Basis und Sicherheitsnetz moderner Krankenhäuser
- Zunehmender Bedarf
- Flexible Organisationsstrukturen Intensivmedizinische Kompetenz außerhalb der ICU
- Intensivmedizin benötigt nicht nur ausreichende Ressourcen sondern Steuerungsinstrumente für den gesamten Betreuungsprozess von kritisch kranken Patienten.
- Ziel: eine integrierte innerklinische Notfallmedizin und Intensivmedizin