Cinc coses que podem fer (i hem de fer) millor en el maneig del malalt amb sèpsia

Xavier Nuvials

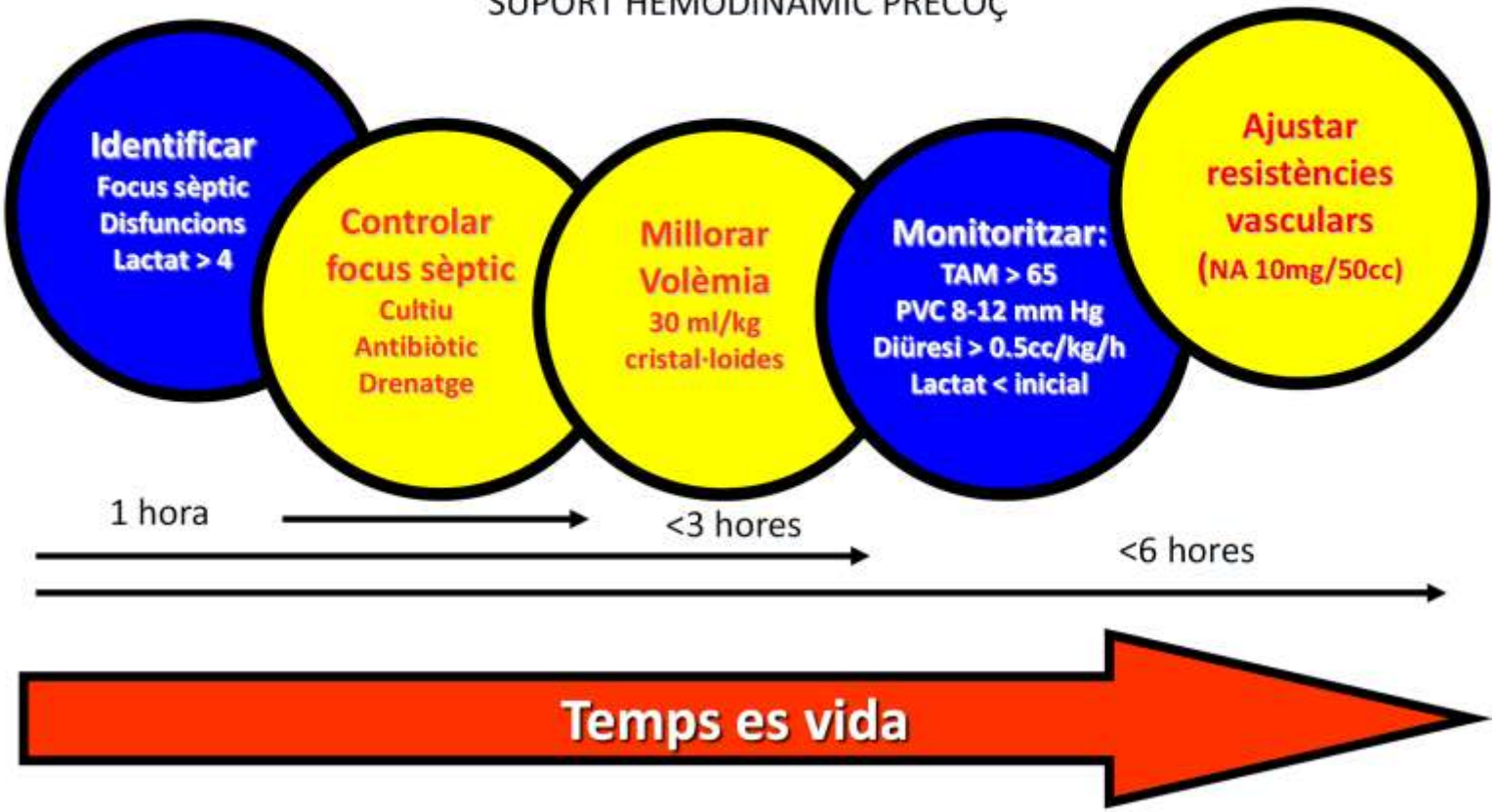
Hospital Universitari Arnau de Vilanova
Lleida

Cadena de la supervivència de la sèpsia greu

IDENTIFICACIÓ PRECOÇ

CONTROL DEL FOCUS INFECCIÓS

SUPORT HEMODINÀMIC PRECOÇ



Qué podem fer millor?

- Detecció
- Confirmació microbiològica
- Tractament antimicrobià
- Ressuscitació hemodinàmica
- “En la visió de conjunt”

DETECCIÓ

ORIGINAL

The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis

Patient characteristics	Subjects (%)	Hospital mortality (%)
All	100	34.8
Source		
ED	52.4	27.6
ICU	12.8	41.3
Ward	34.8	46.8

Intensive Care Med (2010) 36:222–231
DOI 10.1007/s00134-009-1738-3

Medical Emergency team
"Outreach Team" "Rapid response team"

- Branca aferent: **Detecció**
  - Escales d'alerta precoç "Early Warning Scores"
  - Criteris d'activació
- Branca eferent: **Resposta i tractament**
  - Equips específics

Prospective Trial of Real-Time Electronic Surveillance to Expedite Early Care of Severe Sepsis

Jessica L. Nelson, BS, Barbara L. Smith, BA, Jeremy D. Jared, BS, John G. Younger, MD, MS

- **Estudi prospectiu, pre-post . 1 semestre 2009**
- **Pacients d'urgències. Detecció automàtica**
  - **2 criteris de SIRS + 2 episodis de TAS < 90 mmHg**
- **Fase 1. Recollida de dades - no alerta**
- **Fase 2. Recollida de dades - alerta**
- **Objectius**
  - **La detecció automàtica incrementa el nombre de mesures realitzades**
  - **Les mesures es realitzen més precoçment**

Ann Emerg Med. 2011;57:500-504.

Prospective Trial of Real-Time Electronic Surveillance to Expedite Early Care of Severe Sepsis

Jessica L. Nelson, BS, Barbara L. Smith, BA, Jeremy D. Jared, BS, John G. Younger, MD, MS

- **33.460 pacients**
- **398 pacients : 2 criteris SIRS + 2 episodis hipotensió**
- **184 (46%): Sèpsia greu**
- **Algoritme : VPP 54% / VPN 99%**
- **Nombre de mesures realitzades:**
  - **Rx. Tòrax : 3,2 95% IC [1,1-9,0]**
  - **Hemocultius: 2,9 95% IC [1,1-7,7]**
- **Precocitat de les mesures**
  - **Hemocultius : 86 min IQR[31-296] vs 81 min IQR[37-245]**
- **El 50% de les deteccions fetes abans pel personal assistencial**

Ann Emerg Med. 2011;57:500-504.

Implementation of a real-time computerized sepsis alert in nonintensive care unit patients*

