Nosocomial pneumonia in the ICU: Still a disease?

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Nosocomial pneumonia in the ICU: Still a disease?

- *Recent changes in epidemiology*
- Avoiding overuse of antibiotics
- Implementing an effective preventive strategy

P. aeruginosa: Susceptibility Rates (%) 2000-2001

	AK	GM	FEP	CAZ	IMI	P/T	CIP
France	68	42	54	71	70	71	57
Italy	81	53	61	59	63	82	58
Germany	92	72	77	80	71	89	66
Spain	97	66	70	73	71	80	71
US	86	67	71	71	74	85	61
Canada	81	67	64	75	78	89	63

LRT infect
90-1
80-8
70-7
60-6
<60%

Jenzel RP et al. *Antimicrob Agents Chemother.* 2003;47:3089-3098.

P. aeruginosa – appearance of "panresistant" strains

University Hospital of Varese
March 2000
58 y/o
Pneumonia

12 days → **Ciprofloxacin + Piperacillin**

3 days → **Ciprofloxacin + Imipenem**

Bronchial washing: MDR *P. aeruginosa*

	MICs (µg/ml)		
Carbenicillin	>128	Amikacin	64
Mezlocillin	>128	Gentamicin	>128
Pip./Tazo.	48	Tobramycin	>128
Ceftazidime	>128	Netilmicin	>128
Cefepime	>128		
Aztreonam	>128	Ciprofloxacin	>128
Imipenem	>128	Levofloxacin	>128
Meropenem	>128		

Production of PER-1 ESBL VIM-2 MBL

Docquier *et al*. *Emerg Infect Dis* 2001; 7:910

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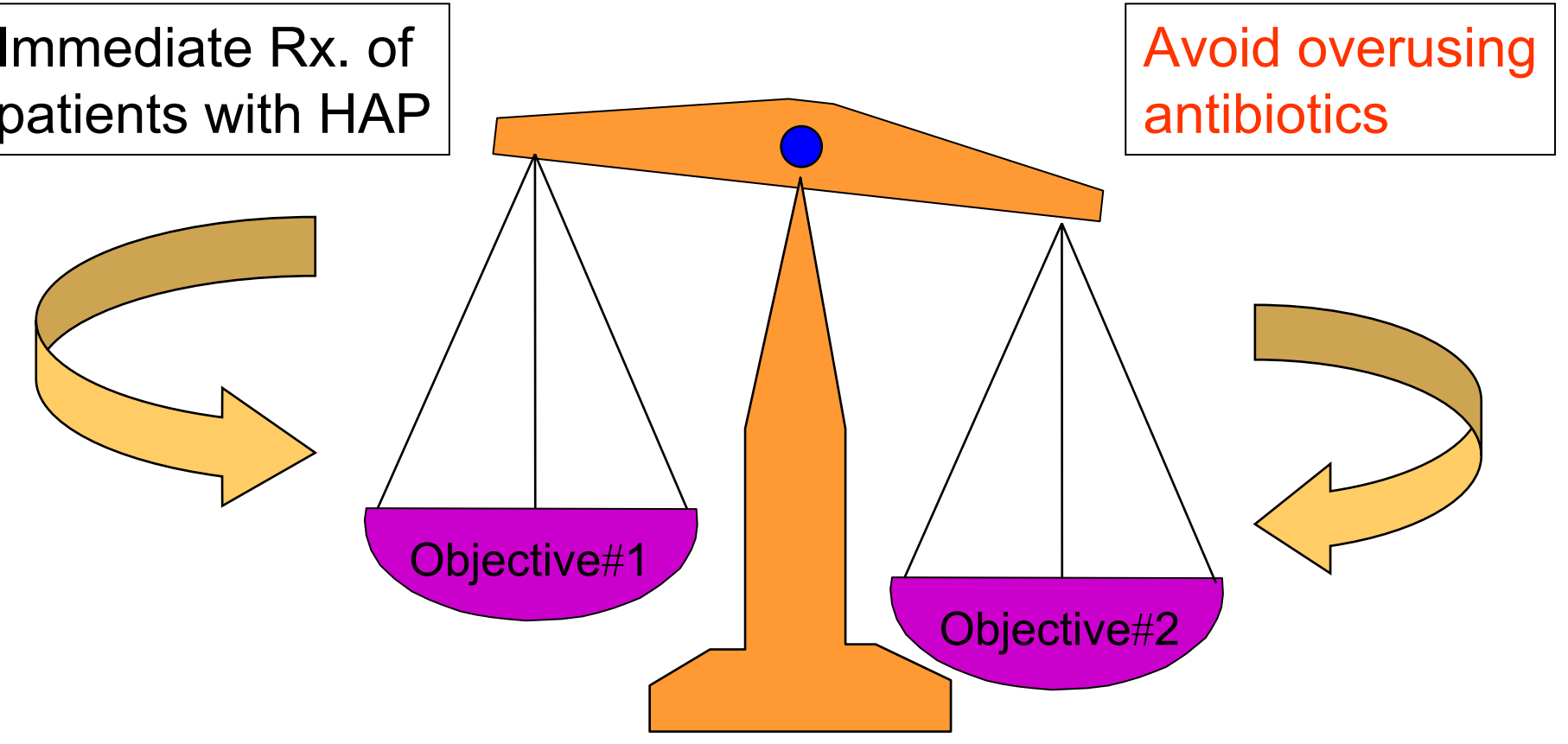
Biological Markers for Early Diagnosis and Treatment Response in VAP: *The Search for the Holy Graal*



HAP: Current Treatment Guidelines

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merican Thoracic Society Documents

idelines for the Management of Adults with spital-acquired, Ventilator-associated, and althcare-associated Pneumonia

OFFICIAL STATEMENT OF THE AMERICAN THORACIC SOCIETY AND THE INFECTIOUS DISEASES SOCIETY OF AMERICA WAS AP
E ATS BOARD OF DIRECTORS, DECEMBER 2004 AND THE IDSA GUIDELINE COMMITTEE, OCTOBER 2004

chairs: M. Niederman; D. Craven
mmittee members: M. Bonten; J. Chastre; W. Craig; J.Y. Fagon;
all; G. Jacoby; M. Kollef; C. Luna; L. Mandell; A. Torres; R. Wunderink

Am J Respir Crit Care Med 2005;171:388-416

Current Treatment Guidelines: What is new?

