

Clinical Use of a Patient Data Management System

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Department of Intensive Care Medicine

Clinical Use of a PDMS

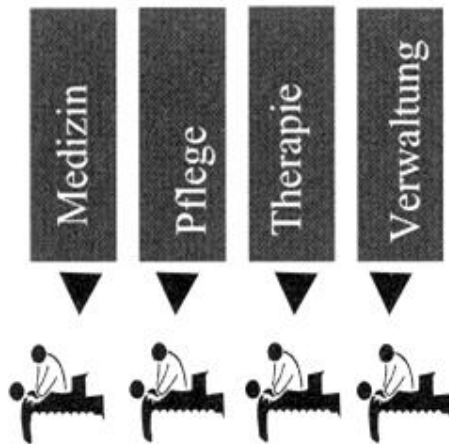
- General background: ICT in health care
- Using the PDMS in my daily practice
- Lessons learnt and wish list



The 180°- Shift *(from disease- to patient-centred care)*

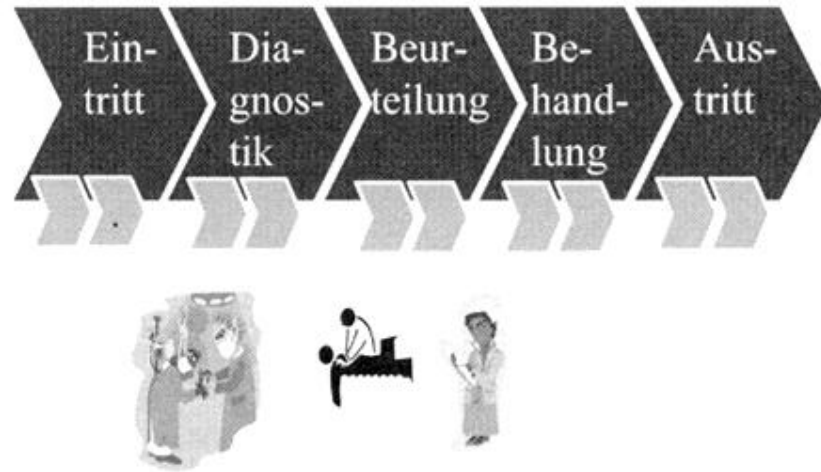
Traditionell

Denken und Handeln in Funktionen
(Pflege, Ärzte, Physiotherapie,
Administration, ...)



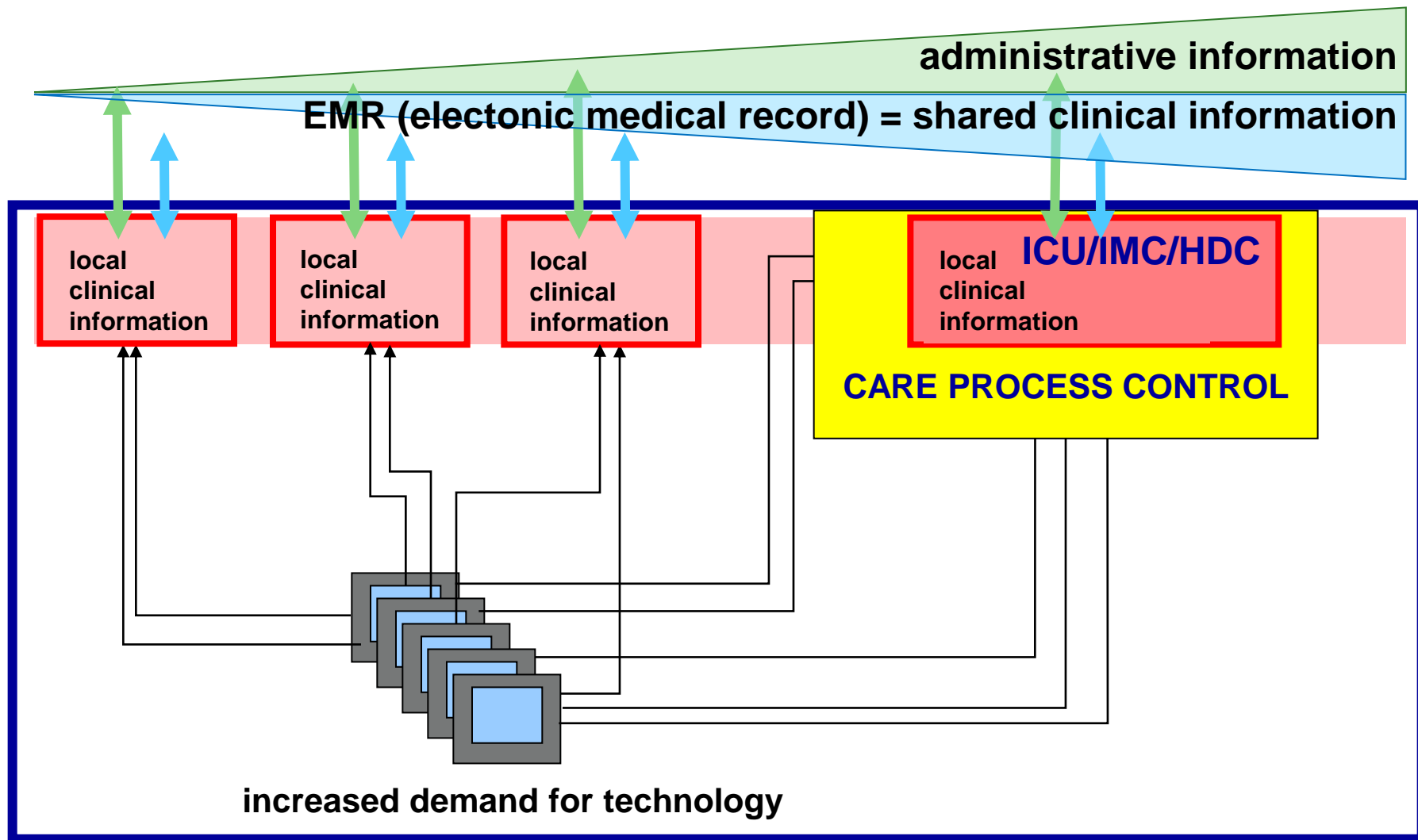
Prozess-Basiert

Denken und Handeln in Prozessen
(Patient und sein Weg
durch das Spital)