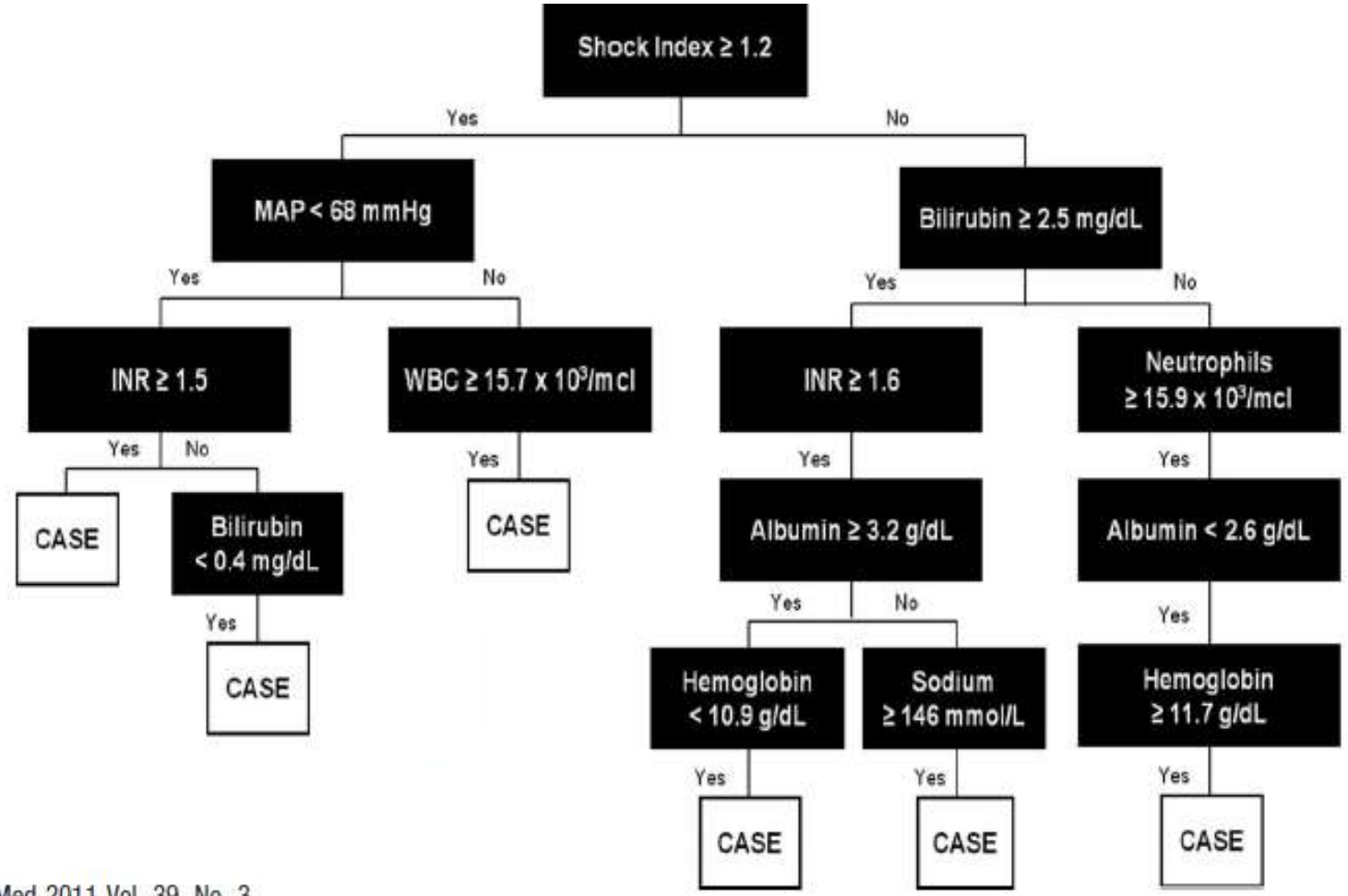
Amber M. Sawyer, PharmD; Eli N. Deal, PharmD; Andrew J. Labelle, MD; Chad Witt, MD; Steven W. Thiel, MD; Kevin Heard, BS; Richard M. Reichley, RPh; Scott T. Micek, PharmD; Marin H. Kollef, MD

- **Estudi prospectiu. Hospital acadèmic**
- **Pacients ingressats a planta hospitalització**
  - **Intervenció: protocol de detecció automàtica en temps real (n=84)**
  - **No intervenció: protocol assistencial standart (n=181)**
- **Objectius**
  - **Mesures diagnòstiques i terapèutiques (< 12 h)**
  - **Mortalitat /estades**

Crit Care Med 2011 Vol. 39, No. 3

Implementation of a real-time computerized sepsis alert in nonintensive care unit patients*

Amber M. Sawyer, PharmD; Eli N. Deal, PharmD; Andrew J. Labelle, MD; Chad Witt, MD; Steven W. Thiel, MD; Kevin Heard, BS; Richard M. Reichley, RPh; Scott T. Micek, PharmD; Marin H. Kollef, MD



Crit Care Med 2011 Vol. 39, No. 3

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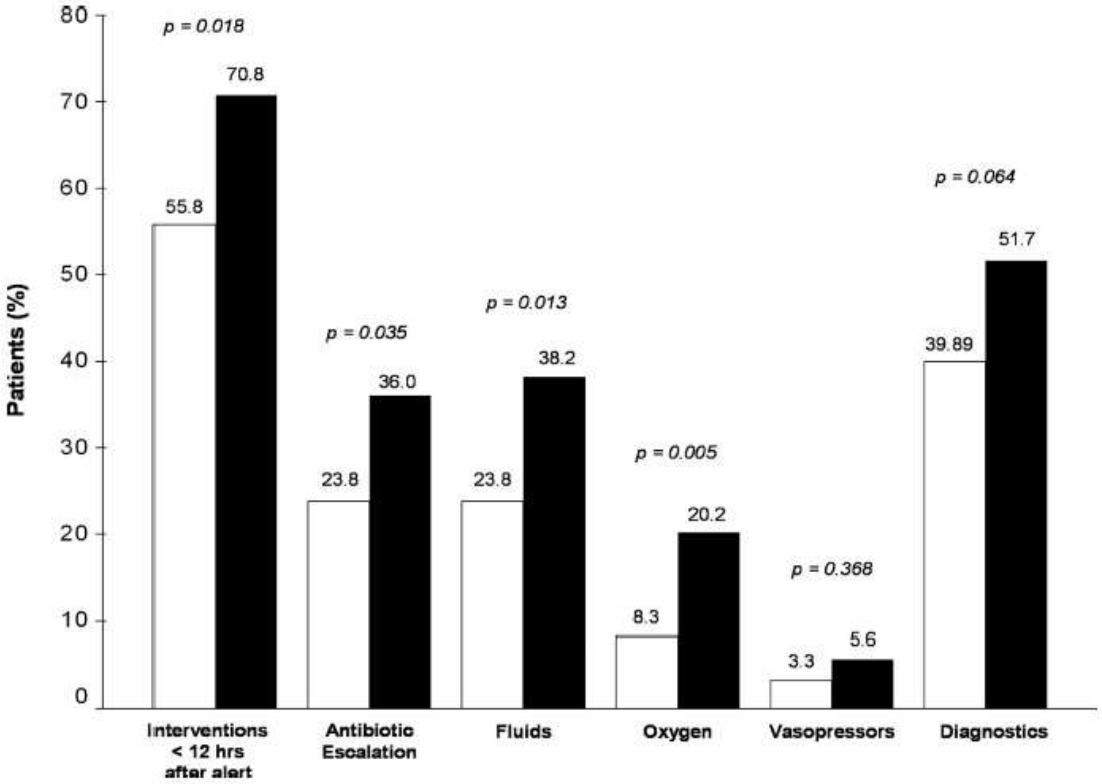


Figure 3. New therapies and diagnostics obtained within 12 hrs of the sepsis alert in the interventio group (*black bars*) and the nonintervention group (*white bars*).

Implementation of a real-time computerized sepsis alert in nonintensive care unit patients*

Amber M. Sawyer, PharmD; Eli N. Deal, PharmD; Andrew J. Labelle, MD; Chad Witt, MD; Steven W. Thiel, MD; Kevin Heard, BS; Richard M. Reichley, RPh; Scott T. Micek, PharmD; Marin H. Kollef, MD