- Immediate sampling of airways secretions before introduction of new ABs
- Risk factors for multiresistant strains
- Making explicit the way antibiotics could be stopped on days 2-3
- Stopping vancomycin and linezolid if no MRSA isolated
- Restricting the use of broad-spectrum agents to infection caused by pathogens only susceptible to these agents
- Switching to monotherapy on day 3
- Shortening the duration of therapy

Risk Factors for Multidrug-Resistant Pathogens

- Antimicrobial therapy in preceding 90 d
- Current hospitalization of 5 d or more
- High frequency of antibiotic resistance in th community or in the specific hospital unit
- Presence of risk factors for HCAP:
  - Hospitalization for 2 d or more in the preceding 90 d
  - Residence in a nursing home or extended care facility
  - Home infusion therapy (including antibiotics)
  - Chronic dialysis within 30 d
  - Home wound care
  - Family member with multidrug-resistant pathogen
- Immunosuppressive disease or therapy

Stage B-Step 2: Focusing Therapy Once the Agent of Infection is Identified

- In many patients, including those with late-onset infection, therapy can be narrowed:
  - either because an anticipated organism, such as *P. aeruginosa* or MRSA, was no recovered
  - or because the organism(s) is(are) susceptible to a less broad-spectrum antibiotic than used in the initial regimen

Focusing Therapy Once the Agent of Infection is Identified (2

- Restrict use of very broad-spectrum agents, such as carbapenems, pip./taz., and cefepim to infection caused by pathogens only susceptible to these agents; i.e.,
  - Treat infections caused by Enterobacteriaceae with a 3rd-gen. cephalosporin (except ESBL-producing strains)
  - Treat MSSA infections with oxacillin
  - Restrict use of ciprofloxacin to pts allergic to ß-lactams.

uoroquinolone Use and Subsequent mergence of Multiple Drug-resistant acteria in 239 ICU Patients

Nseir et al. Crit Care Med 2005

Variable	Odds ratio (95% CI)	P value
Duration of antibiotic treatment	1.1 (1.0-1.2)	<0.001
Fluoroquinolone use	3.3 (1.7-6.5)	<0.001