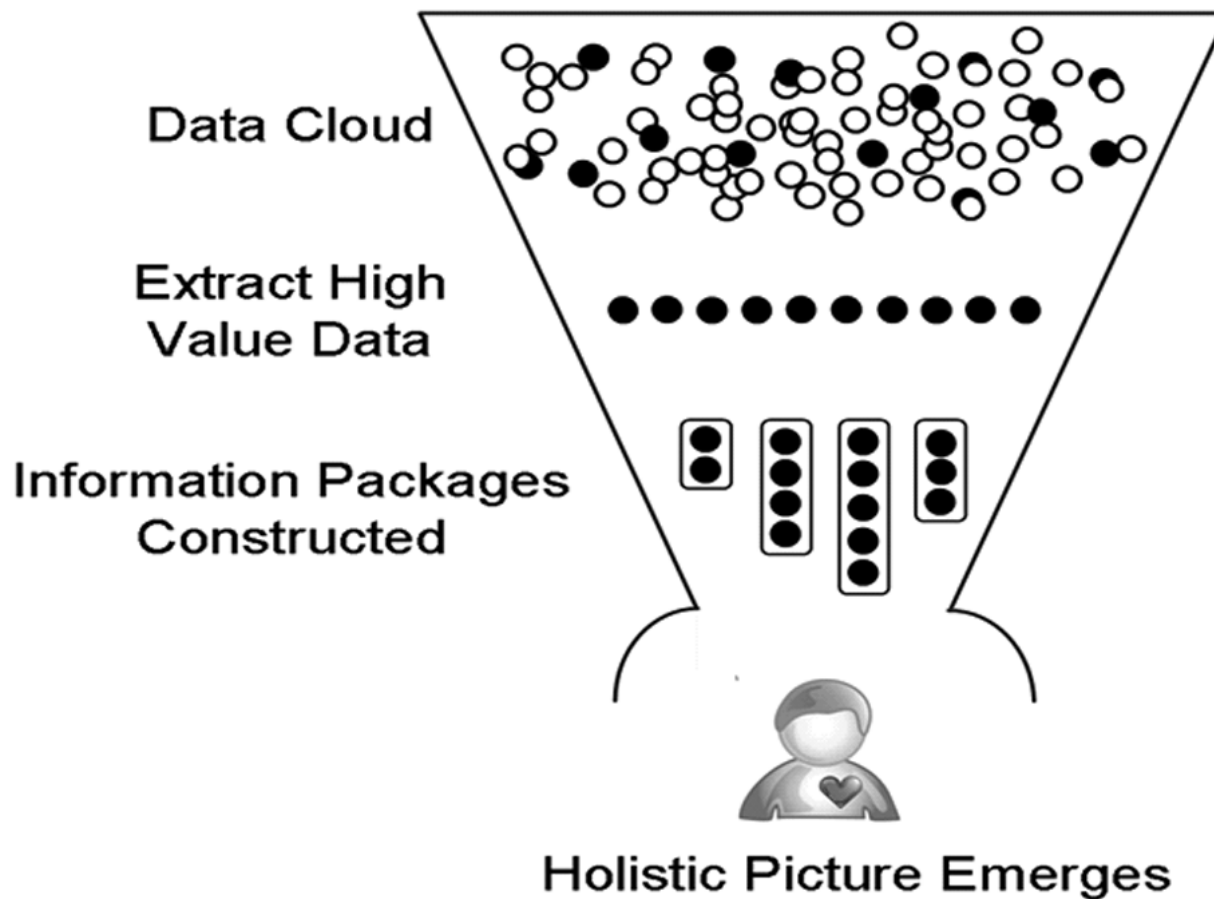
Etienne M. TQM-Leitfaden für Spitäler, 2005:49

The 180°- Shift is also true for ICT!



Modified from J. Takala, Bern

From a data cloud to consistent delivery of care

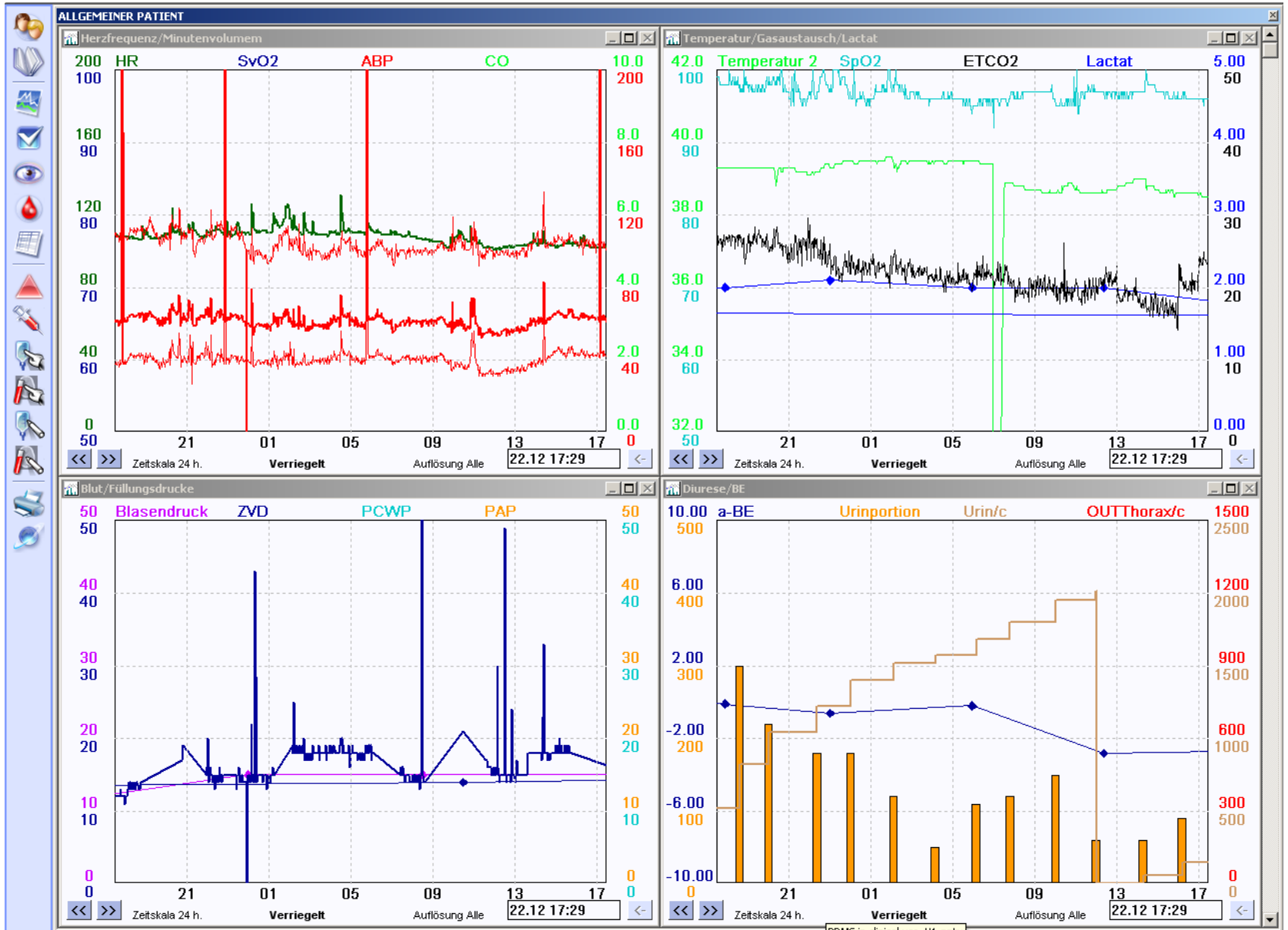


Pickering BW et al. Crit Care 2012 16:220

Clinical Use of a PDMS

- General background: ICT in health care
- Using the PDMS in my daily practice
 - Patient management
 - Daily management of the ICU
 - Strategic management of the ICU
- Lessons learnt and wish list





Computerized physician order entry: Pro

- Before-afer study
- Mixed adult ICU (tertiary academic center)
- Computerized decision support for red cell (RBC) transfusion in critically ill adults

Red Blood Cell Product Order Detail

Order Name: Red Blood Cell Product

Clinic Number: *

Indication*

INDICATION RBC [9116]

Adult ICU (+)

Other Locations (+)

Adult ICU [9116]

Hgb <= 7 g/dL

Hgb > 7 or unknown (+)

Hgb > 7 or unknown [9116]

Active Bleeding

Peripheral Ischemia - coronary, periph vascular, cerebrovascular

Symptomatic Anemia - confusion, angina, tachycardia, hypotension

Early Septic Shock - (within 12h from the onset)

Other, specify:

Do any of the following apply to this patient?