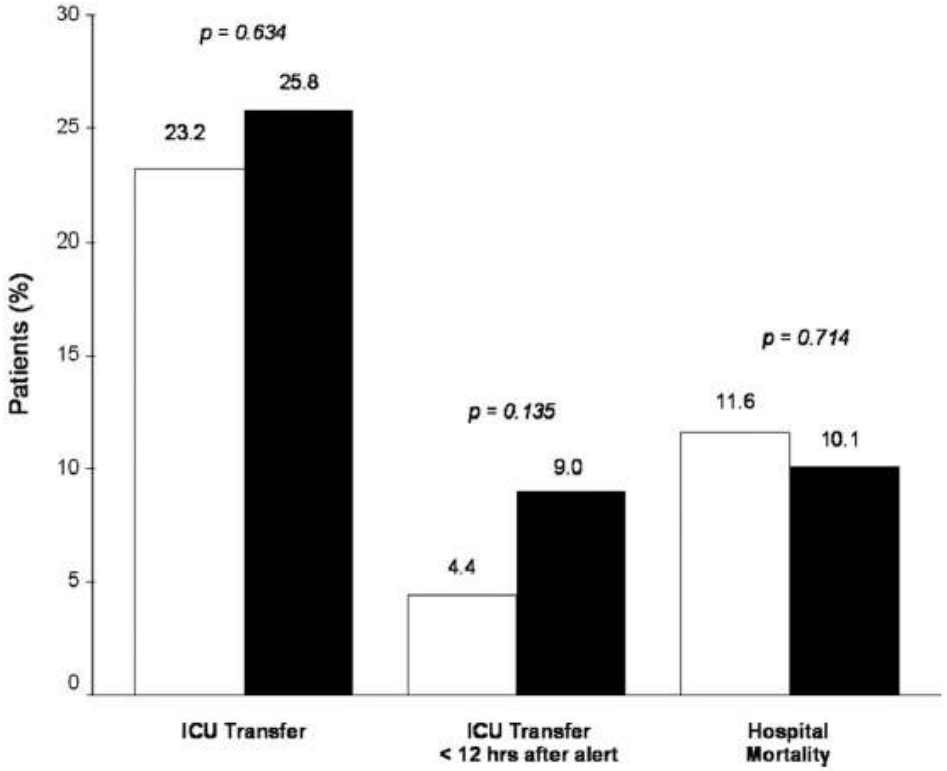


Figure 4. Intensive care unit (*ICU*) transfer and hospital mortality for patients in the intervention group (*black bars*) and the nonintervention group (*white bars*).

Journal of HOSPITAL MEDICINE www.journalofhospitalmedicine.com

ORIGINAL RESEARCH

Development, Implementation, and Impact of an Automated Early Warning and Response System for Sepsis

Craig A. Umscheid, MD, MSCE[1,2,3,4,5,6*], Joel Betesh, MD[1], Christine VanZandbergen, PA, MPH[7], Asaf Hanish, MPH[1], Gordon Tait, BS[7], Mark E. Mikkelsen, MD, MSCE[2,3], Benjamin French, PhD[1,3,4,5], Barry D. Fuchs, MD, MS[2]

En el periode post-implantació:

- **Excel.lent cumplimentació de la documentació**
- **Resposta abans de 30 minuts en el 90% de les activacions**
- **50% de les trucades pacients no crítics**
- **1/3 dels casos verificats com a sèpsia**
- **90% dels casos l'equip ja era conscient de la situació del pacient previ a l'avís**
- **Milloria de l'adherència a les recomancions (fluids, cultius, antimicrobians, mesura del lactat)**
- **No efecte sobre resultats (estades, ingrés UCI, mortalitat)**

Randomized trial of automated, electronic monitoring to facilitate early detection of sepsis in the intensive care unit*

Michael H. Hooper, MD, MSc; Lisa Weavind, MBBCh; Arthur P. Wheeler, MD; Jason B. Martin, MD; Supriya Srinivasa Gowda, MBBS; Matthew W. Semler, MD; Rachel M. Hayes, PhD; Daniel W. Albert, MS; Norment B. Deane, MS; Hui Nian, PhD, MS; Janos L. Mathe, MSc; Andras Nadas, MSc; Janos Sztipanovits, PhD; Anne Miller, PhD; Gordon R. Bernard, MD; Todd W. Rice, MD, MSc, FCCP

Table 2. Outcomes of patients by group

Outcome Variable	Intervention	Controls	*p*
Time to first new antibiotic, median (interquartile range), hrs	6.0 (2.4–18.8)	6.1 (2.5–21.0)	.95
6-hr fluid administration, mean, mL	1019 ± 1241	964 ± 1196	.57
Hypotensive at enrollment	1589 ± 1874	1479 ± 1600	.92
Intensive care unit length of stay, median (interquartile range), days	3.0 (2.0–5.0)	3.0 (2.0–4.0)	.22
Hospital length of stay, days	5.7 (2.8–10.5)	4.7 (2.7–8.1)	.08
Mortality, %	14%	10%	.29

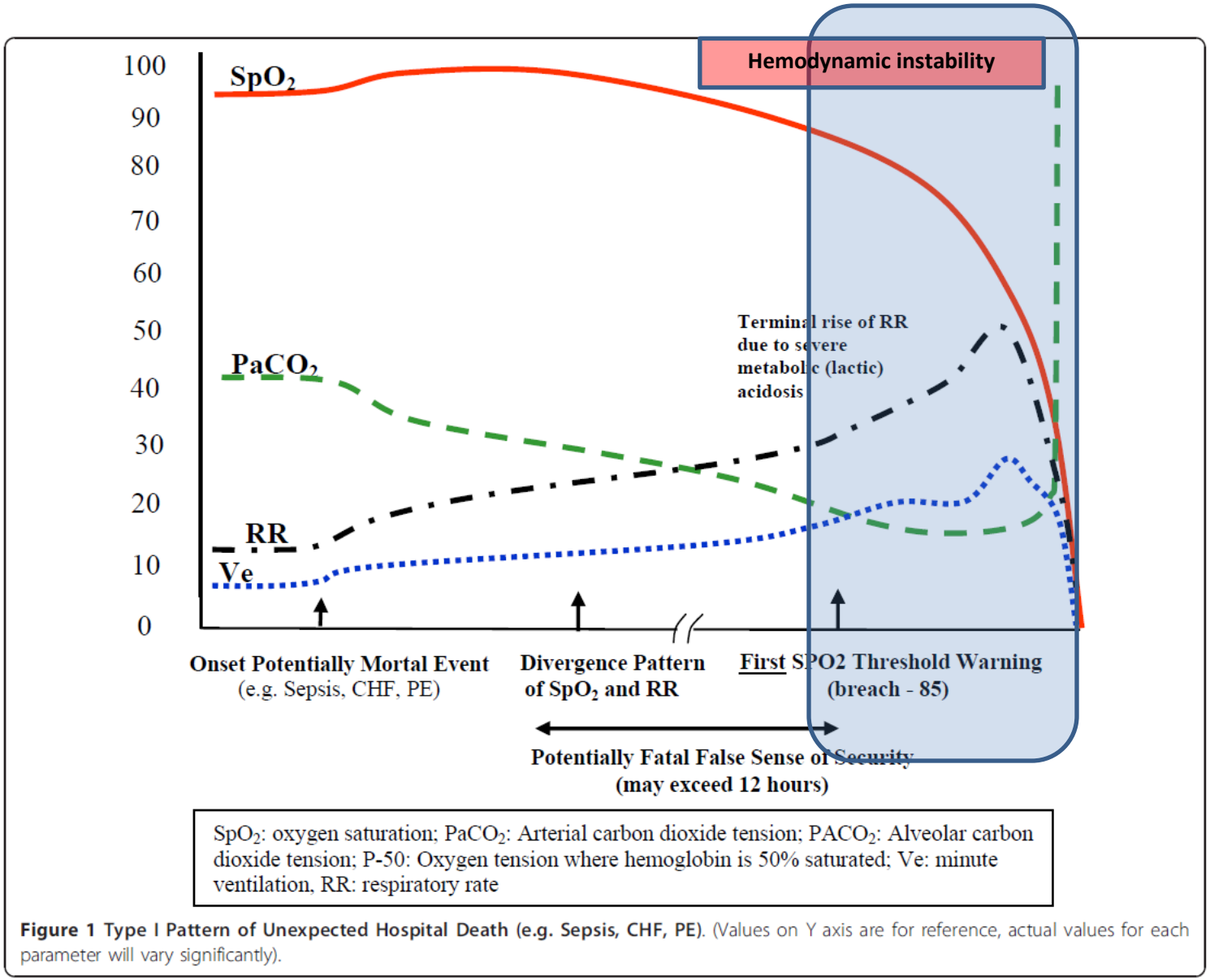


Figure 1 Type I Pattern of Unexpected Hospital Death (e.g. Sepsis, CHF, PE). (Values on Y axis are for reference, actual values for each parameter will vary significantly).