mited Value of Combination Therap Patients with Severe Infection

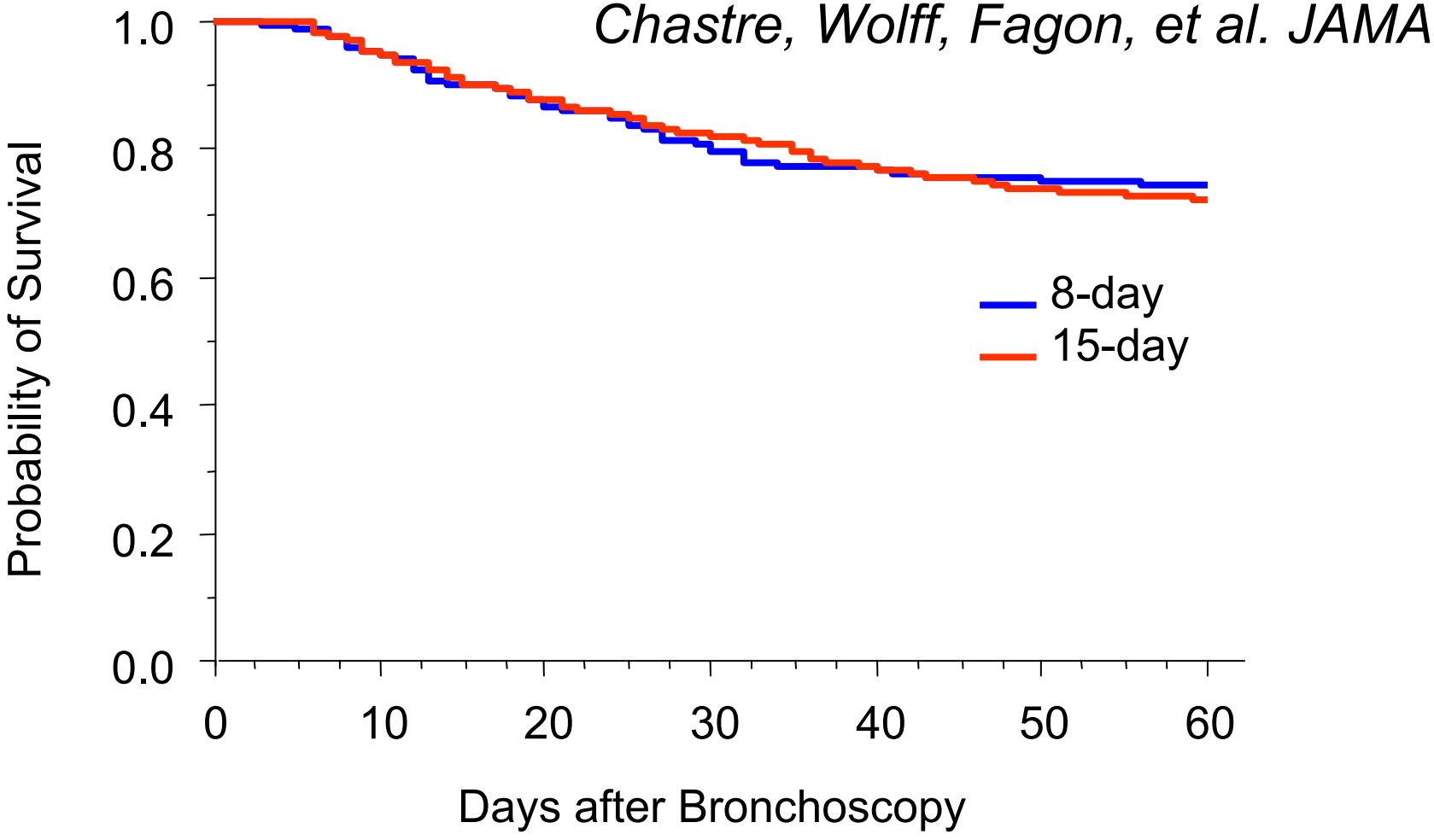
Paul et al. BMJ 2004; 328: 66

- Meta-analysis of beta-lactam monotherapy vs. beta-lactam/aminoglycoside combination for severe infection
- 64 randomized trials, non-neutropenic,7586 patients
  - No difference in mortality (RR for monoRx. 0.90)
  - No differences in clinical and bacteriologic failures (RR=0.87 and 0.86)
  - No advantage for *P. aeruginosa* infection (426 patients)
  - No difference in emergence of resistance or colonization rates
  - Significantly less nephrotoxicity with monoRx. (RR =0.36)

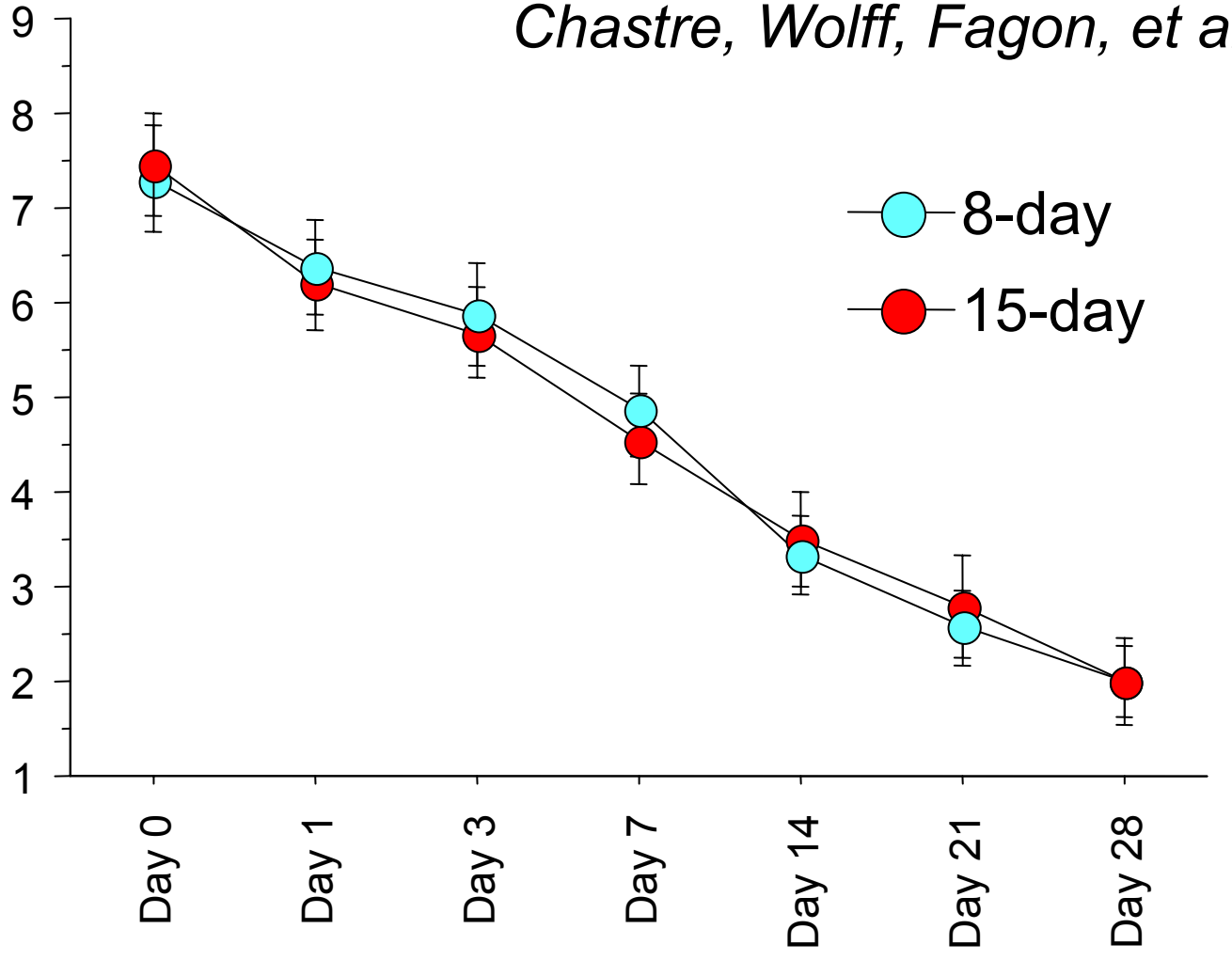
Stage B-Step 4: Shortening Duration of Therapy

