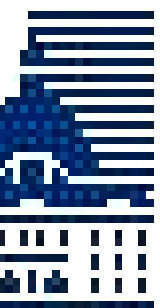


Nosocomial pneumonia in the ICU: Still a disease?



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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

90-100%

80-89%

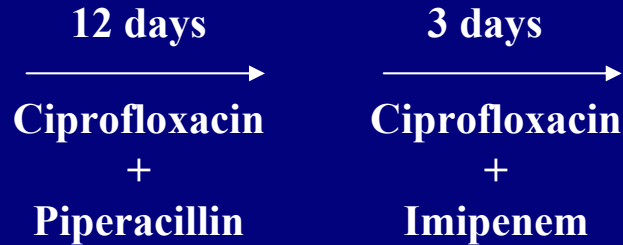
70-79%

60-69%

<60%

P. aeruginosa – appearance of "panresistant" strains

University Hospital of Varese
 March 2000
 58 y/o
 pneumonia

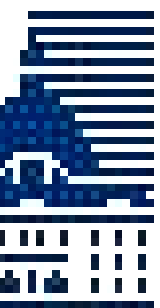


**Bronchial washing:
 MDR *P. aeruginosa***

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**



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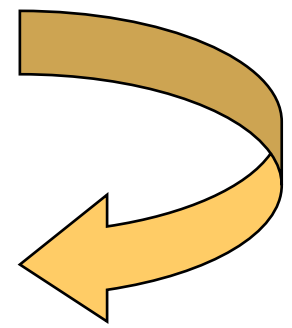
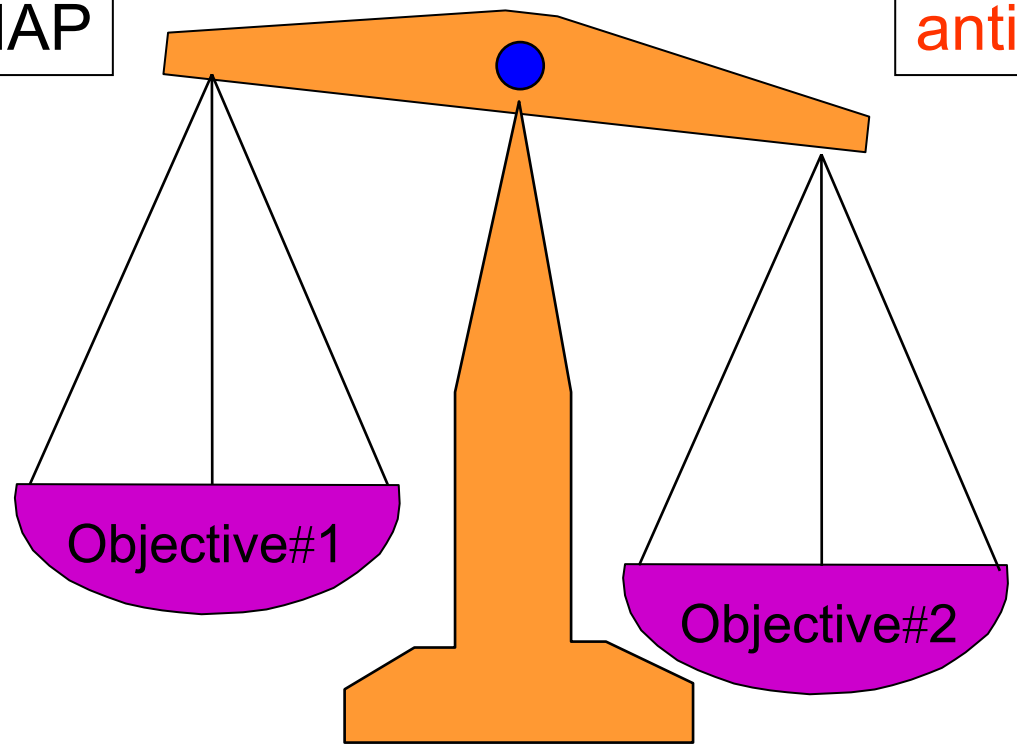
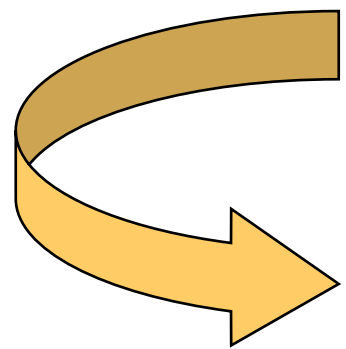
- Recent changes in epidemiology
- *Avoiding overuse of antibiotics*
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Biological Markers for Early Diagnosis and Treatment Response in VAP: The Search for the Holy Graal

Immediate Rx. of patients with HAP

Avoid overusing antibiotics





HAP: Current Treatment Guidelines



American Thoracic Society Documents

Guidelines for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia

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

Chairs: M. Niederman; D. Craven

Committee members: M. Bonten; J. Chastre; W. Craig; J.Y. Fagon;

et al.; 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



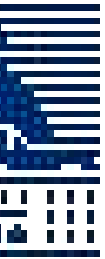
Risk Factors for Multidrug-Resistant Pathogens

- Antimicrobial therapy in preceding 90 d
- Current hospitalization of 5 d or more
- High frequency of antibiotic resistance in the 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 not 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 cefepime 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 β -lactams.