Identification of deteriorating patients on general wards; measurement of vital parameters and potential effectiveness of the Modified Early Warning Score ☆

Jeroen Ludikhuize MD[a,*], Susanne M. Smorenburg MD, PhD[a], Sophia E. de Rooij MD, PhD[b], Evert de Jonge MD, PhD[c]

Results: Two hundred four patients were included. In the 48 hours before the event, a total of 2688 measurements of one or more vital signs were taken. Overall, 81% of the patients had an MEWS value of 3 or more at least once during the 48 hours before their event. Recordings of vital signs were mostly incomplete. Even when the MEWS was 3 or more, respiratory rate, diuresis, and oxygen saturation were documented in only 30% to 66% of assessments.

Journal of Critical Care (2012) 27, 424.e7–424.e13

Qué podem fer millor?
DETECCIÓ

- **Educar**
- **Identificar els factors de risc associats a sèpsia greu dels pacients hospitalitzats?**
- **Identificar als pacients en fases més inicials de la sèpsia greu?**

CONFIRMACIÓ MICROBIOLÒGICA

The Natural History of the Systemic Inflammatory Response Syndrome (SIRS)

A Prospective Study

64,5%

M. Sigfrido Rangel-Frausto, MD, MSc; Didier Pittet, MD; Michele Costigan, RN, BSN; Taekyu Hwang, MS; Charles S. Davis, PhD; Richard P. Wenzel, MD, MSc

JAMA. 1997;278:234-240

Intensive Care Med (2004) 30:580–588
DOI 10.1007/s00134-003-2121-4

ORIGINAL PAPER

The EPISEPSIS Study Group

62,1%

EPISEPSIS: a reappraisal of the epidemiology and outcome of severe sepsis in French intensive care units

Sepsis in European intensive care units: Results of the SOAP study*

60%

Jean-Louis Vincent, MD, PhD, FCCM; Yasser Sakr, MB, BCh, MSc; Charles L. Sprung, MD; V. Marco Ranieri, MD; Konrad Reinhart, MD, PhD; Herwig Gerlach, MD, PhD; Rui Moreno, MD, PhD; Jean Carlet, MD, PhD; Jean-Roger Le Gall, MD; Didier Payen, MD; on behalf of the Sepsis Occurrence in Acutely Ill Patients Investigators

Crit Care Med 2006 Vol. 34, No. 2

CONFIRMACIÓ MICROBIOLÒGICA

Table 2. Performance of Process-of-Care Measurements

Type of Measure	Preintervention Cohort (n = 854)	Postintervention Cohort (n = 1465)	*P* Value
	No. (%) [95% CI]		
Sepsis resuscitation bundle (first 6 h after presentation)			
Measure lactate	334 (39.0) [36-42]	736 (50.1) [48-53]	<.001
Blood cultures before antibiotics	465 (54.4) [51-58]	914 (62.4) [60-65]	<.001

JAMA, May 21, 2008-

Ferrer R. et al.

Table 3 Change in achievement of bundle targets

	Initial quarter achieved (%)	Final quarter achieved (%)[a]	*P* value compared to initial
Initial care bundle (first 6 h of presentation)			
Measure lactate	61.0	78.7	≤0.0001
Blood cultures before antibiotics	64.5	78.3	≤0.0001
Broad spectrum antibiotics	60.4	67.9	0.0002

Intensive Care Med (2010) 36:222–231

CONFIRMACIÓ MICROBIOLÒGICA

DATOS REGISTRO ENVIN-HELICS. 2013

	Community (n=1573)	ICU (n=652)	Hospital (n=934)	Global (n=3211)	[IC_{95}]
Crystalloids	71,6%	64,9%	73,8%	70,7%	[69,1%-72,3%]
Antibiotics	81,2%	79,6%	83,2%	81,5%	[80,1%-82,8%]
Blood cultures	74,7%	73,0%	70,4%	72,9%	[71,3%-74,4%]
Lactate	59,4%	62,9%	62,7%	60,9%	[59,2%-62,6%]
CVP	59,4%	68,1%	68,1%	66,5%	[62,2%-65,5%]
$SvcO_2$	32,1%	37,0%	35,9%	34,3%	[32,6%-35,9%]
Vasopressors	67,1%	73,9%	71,3%	69,8%	[68,2%-71,4%]

ESICM 2014

CONFIRMACIÓ MICROBIOLÒGICA

Table 5.—Organisms Involved in Episodes of Sepsis Syndrome With a Documented Site of Infection

Organism	No. (Weighted %)		
	Episodes With Bloodstream Infection	Episodes With Documented Infection but No Bloodstream Infection	Total Episodes
Gram-negative organisms	153 (35.0)	183 (43.9)	336 (39.8)
Enterobactereaceae	124 (28.0)	106 (26.3)	230 (27.1)
Pseudomonas	24 (5.8)	60 (13.2)	84 (9.8)
Haemophilus	2 (0.5)	7 (2.0)	9 (1.3)
Other gram negative	3 (0.7)	10 (2.4)	13 (1.6)
Gram-positive organisms	168 (39.5)	103 (24.0)	271 (31.0)
Staphylococcus aureus	68 (16.0)	47 (12.0)	115 (13.9)
Enterococcus	28 (5.5)	30 (6.5)	58 (6.1)
Staphylococcus coagulase negative	39 (10.2)	11 (2.0)	50 (5.7)
Pneumococcus	16 (4.1)	2 (0.4)	18 (2.0)
Other β-hemolytic streptococci	3 (0.7)	6 (1.8)	9 (1.3)
Viridans streptococci	9 (2.0)	3 (0.6)	12 (1.2)
Other gram positive	5 (1.0)	4 (0.7)	9 (0.8)
Fungi	34 (7.4)	19 (5.0)	53 (6.1)
Candida species	30 (6.5)	10 (2.9)	40 (4.5)
Fungi, non-*Candida*	4 (0.9)	9 (2.1)	13 (1.6)
Intra-abdominal anaerobes	11 (2.4)	7 (1.8)	18 (2.0)
Other/unclassified organisms	19 (4.5)	22 (5.0)	41 (4.8)
Polymicrobial infection	51 (11.1)	96 (20.8)	147 (16.3)
Total	**436 (100)**	**430 (100)**	**866 (100)**

Epidemiology of Sepsis Syndrome—Sands et al JAMA, July 16, 1997—Vol 278, No. 3

CONFIRMACIÓ MICROBIOLÒGICA

Diagnostic Strategy for Hematology and Oncology Patients with Acute Respiratory Failure

Randomized Controlled Trial

TABLE 1. PATIENT CHARACTERISTICS AT RANDOMIZATION

Characteristics	Routine Day 1 FO-BAL (*n* = 113)	± Day 3 FO-BAL (*n* = 106)
Neutropenia at ICU admission	36 (33)	32 (31.4)
Time (days) from admission to randomization	0 (0–1)	0 (0–1)
Antibacterial agents at admission	88 (76.1)	86 (83)

Azoulay, Mokart, Lambert, *et al.*: Etiologic Diagnosis of ARF in Patients with Cancer

Am J Respir Crit Care Med Vol 182. pp 1038–1046, 2010

JOURNAL OF CLINICAL MICROBIOLOGY, Aug. 2009, p. 2405–2410 Vol. 47, No. 8
0095-1137/09/$08.00+0 doi:10.1128/JCM.00491-09

Utility of a Commercially Available Multiplex Real-Time PCR Assay To Detect Bacterial and Fungal Pathogens in Febrile Neutropenia[▽]

Marie von Lilienfeld-Toal,[1,2]†* Lutz E. Lehmann,[3]† Ansgar D. Raadts,[3] Corinna Hahn-Ast,[1] Katjana S. Orlopp,[1] Günter Marklein,[4] Ingvill Purr,[4] Gordon Cook,[2] Andreas Hoeft,[3] Axel Glasmacher,[1] and Frank Stüber[5]

TABLE 3. Results of blood cultures and PCR during antimicrobial therapy

Pathogen	No. (%) of positive results by[c]:		No. of FNEs (no. initially positive)
	Blood culture	PCR	
None	113 (97)	565 (84)	
Staphylococcus aureus	0	32 (4.8)	19 (6)
Staphylococcus species (CoNS)	2 (1.8)[a]	13 (1.9)	9 (2)
Enterococcus faecium	0	14 (2.0)	6 (1)
Enterococcus faecalis	0	3 (0.4)	1 (1)
Escherichia coli	0	6 (0.9)	4 (3)
Pseudomonas aeruginosa	0	14 (2.0)	3 (1)
Stenotrophomonas maltophilia	1 (0.9)[b]	4 (0.6)	3 (2)
Candida krusei	0	1 (0.1)	1 (0)
Candida albicans	0	8 (1.2)	2 (0)
Aspergillus fumigatus	0	9 (1.3)	5 (1)

[a] One sample yielded a positive result with the same isolate in the accompanying PCR.
[b] Follow-up result of previously positive blood culture; the accompanying PCR yielded the same isolate.
[c] The numbers of samples taken on febrile days were 116 for blood culture and 665 (with 669 results) for PCR.