- If patients have received an initially appropriate regimen, therapy can be shortened to periods as short as 7-8 days, as dictated by clinical response.
- Possible exceptions are immunosuppressed patients and those with infections caused by very difficult-to-treat organisms.

umulative Survival Estimates According Duration of Antimicrobial Treatment

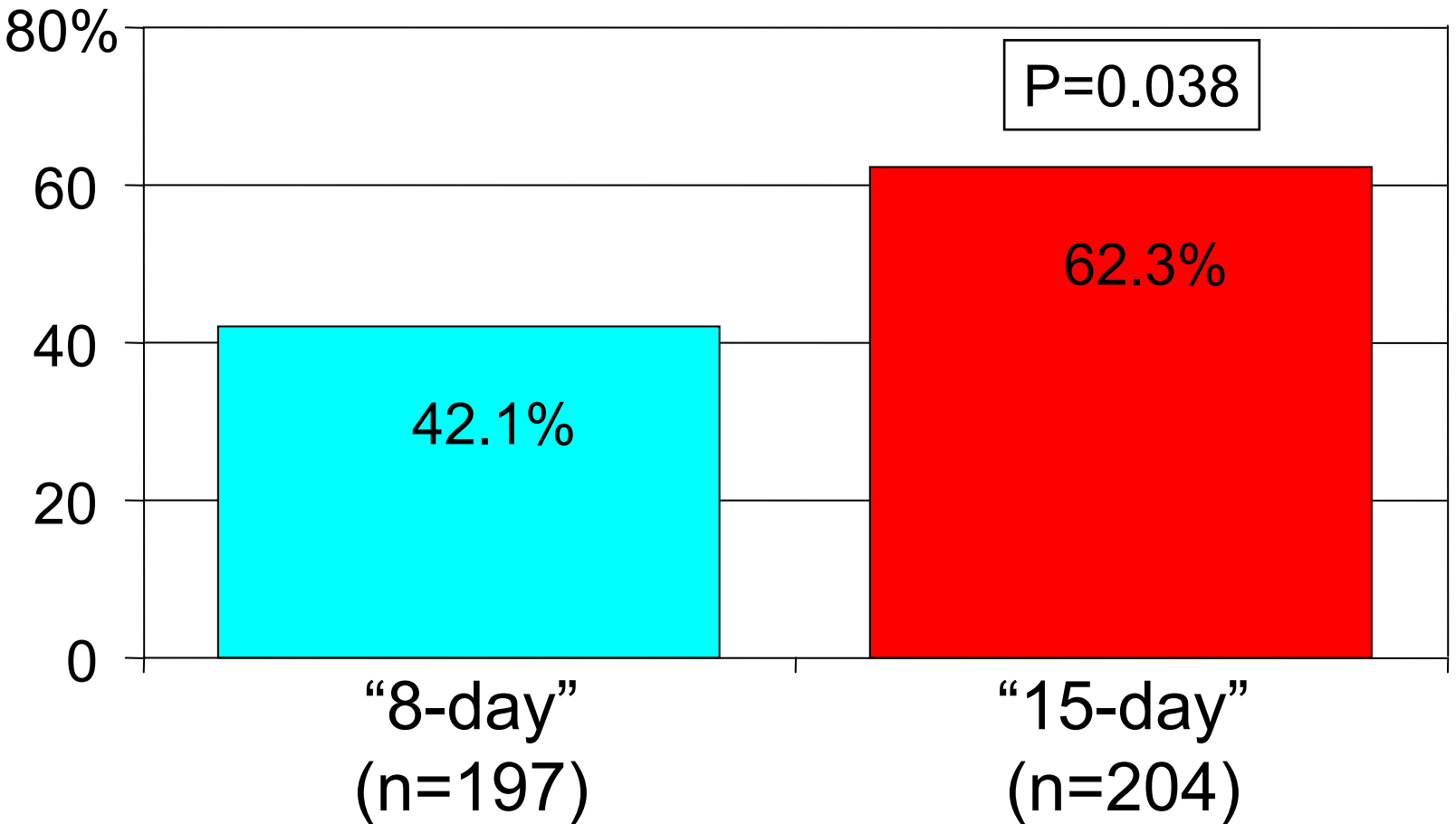


hanges in SOFA score from dmission to day 28



nergence of Multiresistant Pathogens for tients Who Had Pulmonary Infection currence

Chastre, Wolff, Fagon, et al. JAMA 20



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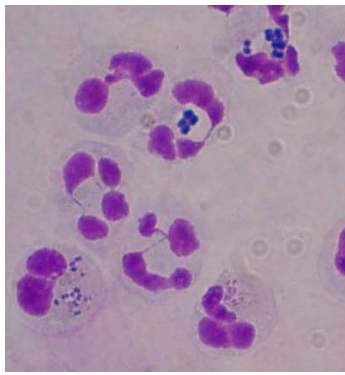
Personal Recipe