Needs Irradiated Products

Needs CMV Safe Products

Needs Leukocyte Reduced Products

Requester

Consultant

Ordered By

Call Back Pager

Alternate Pager #

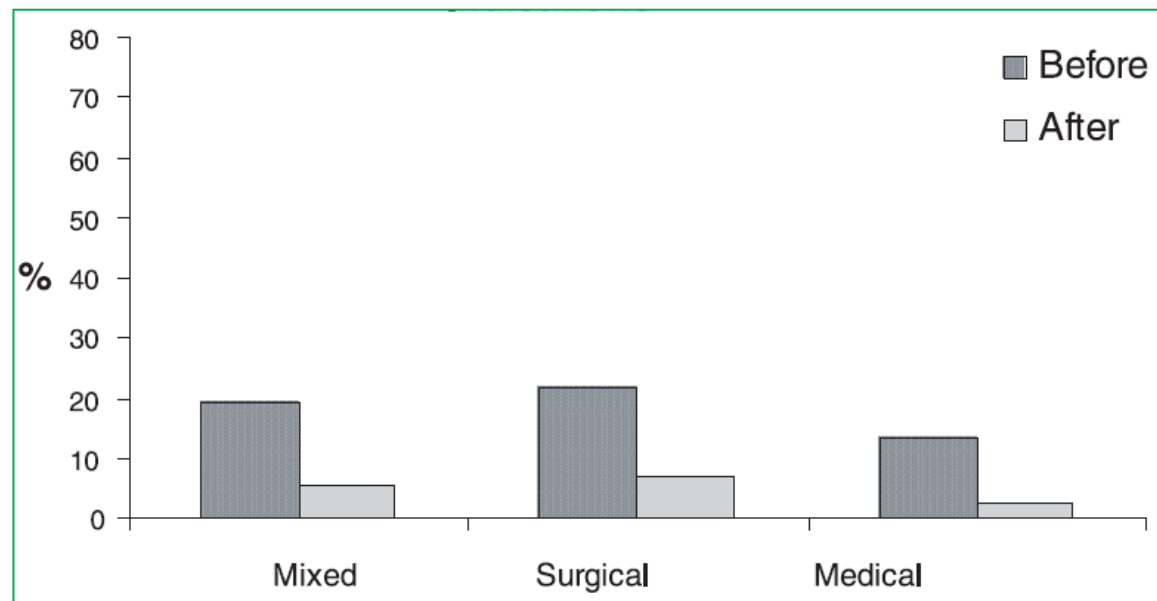
Issue Order

Cancel Order

Rana R et al. Crit Care Med 2006, 34:1892-7

Computerized physician order entry: Pro

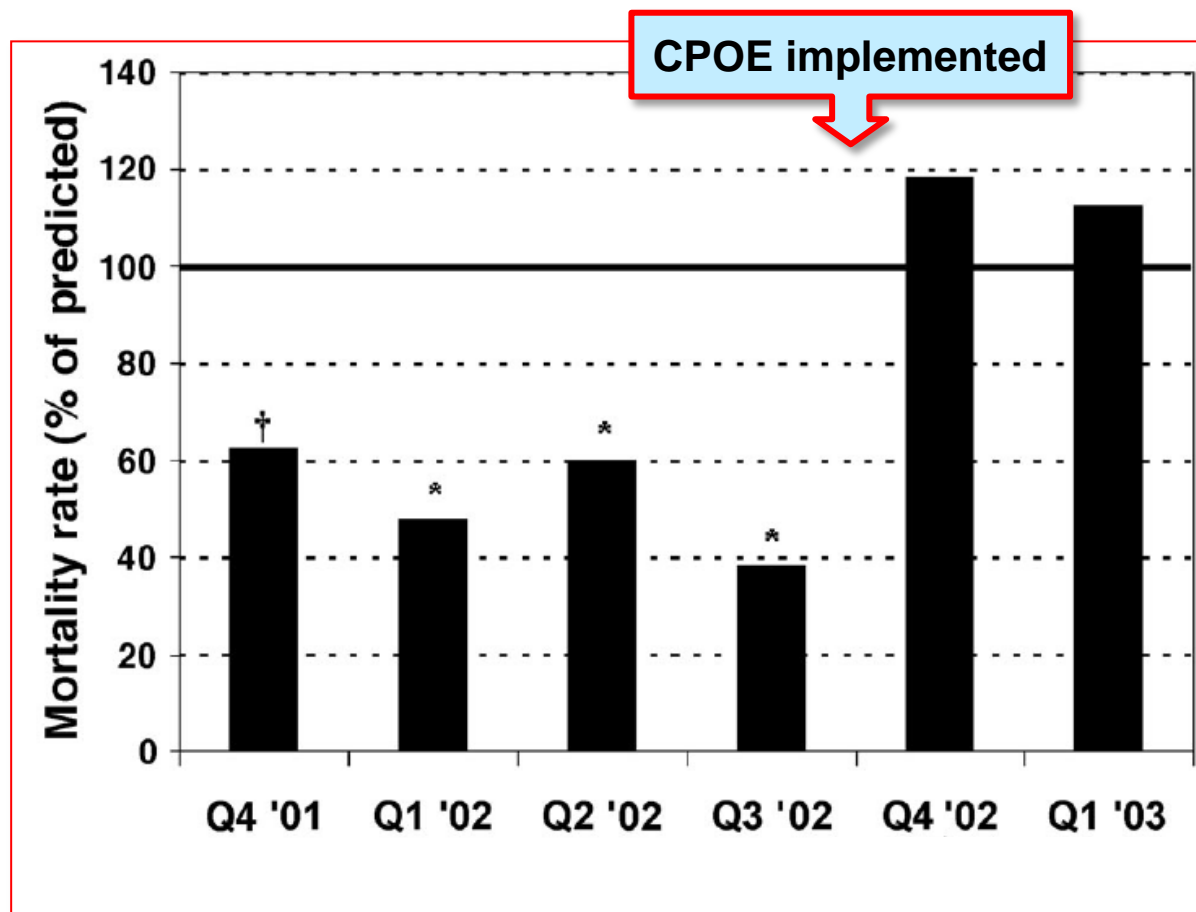
- Reduction in the use of RBC
- Presumably a **combined effect** of
 - Education
 - Protocol
 - Decision support
 - CPOE (forcing functions)