Qué podem fer millor?
CONFIRMACIÓ MICROBIOLÒGICA

- **Optimitzar la presa d'hemocultius**
- **Optimitzar l'obtenció de cultius del focus d'infecció**
- **Complementar els cultius microbiològics amb estudis serològics, microbiologia mol.lecular, histologia i biomarcadors**

TRACTAMENT ANTIBIÒTIC

Effectiveness of Treatments for Severe Sepsis

A Prospective, Multicenter, Observational Study

Ricard Ferrer[1], Antonio Artigas[1], David Suarez[2], Eduardo Palencia[3], Mitchell M. Levy[4], Angel Arenzana[5], Xose Luis Pérez[6], and Josep-Maria Sirvent[7], for the Edusepsis Study Group*

Measurements and Main Results: Of 2,796 patients, 41.6% died before hospital discharge. Treatments associated with lower hospital mortality were early broad-spectrum antibiotic treatment (treatment within 1 hour vs. no treatment within first 6 hours of diagnosis; odds ratio, 0.67; 95% confidence interval, 0.50–0.90; $P = 0.008$) and drotrecogin alfa (activated) (odds ratio, 0.59; 95% confidence interval, 0.41–0.84; $P = 0.004$). Fluid challenge and low-dose steroids showed no benefits.

Am J Respir Crit Care Med Vol 180. pp 861–866, 2009

The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis

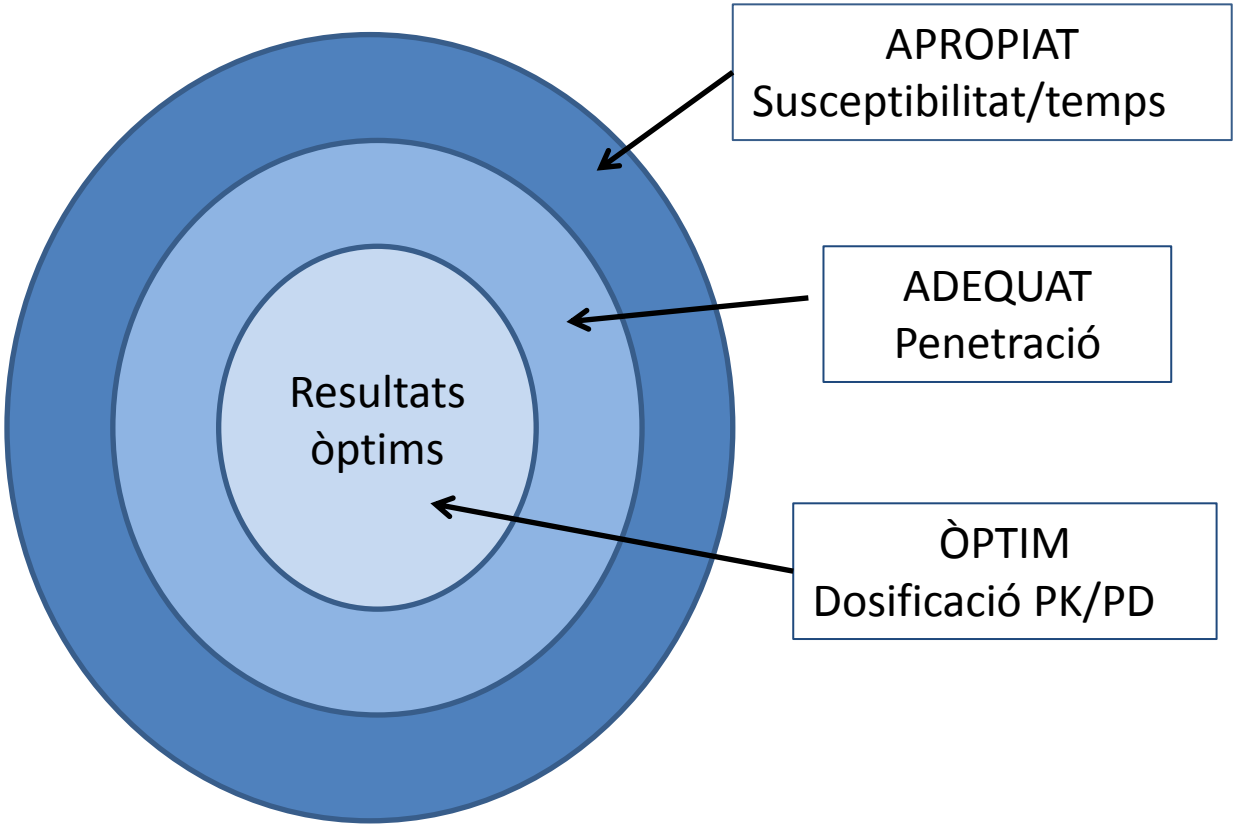
Table 3 Change in achievement of bundle targets

	Initial quarter achieved (%)	Final quarter achieved (%)[a]	*P* value compared to initial	Remaining quarters achieved (%)	*P* value compared to initial
Initial care bundle (first 6 h of presentation)					
Measure lactate	61.0	78.7	≤0.0001	72.5	≤0.0001
Blood cultures before antibiotics	64.5	78.3	≤0.0001	76.3	≤0.0001
Broad spectrum antibiotics	60.4	67.9	0.0002	67.0	≤0.0001
Fluids and vasopressors	59.8	77.0	≤0.0001	71.1	≤0.0001
CVP >8 mmHg	26.3	38.0	≤0.0001	33.9	≤0.0001
ScvO2 >70%	13.3	24.3	≤0.0001	21.7	≤0.0001
All resuscitation measures	10.9	21.5	≤0.0001	21.1	≤0.0001
Management bundle (first 24 h after presentation)					
Steroid policy	58.5	73.9	≤0.0001	66.8	≤0.0001
Administration of drotrecogin alfa policy	47.4	53.5	0.003	49.9	0.02
Glucose control	51.4	56.8	0.0009	55.4	≤0.0001
Plateau pressure control	80.8	83.8	0.24	82.6	0.09
All management measures	18.4	25.5	≤0.0001	23.3	≤0.0001

[a] Represents the last quarter of data submission from each institution during the 2-year data analysis period, regardless of total number of quarters of each institution's participation