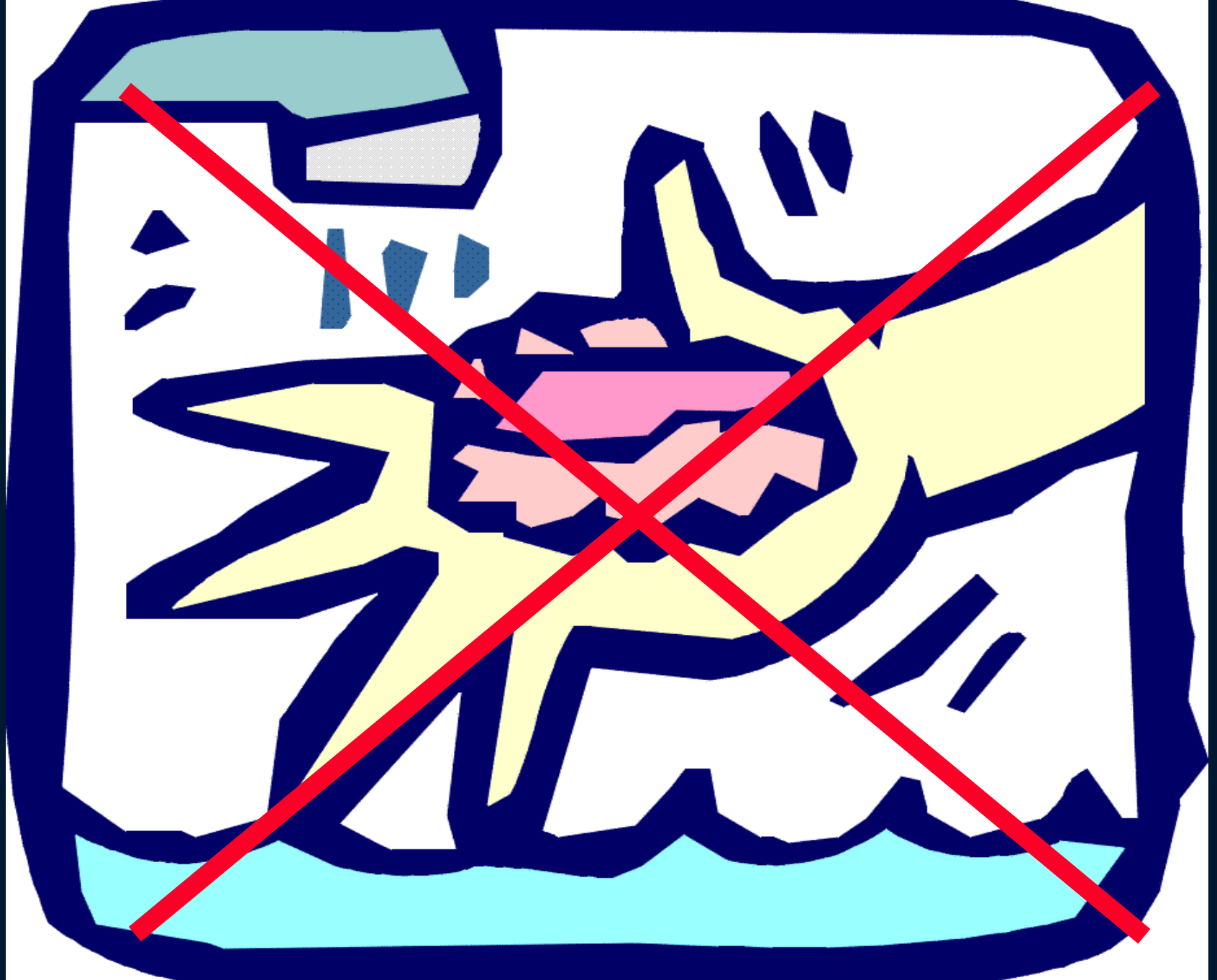
Chastre J. Respiratory Care 2



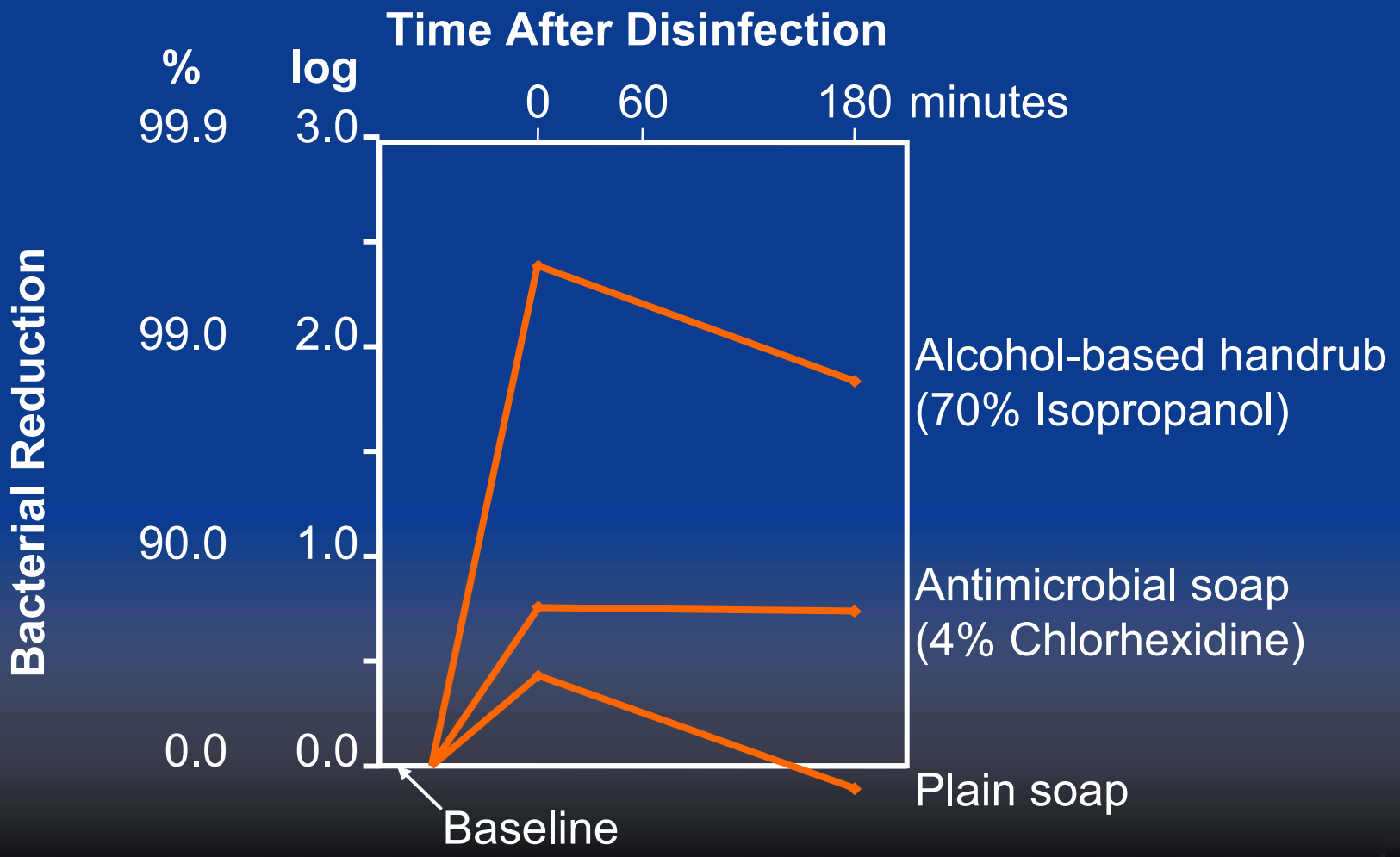
1. Assure adequate staffing levels
2. Immunize HCW for influenza
3. Hand hygiene with alcohol rubs
4. Avoid overuse of antibiotics
5. Follow a restrictive transfusion trigger policy
6. Reduce as much as possible the duration of MV
7. Avoid nasal insertion of endotracheal tubes
8. Maintain cuff pressure >20 cm H_2O
9. Re-intubate promptly patients who would inexorably fail extubation
10. Keep patients semirecumbent
11. Provide oral care with chlorhexidine
12. Use HME or heated-wire circuits

ICU Staffing and Risk of Infection

hor	Year	Journal	Predictor Variable	Outcome
dkin	1996	ICHE	Patient to nurse ratio	Rates of IVDR BSI significantly associated with increasing patient-to nurse ratio
chibald	1997	JID	Nursing hours per patient day	Significant inverse relationship betw nursing hours:patient day and nosocomial infection rate found (r -0 *P* = 0.003)
rbarth	1999	ICHE	Normal versus Under-staffed periods	Rates of nosocomial infection cause by *E. cloacae* increased 6-fold (CI 2.2 16.4) in an ICU during understaffed periods
edleman	2002	NEJM	Hours of care provided by RN	Rates of HAP and UTI decreased 2.7 and 3.6% for every additional hour o patient care provided by an RN
nso- anove	2003	ICHE	Float nurse activity	IVDR BSI 2.6x greater in patients receiving >60% of their care from flo nurses



Ability of Hand Hygiene Agents to Reduce Bacteria on Hands



Adapted from: *Hosp Epidemiol Infect Control*, 2nd Edition, 1999

Time Spent Cleansing Hands: one nurse per 8 hour shift

- Hand washing with soap and water: 56 minutes
  - Based on seven (60 second) handwashing episodes per hour
- Alcohol-based handrub: 18 minutes
  - Based on seven (20 second) handrub episodes per hour

~ Alcohol-based handrubs reduce time needed for hand disinfection ~

Voss A and Widmer AF. *Infect Control Hosp Epidemiol* 1997;18:205-208.