Rana R et al. Crit Care Med 2006, 34:1892-7

Computerized physician order entry: Con

- Introduction of CPOE
- Tertiary care level children's hospital



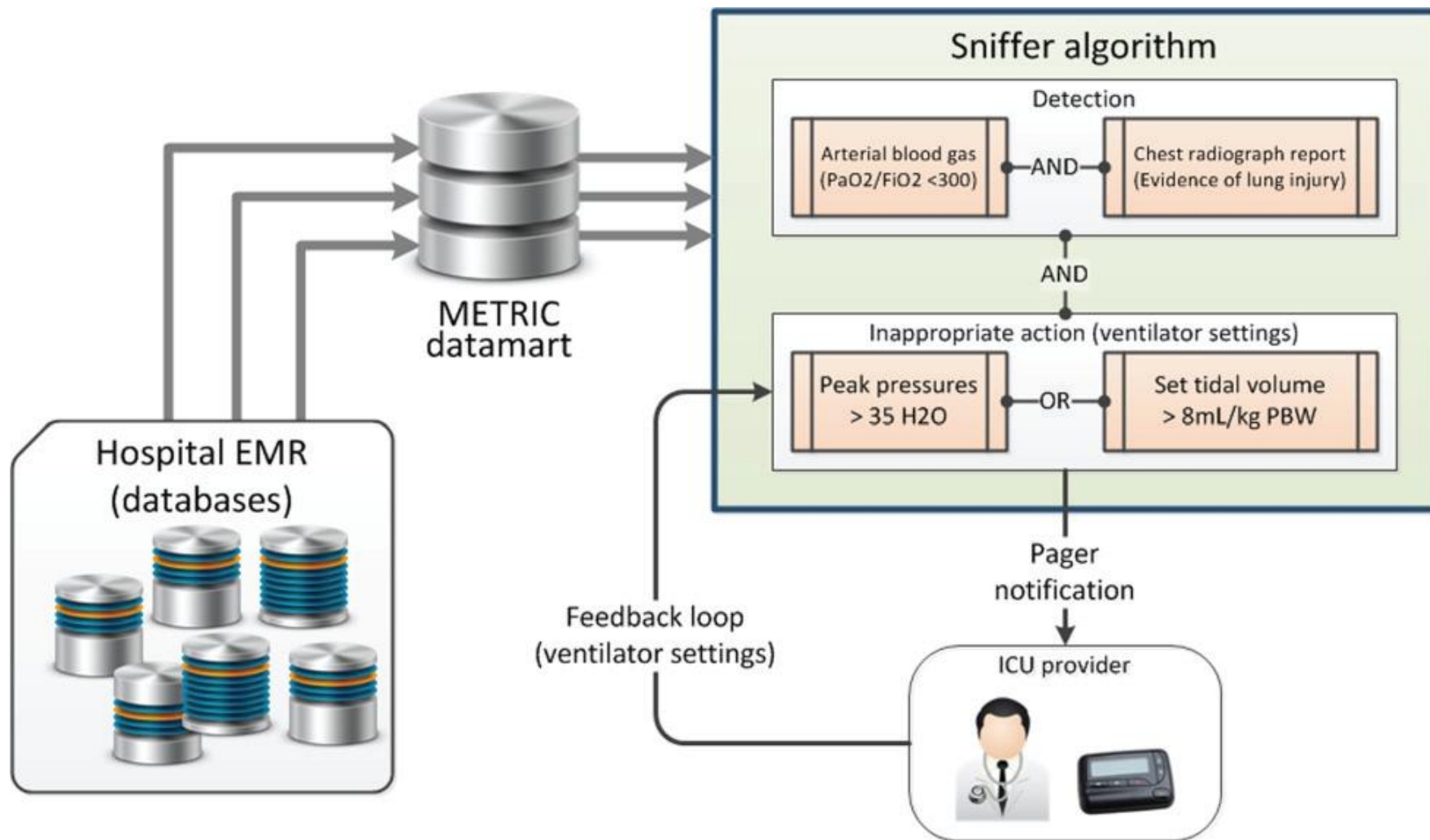
Han YY et al. Pediatrics 2005, 116:1506-12

Computerized physician order entry: Con

- Introduction of CPOE
- Tertiary care level children's hospita
- Possible causes of increased mortality
 - **Additional time to enter orders** in CPOE
 - **More time spent upfront** (→ reduced time at bedside)
 - Physicians
 - Nurses
 - **Delays** in administration of critical medication
 - Due to centralisation of pharmacy services
 - General clinical **application program suboptimal** for ICU
- But
 - Association is **not** necessarily cause-and-effect relationship!

Han YY et al. Pediatrics 2005, 116:1506-12

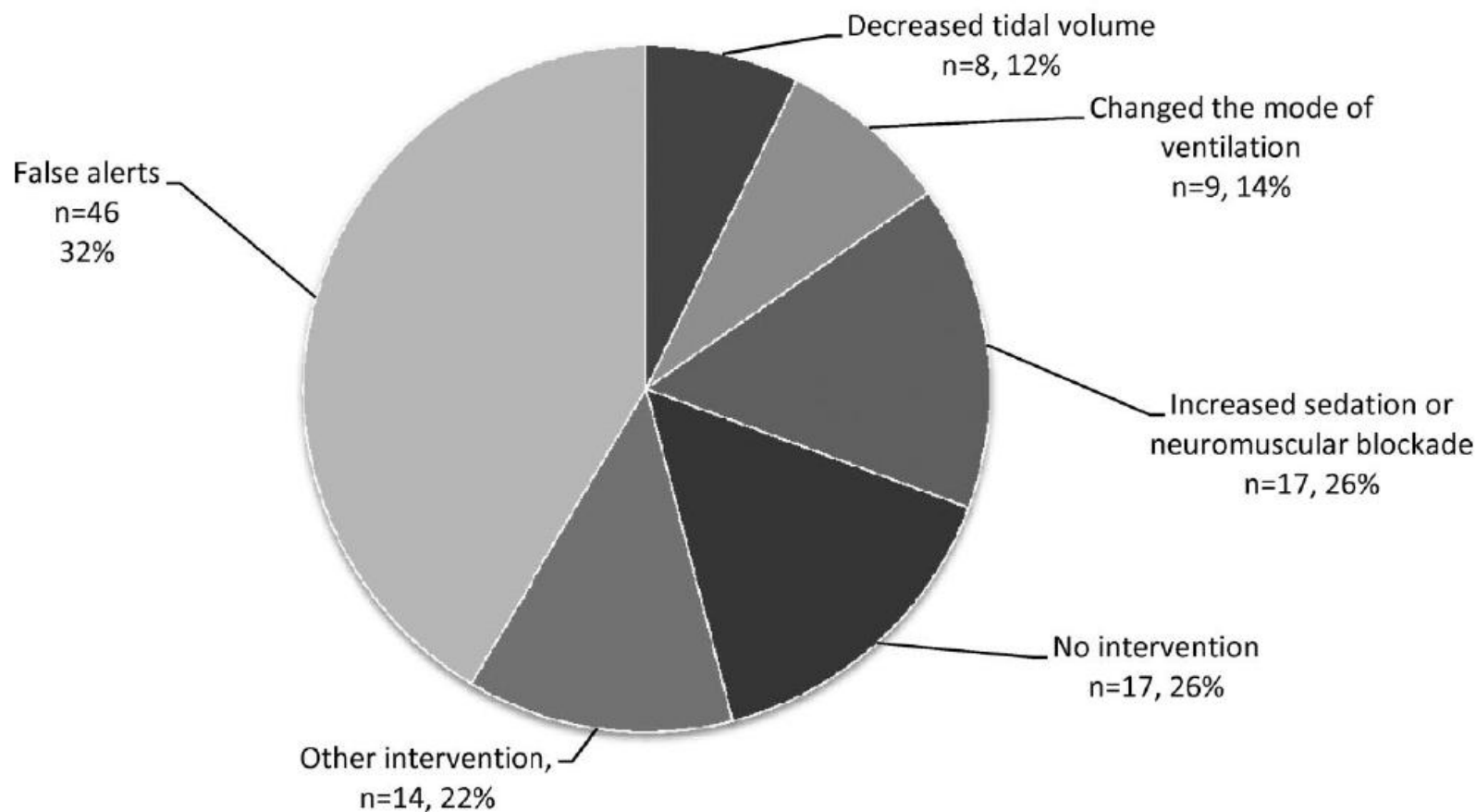
„Smart Alarm“ → Relevant provider action



Pickering BW et al. Crit Care 2012 16:220

„Smart Alarm“ → Relevant provider action

VILI Alerts



Herasevich V et al. Crit Care Med 2011 39:34-9

Clinical decisions-support systems: actual state

Aim: To evaluate the effect of CDSSs on clinical outcomes, health care processes, workload and efficiency, patient satisfaction, cost, and provider use and implementation.