Intensive Care Med (2010) 36:222–231

TRACTAMENT ANTIBIÒTIC
Components



Ulldemolins et al. Crit. Care Clinics

TRACTAMENT ANTIBIÒTIC

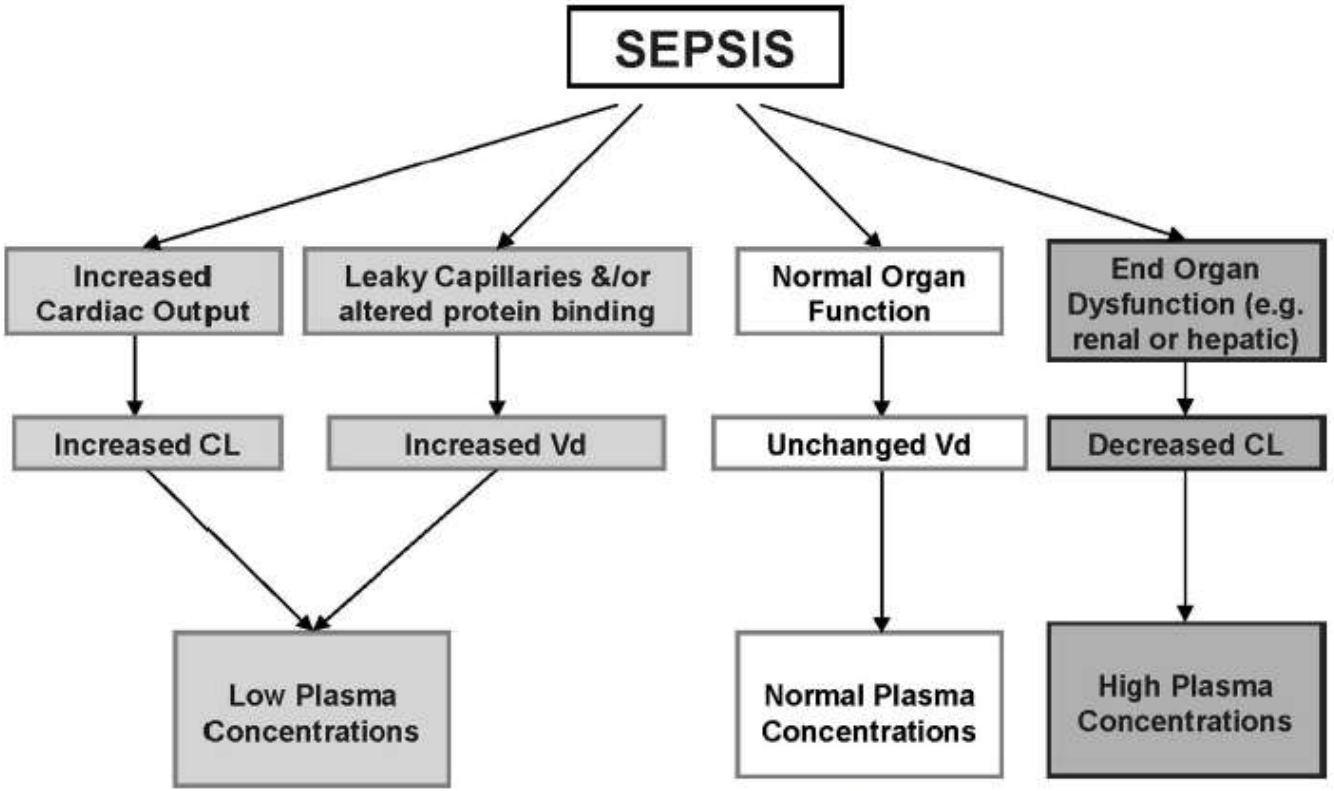


Figure 3. Schematic representation of the basic pathophysiological changes that can occur during sepsis and their subsequent pharmacokinetic effects. Note that there can be significant overlap between the groups above enabling multiple permutations for altered drug pharmacokinetics, e.g. patients with mild-to-moderate renal failure may develop increased transintestinal clearance of ciprofloxacin resulting in relatively normal plasma concentrations (39). *CL*, clearance; *Vd*, volume of distribution.

Crit Care Med 2009 Vol. 37, No. 3

TRACTAMENT ANTIBIÒTIC

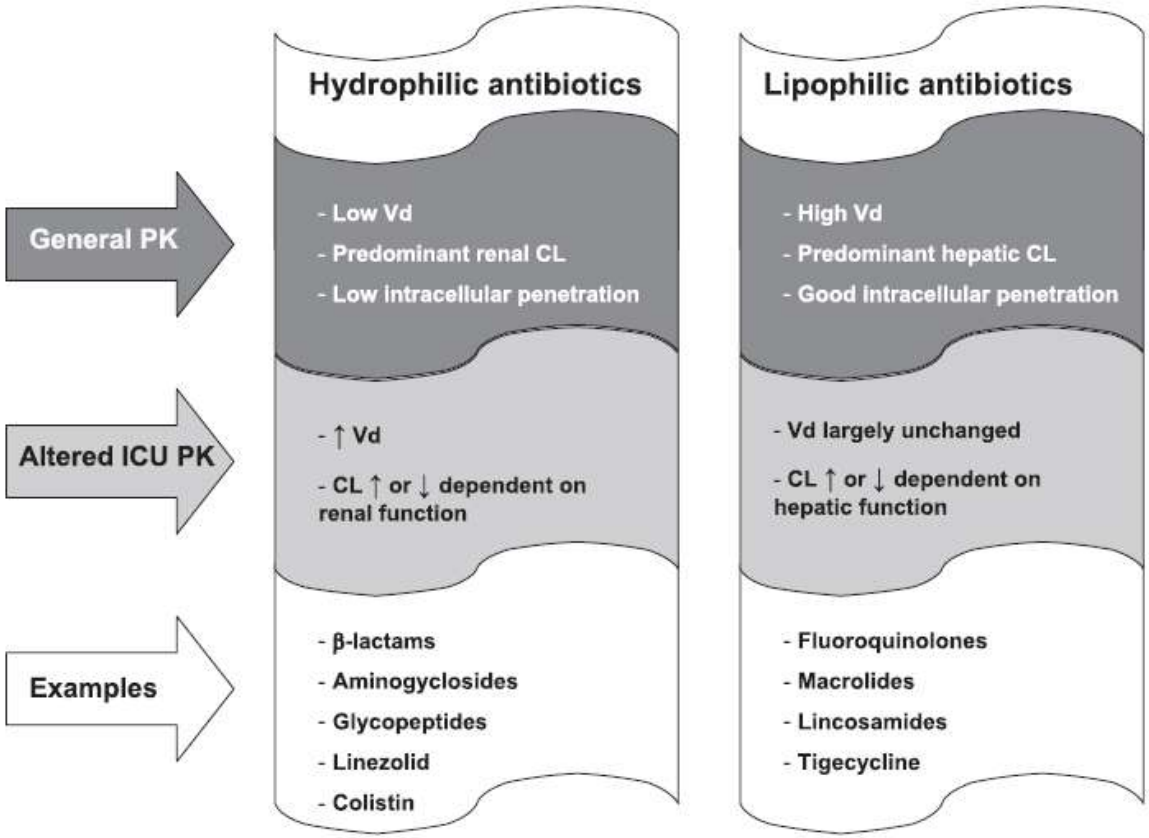


Figure 2. The interrelationship of hydrophilicity and lipophilicty of antibiotic molecules on the pharmacokinetic characteristics in general ward patients (General pharmacokinetics [*PK*]) and the altered PK observed in critically ill patients in intensive care unit (*ICU*). *CL*, clearance; *Vd*, volume of distribution.