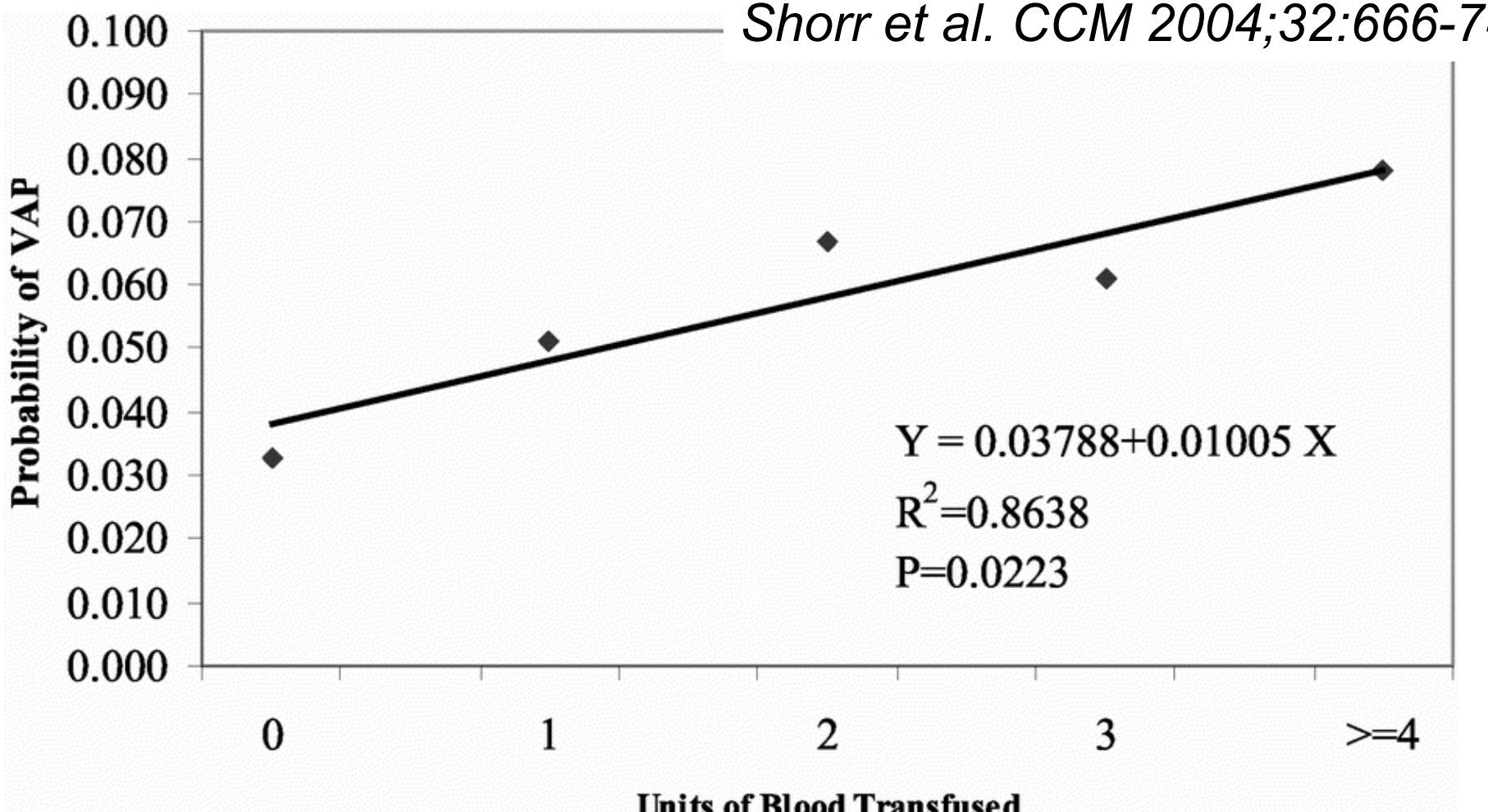
Shorr et al. CCM 2004. A prospective cohort of 1518 patients

e 2. Multivariate analysis of independent risk factors for all ventilator-associated pneumon

Variable	Adjusted Odds Ratio[a]	95% CI	p
ale	1.54	1.15–2.07	
emale	Ref	—	
itting diagnosis			
rauma	1.68	1.15–2.47	
ther diagnoses	Ref	—	
tion			
ontinuous sedation (yes/no)	1.43	1.07–1.92	
itional status			
arly enteral nutrition	2.65	1.93–3.63	<
PN	3.27	2.24–4.75	<
ral intake	Ref	—	
sfusion			
-2 units transfused	1.90	1.28–2.82	
2 units transfused	1.87	1.24–2.82	
o transfusion	Ref	—	
transfusion (yes/no)[b]	1.89	1.33–2.68	
ation of MV, days	1.50	1.33–1.70	<