Conclusions

- Both commercially and locally developed CDSSs are effective at improving health care process measures across diverse settings
- However, **evidence** for clinical, economic, workload, and efficiency outcomes remains **sparse**

Bright TJ et al. Ann Intern Med 2012 157:29-43
See also NIH's HTA assessment 2010, 14:No 48

Daily management of the ICU

Patient Summary
Pod
Bed: HDU-3 MR number:123123 Johan Konor

ICU 7 **A. JOHNSON**
Dr. Gates Dr. Ramos

ICU 8 **E. ANDERSON**
Dr. Gates Dr. Ramos

ICU 9 **W. EDWARDS**
Dr. Butler Dr. Price

ICU 10 **T. JACKSON**
Dr. Butler Dr. Price

ICU 6 **G. MILLER**
Dr. Gates Dr. Ramos

ICU 11 **S. PARKER**
Dr. Butler Dr. Price

ICU 5 **M. ROBERTS**
Dr. Gates Dr. Ramos

ICU 12 **W. GARCIA**

ICU 4 **O. ALLEN**
Dr. Gates Dr. Walker

ICU 3 **E. THOMPSON**
Dr. Gates Dr. Walker

ICU 2 **C. LEWIS**
Dr. Gates Dr. Walker

ICU 1 **K. WRIGHT**
Dr. Gates Dr. Walker

A bar chart with 'Patients' on the y-axis (0-6) and categories 0-3 on the x-axis. Category 0 has 1 patient (green), category 1 has 1 patient (yellow), category 2 has 5 patients (yellow), and category 3 has 4 patients (yellow).

A gauge labeled 'Average length of stay' with a scale from 0 to 50. The needle points to approximately 35.

A gauge labeled 'Average age' with a scale from 0 to 100. The needle points to approximately 65.

Severity

APACHE II

POD 1

Stationen Statistik Score Links

+ KIM → Test → Neuro-IMC → **INO**

Blau 1 >>

Blau 2 >>

Blau 3 >>

Blau 4 >>

Blau 5 >>

Blau 6 >>

Patientlist INO

©/trikIM_PDMS Printdate:09.01.2013
Seite 1 von 3

IMC	Sex	Bdav	Age	LOSAdm	AdmWard	Oxia	CRP	Infekt	GCS-ES-SAPS	Diao-APACHE	Diaonosis
65	M	1	1075	30.12.2012	Neurohir.	560	32		14	20	1. Intrazerebrale Blutung Intrazerebrale Blutung frontal links mit Ventrikeleinb. Kraniotomie 26.12., Eröffnungsdruck 78 mmHg, Per. instabil, ICP, instab. tonisch-klonische Anfälle
65	M	4	504	04.01.2013	Viszeralchir.	212	122		15	27	1. Perforation/Ruptur 6.1. Revisionslap. Tücher ex. Ileostoma, 4.1. Revis. Hemikolektomie re., Ileumbindverschluss, bei Kolon Whipple 11/12 Pankreasop-Ca pT3N1 (R0-Resek. CPOD, Aut. HT, NIDDM)
65	F	0	543	04.01.2013	Neurologie	200	78		13	41	7. Krampfanfall Status Epilepticus, Anti-Phospholipid-AK-Syndrom, Sinusvenenthrombose '00, St. n. ICB 10/11, St. n. S. Hemorganisches Psychosyndrom
65	F	3	039	09.01.2013	Viszeralchir.			JA	14	33	06. Bakterielle Pneumonie respiratorische Dekompensation bei V.a. Pneumoni. Vorhofflimmern, Z.n. Pneumothorax
65	M	1	005	09.01.2013	Herz/Gefäss				15		1. Dissezierendes/rup- turiertes Aortenaneurysma 9. Andere OP kardiovaskulär
65	M	2	7	1.18	08.01.2013	Herz/Gefäss	504	71	14	Y 22	HTx 8.1.13 bei dilat. Herdomyopathie, St. n. ICD Implant. u/ter Cordarone
65	M	0	1	088	08.01.2013	Gastroenter.	352	54	14	91	06. Akuter 08.01.13 In Stent Stenose mit RIVA/DA, 3 DES, 1

Strategic management of the ICU

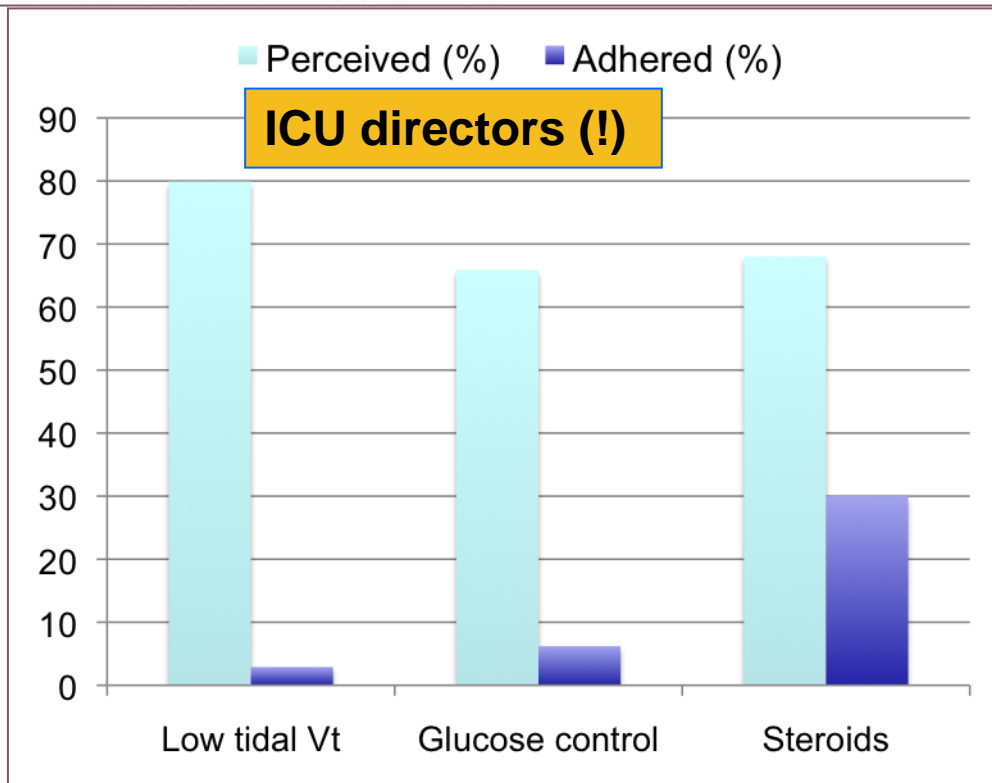
- The central role of an ICU in the acute care hospital
- Planning structures and resources
- Orientation towards results (reporting)
- Quality control and management
 - Concentration on a few key elements
 - Taking advantage of strengths
 - Trust and positive thinking

Practice and perception—A nationwide survey of therapy habits in sepsis*

Frank M. Brunkhorst, MD; Christoph Engel, MD; Max Ragaller, MD; Tobias Welte, MD; Rolf Rossaint, MD; Herwig Gerlach, MD; Konstantin Mayer, MD; Stefan John, MD; Frank Stuber, MD; Norbert Weiler, MD; Michael Oppert, MD; Onnen Moerer, MD; Holger Bogatsch, MD; Konrad Reinhart, MD; Markus Loeffler, MD; Christiane Hartog, MD; for the German Sepsis Competence Network (SepNet)

Table 1. Recommended interventions (treatment goal)

- Time and severity independent
 - Low-tidal volume ventilation^a (≤6 mL per kg predicted body weight)
 - Glycemic control^b (blood glucose 4.4–6.1 mmol/L)
- Time and severity dependent
 - Activated protein C^c
 - Low-dose hydrocortisone (200–300 mg/24 hr)^d
 - Non-use of low-dose dopamine to protect renal function (≤ 5 µg/kg/min)^e
 - Non-use of antithrombin^f



Brunkhorst FM et al. Crit Care Med 2008, 36:2719-25

The first score: Apgar Score

Current Researches in Anesthesia and Analgesia—July-August, 1953

A Proposal for a New Method of Evaluation of the Newborn Infant.*

Virginia Apgar, M.D., New York, N. Y.