Crit Care Med 2009 Vol. 37, No. 3

TRACTAMENT ANTIBIÒTIC

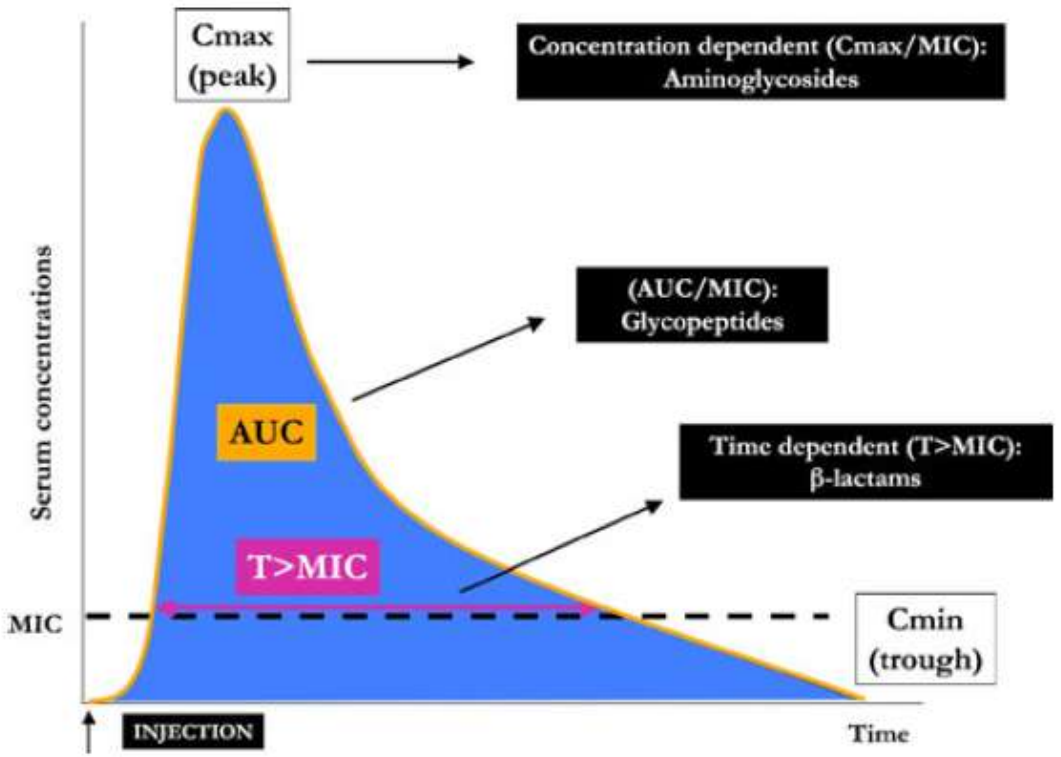


Fig. 1 Pharmacokinetic and pharmacodynamic parameters of β-lactams, aminoglycosides and glycopeptides on a concentrations vs. time curve. *AUC* Area under the curve; *Cmax* peak concentration obtained after a single dose; *Cmin* the lowest concentration before the following administration; *MIC* minimal inhibitory concentration

Curr Infect Dis Rep (2011) 13:406–415

Insufficient β-lactam concentrations in the early phase of severe sepsis and septic shock

Fabio Silvio Taccone[1], Pierre-François Laterre[2], Thierry Dugernier[3], Herbert Spapen[4], Isabelle Delattre[5], Xavier Wittebole[2], Daniel De Backer[1], Brice Layeux[6], Pierre Wallemacq[5], Jean-Louis Vincent[1] and Frédérique Jacobs*[6]

Table 3: Adequate concentrations of the four drugs, with regard to renal dysfunction

	meropenem (n = 16)	ceftazidime (n = 18)	cefepime (n = 19)	piperacillin-tazobactam (n = 27)
T > 4 × MIC (%)	57 (25-100)	45 (8-100)	34 (10-100)	33 (0-100)
Adequate PK, n (%)	12 (75)	5 (28)	3 (16)	12 (44)
CrCl <50 mL/min (%)	5/6 (83)	3/9 (33)	2/12 (17)	10/14 (71)
CrCl >50 mL/min (%)	7/10 (70)	2/9 (22)	1/7 (14)	2/13 (15) *

Data are expressed as counts (percentage) or median (range).
CrCl, creatinine clearance; MIC, minimal inhibitory concentration; PK, pharmacokinetic.
* $P = 0.03$ (vs. CrCl < 50 mL/min).

First-dose and steady-state population pharmacokinetics and pharmacodynamics of piperacillin by continuous or intermittent dosing in critically ill patients with sepsis

Jason A. Roberts[a,b,c,*], Carl M.J. Kirkpatrick[d], Michael S. Roberts[e], Andrew J. Dalley[a], Jeffrey Lipman[a,c]

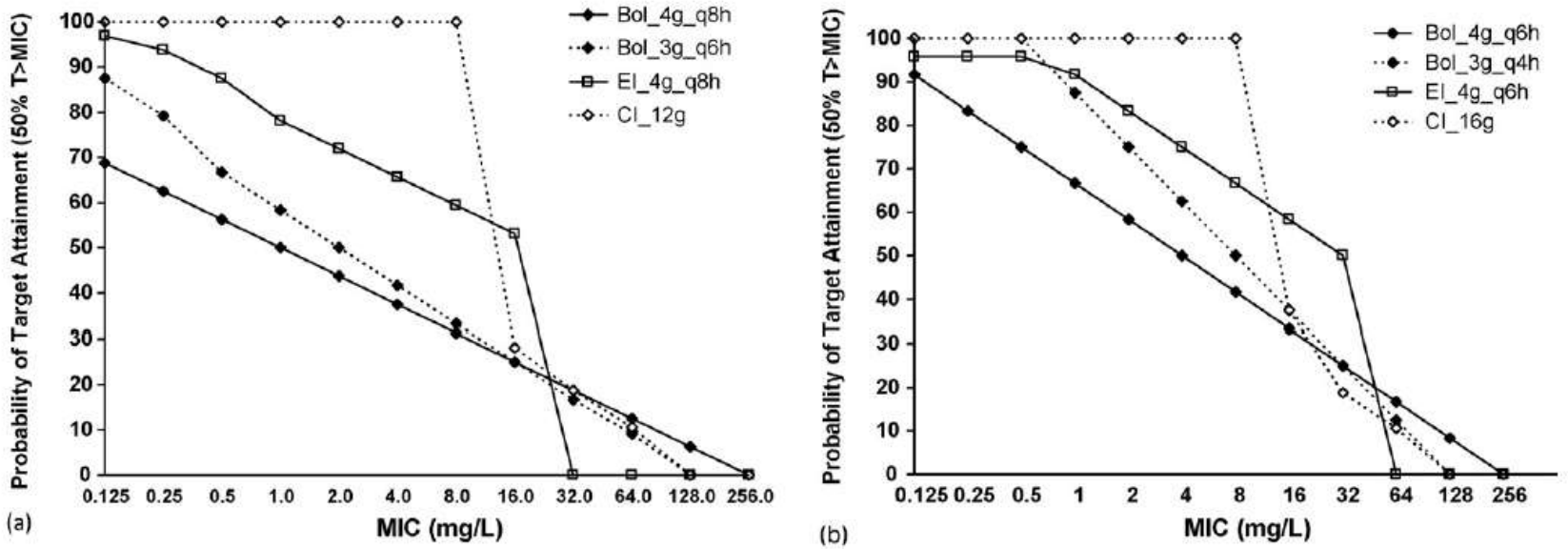


Fig. 2. Probability of target attainment (PTA) for piperacillin administered by bolus, extended or continuous dosing as (a) 12 g/day and (b) 16 g/day or 18 g/day. The chosen target for analysis was 50% of the dosing interval for piperacillin plasma concentrations to be in excess of the minimum inhibitory concentration (MIC). Bol, bolus; q8h, administered every 8 h; q6h, administered every 6 h; EI, extended infusion; CI, continuous infusion.

Appropriate Antibiotic Dosage Levels in the Treatment of Severe Sepsis and Septic Shock

Fabio Silvio Taccone · Maya Hites · Marjorie Beumier · Sabino Scolletta · Frédérique Jacobs

Curr Infect Dis Rep (2011) 13:406–415

Table 1 Recommended and PK-adjusted regimens for aminoglycosides, broad-spectrum β-lactams and vancomycin. Dosages are proposed in case of normal renal function and to target less susceptible strains. Daily regimens of aminoglycosides will depend on the C_{max}/MIC ratio obtained with the previous administrations and on the C_{min}. Continuous infusion is applied when drug is administered over 24 h. Extended infusion is scheduled as 3 to 4-hour administration for piperacillin and 3-hour administration for meropenem

	Recommended loading dose	Recommended daily dose	PK target	PK adjusted loading dose	PK adjusted daily dose
Amikacin	15 mg/kg	–	C_{max}/MIC > 8–10	25–30 mg/kg	–
Tobramycin	5–7 mg/kg	–	C_{max}/MIC > 8–10	8–9 mg/kg	–
Gentamycin	5–7 mg/kg	–	C_{max}/MIC > 8–10	8–9 mg/kg	–
Cefepime	2 g	2 g/8 h	70% T > 4 x MIC	2 g	6 g CI
Ceftazidime	2 g	2 g/8 h	70% T > 4 x MIC	2 g	6 g CI
Piperacillin	4 g	4 g/6 h	50% T > 4 x MIC	4 g	4 g q6h ED
Meropenem	1 g	1 g/8 h	40% T > 4 x MIC	1 g	1–2 g/8 h ED
Vancomycin	15 mg/kg	15 mg/kg/12 h	C_{min} > 15–20 μg/mL (II) C_{min} > 20–30 μg/mL (CI)	35 mg/kg in 4 h	30–40 mg/kg CI

CI continuous infusion; C_{max} peak concentration; *II* intermittent infusion; *MIC* minimal inhibitory concentration; *T>MIC* time above the MIC.