ed Blood Cell Transfusion and VAP: A rospective Cohort Study of 1518 Patien

Shorr et al. CCM 2004;32:666-7

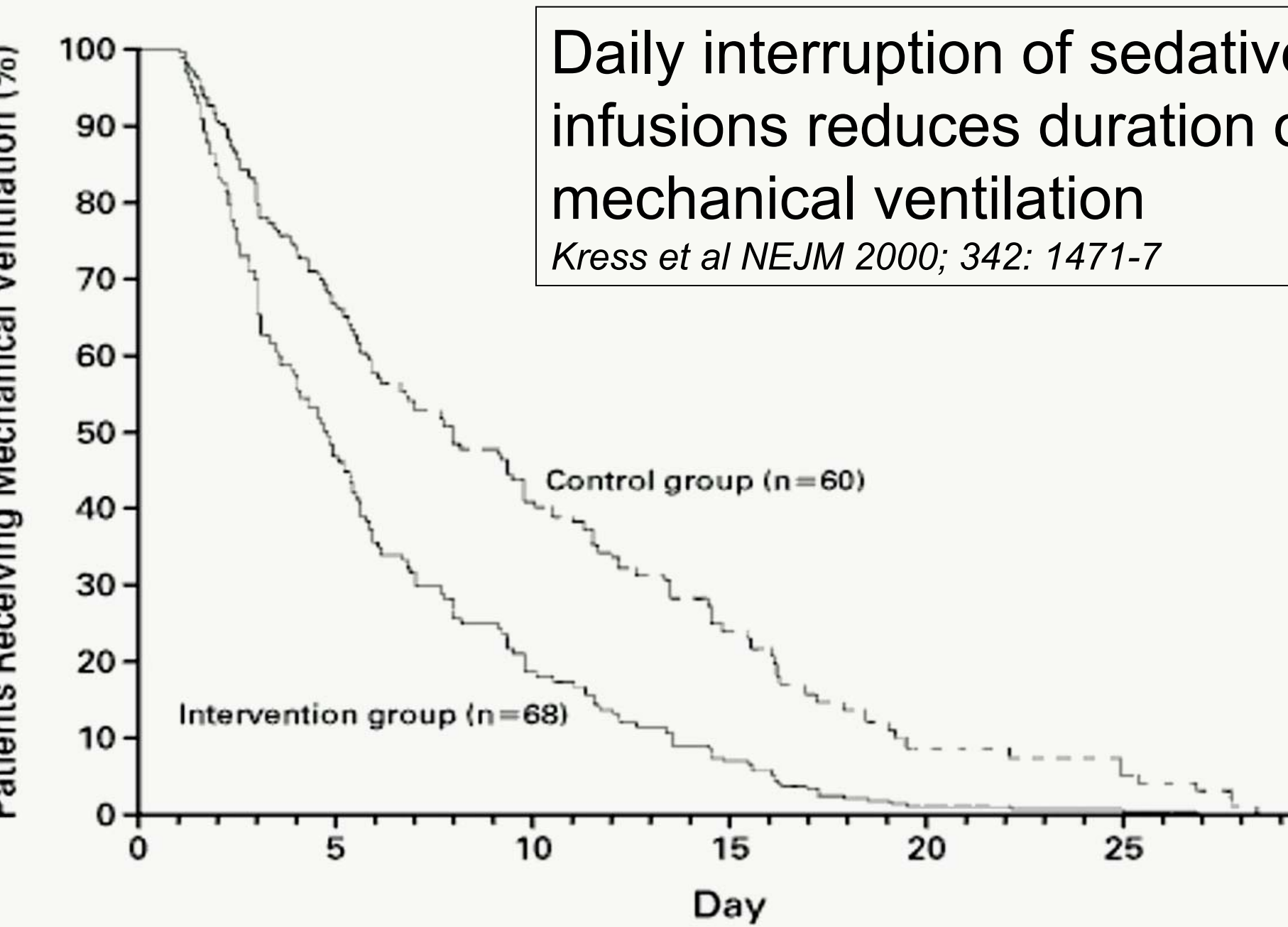


Prevention of Pulmonary Infections in the ICU: Duration of Exposure

- Use NIV when possible.
- Use intensive insulin therapy with tight control of glycemia
- Extubate as soon as possible.
  - Daily interruption of sedative infusion
  - Weaning protocol
  - Avoid use of paralyzing agents
- Prevent accidental extubation.

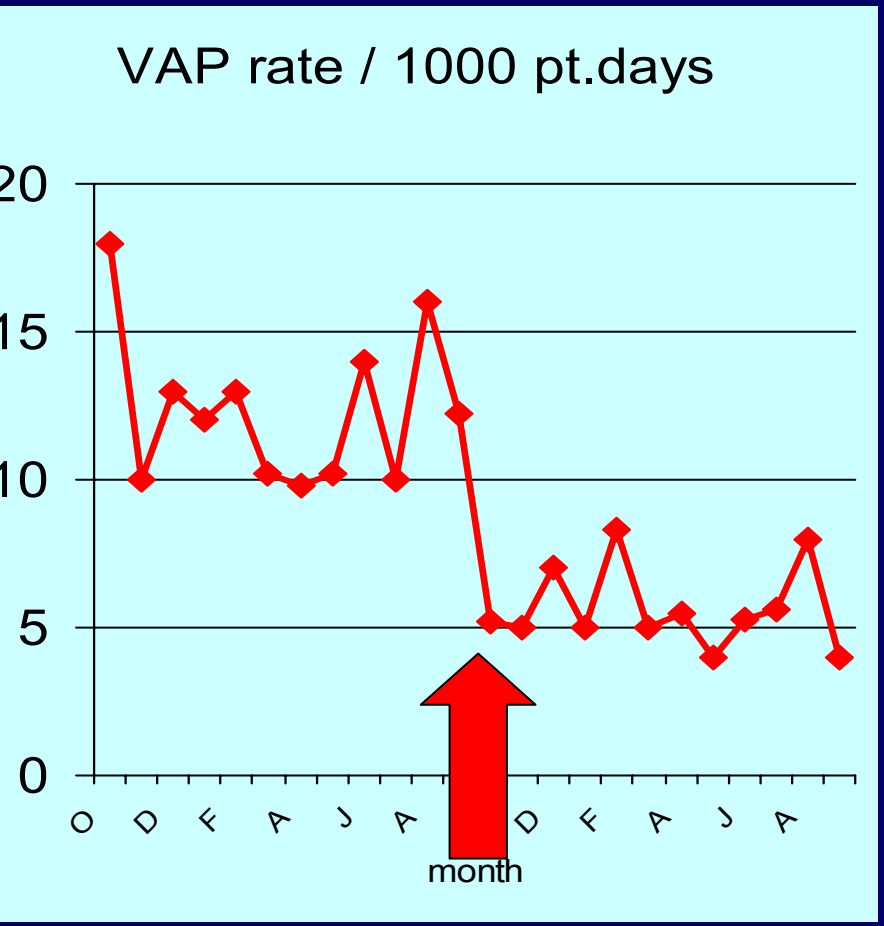
Daily interruption of sedative infusions reduces duration o mechanical ventilation

Kress et al NEJM 2000; 342: 1471-7



An education program for respiratory therapists and nurs reduced incidences of VAP

J. Zack et al. Crit Care Med 2002; 30: 2407-12



- Semi-recumbent patient position
- Oral instead of nasal intubation
- Oral instead of nasogastric tubes
- Extubate as soon as possible
- Prevent accidental extubation
- Prevent adequate sedation to prevent accidenta extubation
- Avoid gastric overdistension
- Provide oral hygiene >1/day
- Drain condensate from respiratory circuit
- Use in-line adapters for aerosolized medicatio
- Use non-invasive MV when possible
- Avoid overuse of antibiotics
- Provide daily chlorhexidine oral rinse
- Immunize for influenza and S. pneum.