Department of Anesthesiology, Columbia University, College of Physicians and Surgeons and the Anesthesia Service, The Presbyterian Hospital



RESUSCITATION OF INFANTS at birth has been the subject of many articles. Seldom have there been such imaginative ideas, such enthusiasms, and dislikes, and such unscientific observations and study about one clinical picture. There are outstanding exceptions to these statements, but the poor quality and lack of precise data of the majority of papers concerned with infant resuscitation are interesting.

Apgar V. Curr Res Anaesth Analg 1953, 32:260-7

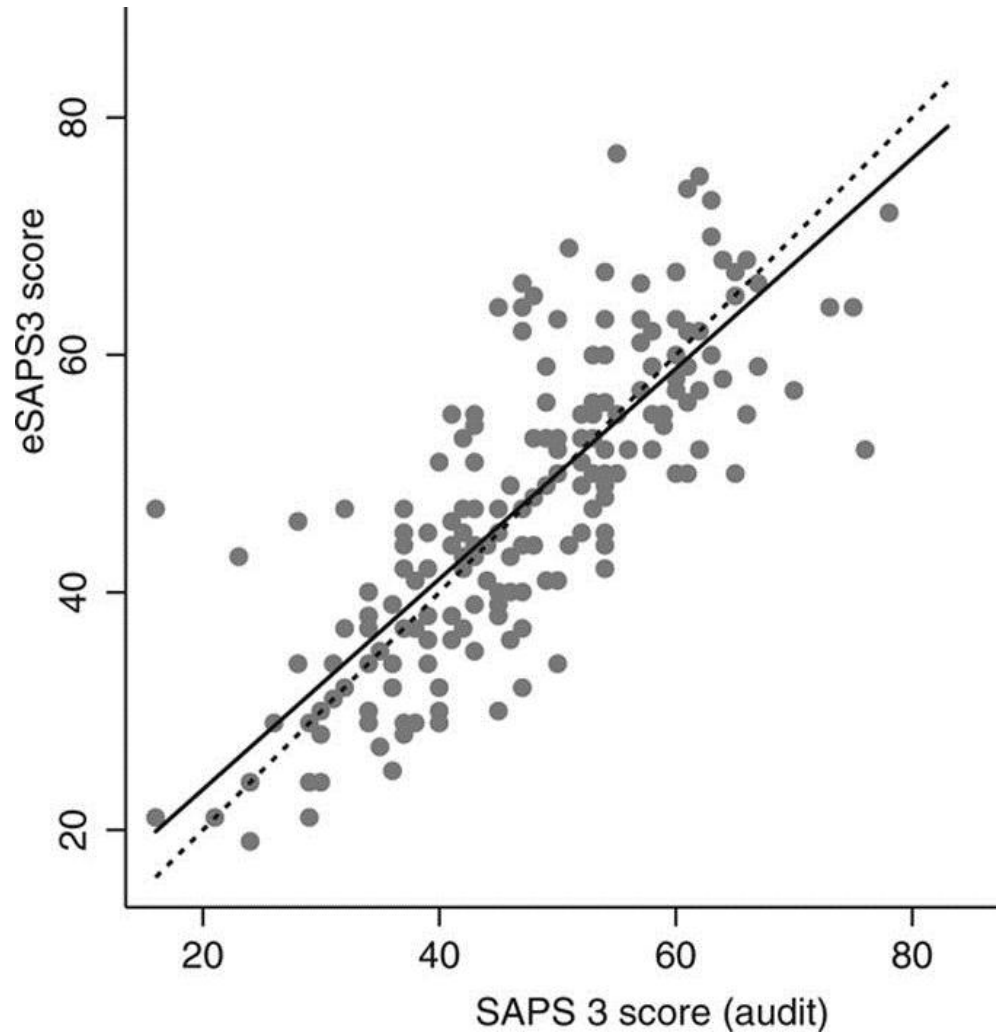
What is a score (scoring system)?

- Score and scoring system
 - Rating, or disease classification system
 - Usually expressed numerically
 - Based on
 - Predefined set of variables
 - Rating of each variable, using a predefined scale

Why do we use scores in the ICU today?

- Research
 - Inclusion/exclusion criteria in prospective studies
 - Risk stratification
 - Check for balance between groups (RCT)
- Quality management & benchmarking
 - Calculation of indicators (Severity of acute illness)
 - Risk adjustment, based on outcome prediction models (SMR)
- Reimbursement (SwissDRG)
- Protocols for patient care
 - ~~Sepsis: Use of activated protein-C~~
 - Liver transplant (MELD: Model for end-stage liver disease)
 - Acute care hospital ward: Trigger for medical emergency teams