β-lactam antibiotic concentrations during continuous renal replacement therapy

Marjorie Beumier[1], Giuseppe Stefano Casu[1], Maya Hites[2], Lucie Seyler[2], Frederic Cotton[3], Jean-Louis Vincent[1], Frédérique Jacobs[2] and Fabio Silvio Taccone[1*]

Conclusions

During CRRT, β-lactam antibiotics regimens similar to those recommended for patients with normal renal function should be given to avoid under-dosing as empirical therapy. However, drug accumulation occurs rapidly and daily doses should be rapidly reduced, especially in case of very susceptible bacteria. Given the wide variability in drug PK parameters in this population of patients, TDM could be considered to adjust drug regimens. Drug prescription should also take into account the intensity of CRRT.

Therapeutic drug monitoring of β-lactams in critically ill patients: proof of concept

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Table 2
Effect of indication for antibiotic therapy on the need for β-lactam antibiotic dose adjustment at the first therapeutic drug monitoring (TDM) level.

Indication for antibiotic therapy	Patients	Dose maintained	Dose increased[a]	Dose decreased
Primary or secondary bacteraemia	18 (8%)	2 (11%)	13 (72%)	3 (17%)
Hospital-acquired pneumonia	89 (38%)	14 (16%)	53 (60%)	22 (25%)
Community-acquired pneumonia	47 (20%)	21 (45%)	15 (32%)	11 (23%)
Meningitis	17 (7%)	7 (41%)	8 (47%)	2 (12%)
Wound prophylaxis post-trauma or post-operative	10 (4%)	1 (10%)	9 (90%)	0 (0%)
Skin and soft-tissue infection	16 (7%)	5 (31%)	8 (50%)	3 (19%)
Abdominal sepsis	28 (12%)	7 (25%)	10 (36%)	11 (39%)
Neutropenic sepsis	4 (2%)	3 (75%)	1 (25%)	0 (0%)
Urosepsis	7 (3%)	1 (14%)	2 (29%)	4 (57%)
Total	236 (100%)	61 (25.8%)	119 (50.4%)	56 (23.7%)

[a] Dose increase includes increased dose, increased dosing frequency, or administration by continuous or extended infusion. Dose adjustments at direction of pharmacist dependent on discrepancy between TDM and minimum inhibitory concentration (MIC) information per Table 1.

Antibiotic prescription patterns in the empiric therapy of severe sepsis: combination of antimicrobials with different mechanisms of action reduces mortality

Ana Díaz-Martín[1,2,3*], María Luisa Martínez-González[4], Ricard Ferrer[5,6], Carlos Ortiz-Leyba[1,2,3], Enrique Piacentini[5], Maria Jesus Lopez-Pueyo[7], Ignacio Martín-Loeches[4,6], Mitchell M Levy[8], Antoni Artigas[4,6], José Garnacho-Montero[1,2,3] and for the Edusepsis Study Group

Table 6 Multivariate analysis of risk factors for mortality

Factors	OR	CI (95%)	*P*
Age (years)	1.023	(1.014-1.032)	<0.001
Sex (male)	1.350	(1.041-1.750)	0.024
APACHE II	1.099	(1.099-1.141)	<0.001
Community-acquired	1.487	(1.119-1.974)	0.006
DCCT	0.699	(0.522-0.936)	0.016
Focus of infection			
Pneumonia	0.784	(0.358-1.718)	0.543
Abdominal	0.595	(0.269-1.317)	0.200
Urologic	0.241	(0.102-0.569)	0.001
Meningitis	0.357	(0.122-1.046)	0.060
Skin and soft-tissue	0.424	(0.157-1.141)	0.089
Catheter	0.441	(0.135-1.445)	0.177
Others	0.772	(0.330-1.806)	0.551
More than one focus	1		

Critical Care 2012, **16**:R223

Qué podem fer millor?
TRACTAMENT ANTIBIÒTIC

- **Disposar de protocols de tractament antibiòtic**
- **Dosificació i pauta administració segons paràmetres PK/PD**
- **Monitorització de nivells**

RESSUSCITACIÓ

ENVIN-HELICS DATA. 2013

	Community (n=1573)	ICU (n=652)	Hospital (n=934)	Global (n=3211)	[IC_{95}]
Crystalloids	71,6%	64,9%	73,8%	70,7%	[69,1%-72,3%]
Lactate	59,4%	62,9%	62,7%	60,9%	[59,2%-62,6%]
CVP	59,4%	68,1%	68,1%	66,5%	[62,2%-65,5%]
$SvcO_2$	32,1%	37,0%	35,9%	34,3%	[32,6%-35,9%]
Vasopressors	67,1%	73,9%	71,3%	69,8%	[68,2%-71,4%]

RESSUSCITACIÓ

Fluid resuscitation in septic shock: A positive fluid balance and elevated central venous pressure are associated with increased mortality*

John H. Boyd, MD, FRCP(C); Jason Forbes, MD; Taka-aki Nakada, MD, PhD; Keith R. Walley, MD, FRCP(C); James A. Russell, MD, FRCP(C)

Crit Care Med 2011 Vol. 39, No. 2

Positive fluid balance as a prognostic factor for mortality and acute kidney injury in severe sepsis and septic shock☆

Fernando Saes Vilaça de Oliveira, MD, Flavio Geraldo Resende Freitas, MD, PhD, Elaine Maria Ferreira, RN, Isac de Castro, PhD, Antonio Toneti Bafi, MD, Luciano Cesar Pontes de Azevedo, MD, PhD, Flavia Ribeiro Machado, MD, PhD*

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Journal of Critical Care 30 (2015) 97–101

Fluid balance in sepsis and septic shock as a determining factor of mortality

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American Journal of Emergency Medicine 33 (2015) 186–189

Qué podem fer millor?
RESSUCITACIÓ

- **Evitar la hiperhidratació dels pacients**

I… Alguna cosa més?

Surviving Sepsis Campaign: association between performance metrics and outcomes in a 7.5-year study

Intensive Care Med (2014) 40:1623–1633

- **La major cumplimentació de les mesures dels bundles s'associa a disminució del risc de mortalitat**

- **La disminució de la mortalitat també està associada al temps de participació dels centres**

CODI SÈPSIA

CatSalut Servei Català de la Salut

El llarg camí cap el CODI SÈPSIA

Generalitat de Catalunya Departament de Salut

2002 — Declaració de Barcelona

2004 — *Surviving Sepsis Campaign*

2008 — Edusepsis CSI

NOV 2011 — Jornada de treball Sèpsia Greu. Comarques Barcelonès Nord – Maresme – Girona.

GEN 2013 — GRUP DE TREBALL CSI SOCMIC-SOCMUE-CSB

7-MAIG 2013 — PRESENTACIÓ CSI SOCIETATS CIENTÍFIQUES

OCT 2012 — GRUP DE TREBALL SÈPSIA GREU SOCMIC

7 JULIOL 2013 — Jornada tècnica sobre el Continu Assistencial en el Maneig de la Sèpsia Greu

NOV 2013 — COMISSIÓ ASSESORA *Societats Departament SEM*

2015 CODI SÈPSIA

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