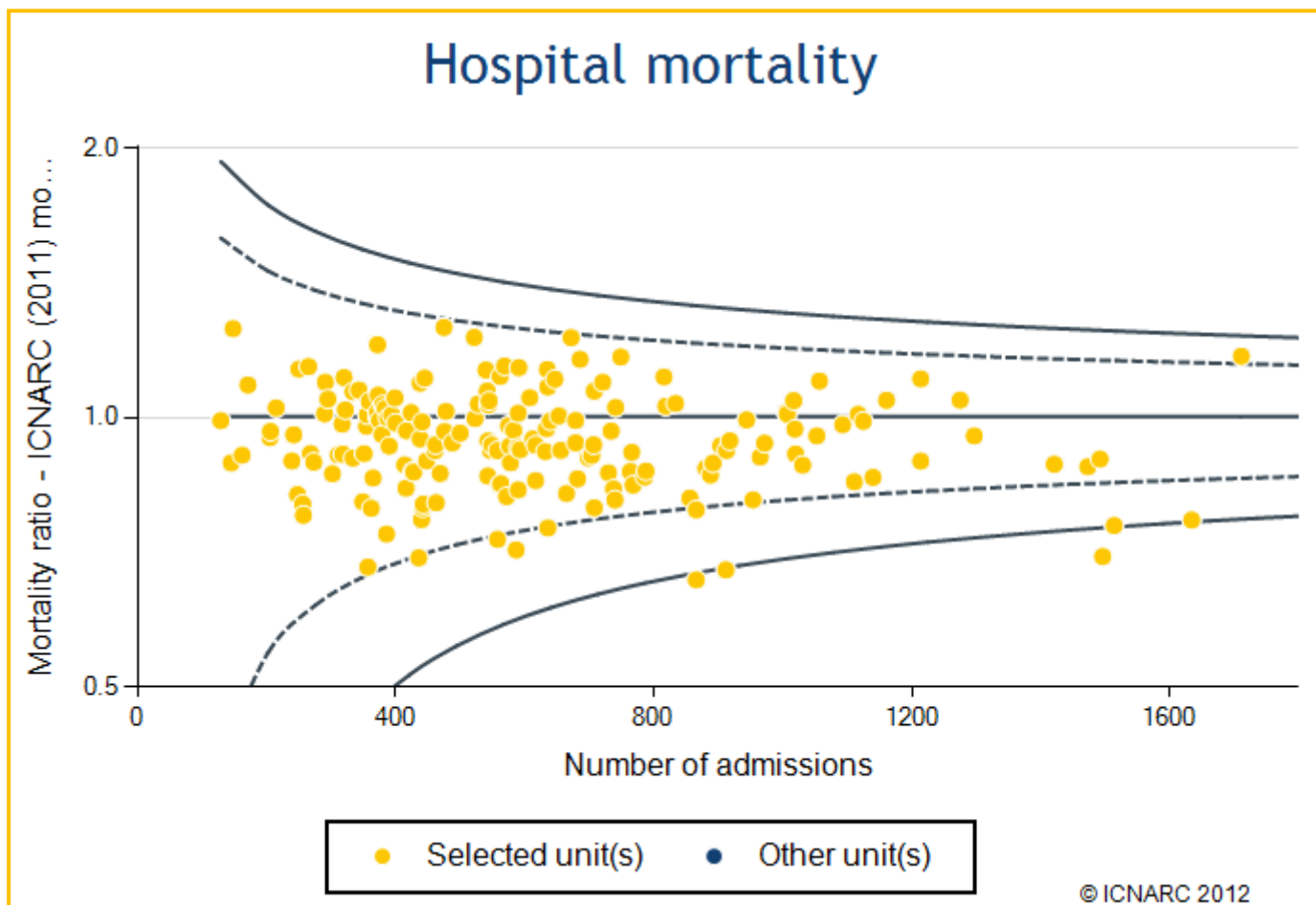
Customized eSimplified SAPS



Liu V et al. Crit Care Med 2013, 41:41-8

UK: Intensive Care National Audit & Reserach Centre

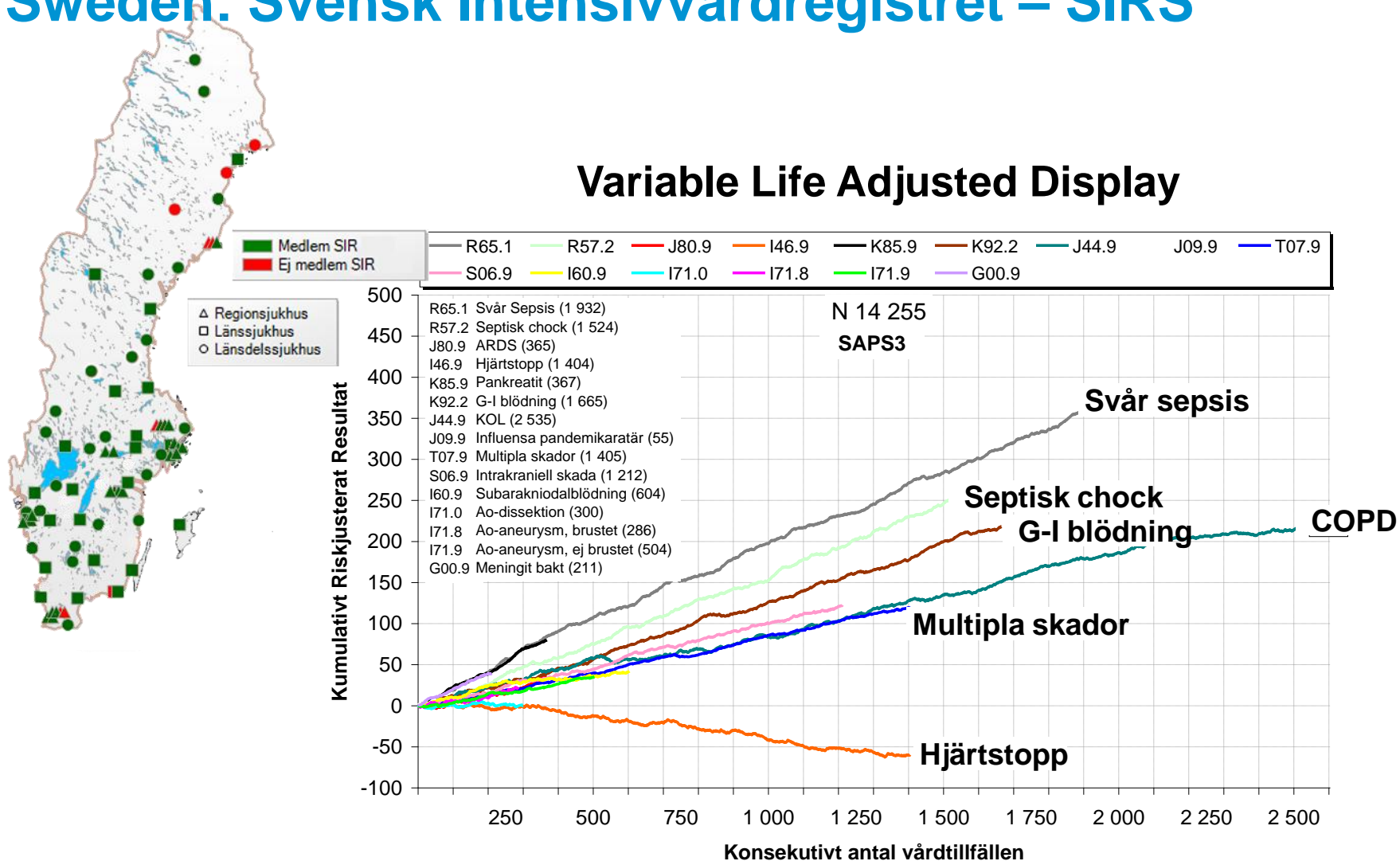
Standardized mortality ratio (SMR) vs. Number of admissions



Case mix programme, summary statistics 2011: www.icnarc.org

Sweden: Svensk Intensivvårdregistret – SIRS

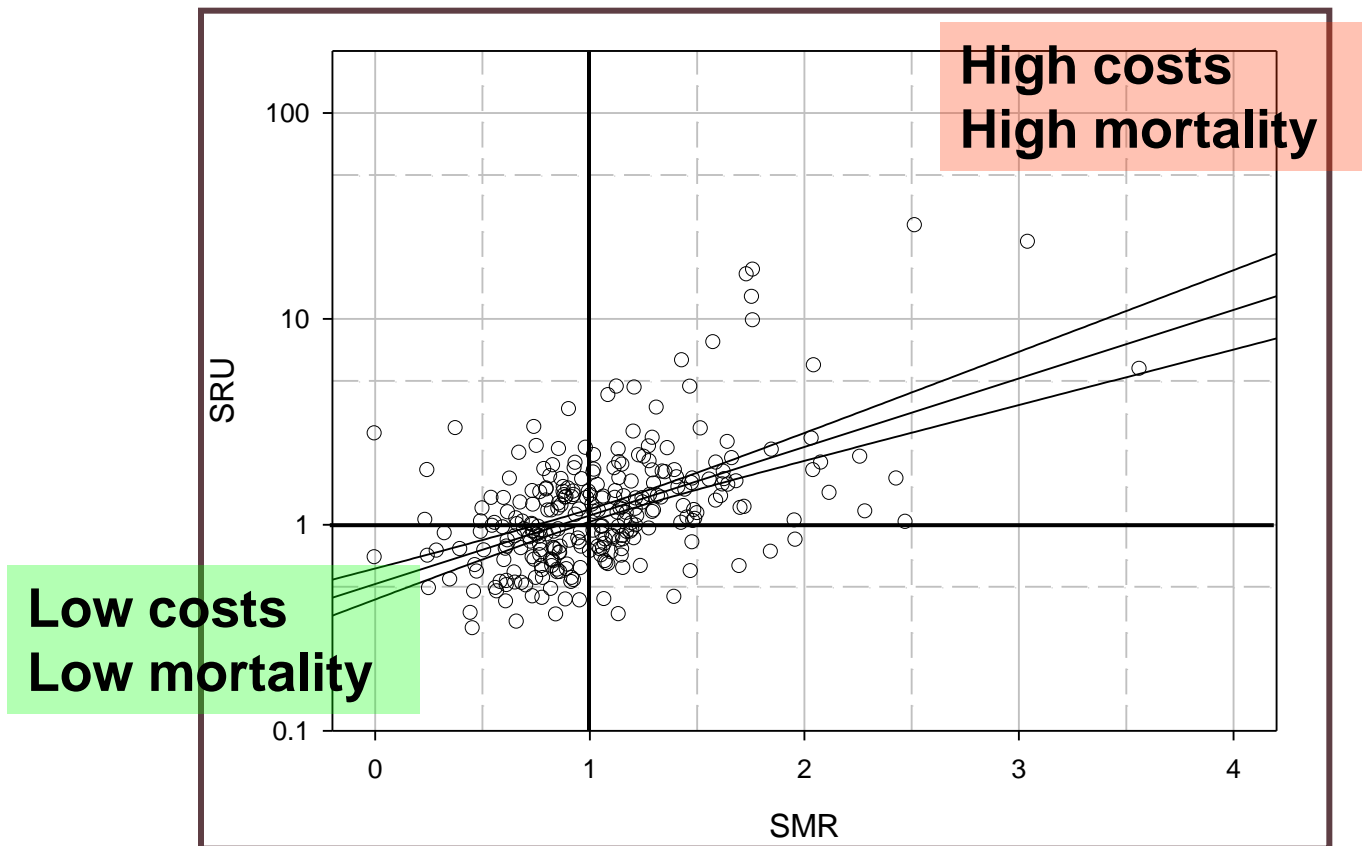
Variable Life Adjusted Display



SIRS Arsrapport 2011: www.icuregswe.org

ICU processes and outcome: SAPS 3

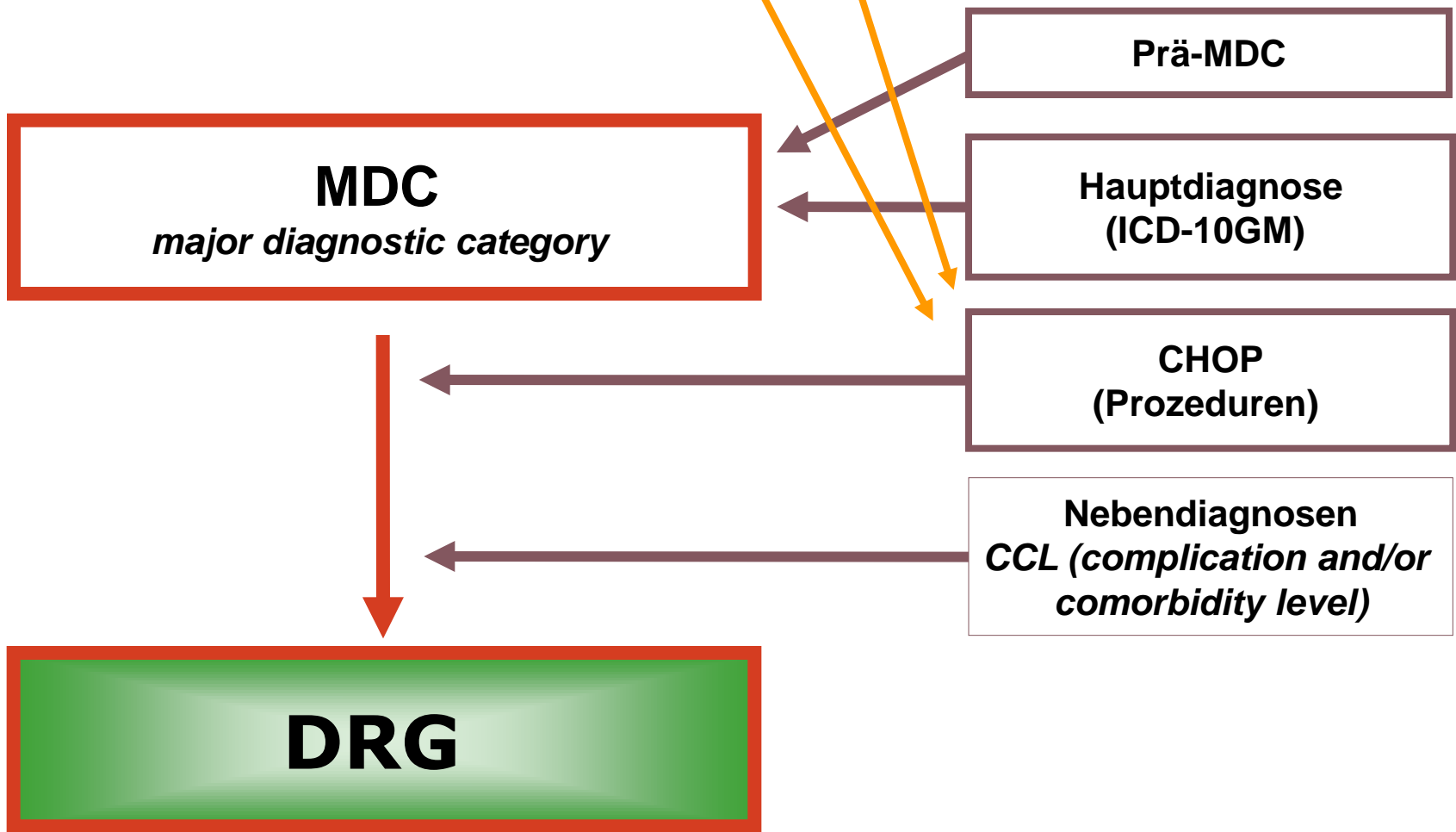
**Standardized mortality ratio (SMR)
vs. Standardized resource use (SRU)**



Rothen HU et al. Intensive Care Med 2007, 33:1329-36

SwissDRG-Grouper

Beatmung 24 - 96 – 250 h



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- General background: ICT in health care
- Using the PDMS in my daily practice
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The ICT Productivity Paradox: Confirmed?

- There is a negative effect of ICT on health care
 - Increased costs without any gain in productivity
 - Safety Problems
- Lack of gain in productivity is due to
 - Mismeasurement
 - Output difficult to measure in service industry (accessibility, convenience, ...)
 - Mismanagement
 - Overly optimistic expectations about return of investment
 - Impatience
 - Poor usability
 - Lack in focus on best ways to improve ICT use in health care
 - Functionality in health care behind usage in „civilian“ life

Jones S et al. N Engl J Med 2012 366:2243-5

PDMS: A wish list

To support clinical management of the patient

- Context-related and integrated display of clinically relevant data
 - Monitor, support systems, laboratory, drugs, ...
 - Display of trends
- Support of clinical workflow
 - Computerized physician order entry (CPOE)
 - Handover
 - Clinical decision-support system
- Allow for valid (reliable, timely, tracking) documentation

PDMS: A wish list

To support management of the ICU

- Bedside documentation of relevant information
 - Therapeutic procedures
 - Drugs, ...
 - Diagnoses
 - Administrative data
- Resource management
- Controlling and reports

Modular configuration

Support

- Configuration
- Training
- Continuous development and adaptation to new needs

Do not forget the main goal of an ICU!