Fluoroquinolone Use and Subsequent Emergence of Multiple Drug-resistant Bacteria in 239 ICU Patients

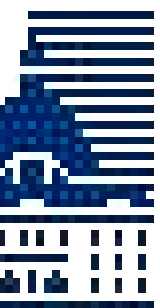
Nseir et al. Crit Care Med 2005

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

Unlimited Value of Combination Therapy Patients with Severe Infection

Paul et al. BMJ 2004; 328: 66

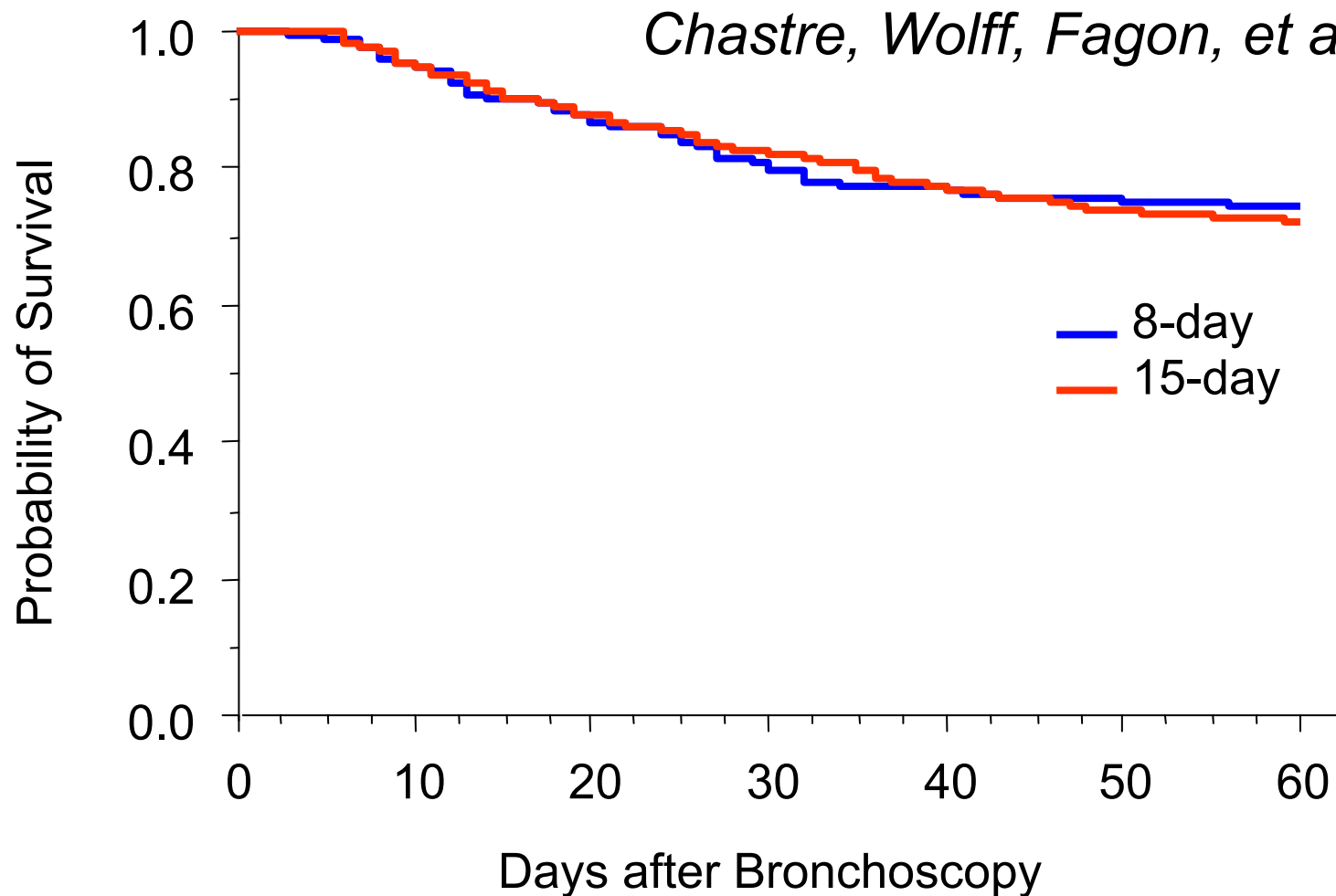
- Meta-analysis of beta-lactam monotherapy vs. beta-lactam/aminoglycoside combination for severe infection
- 64 randomized trials, non-neutropenic, 7586 patients
 - No difference in mortality (RR for monoRx. 0.90)
 - No differences in clinical and bacteriologic failures (RR=0.87 and 0.86)
 - No advantage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



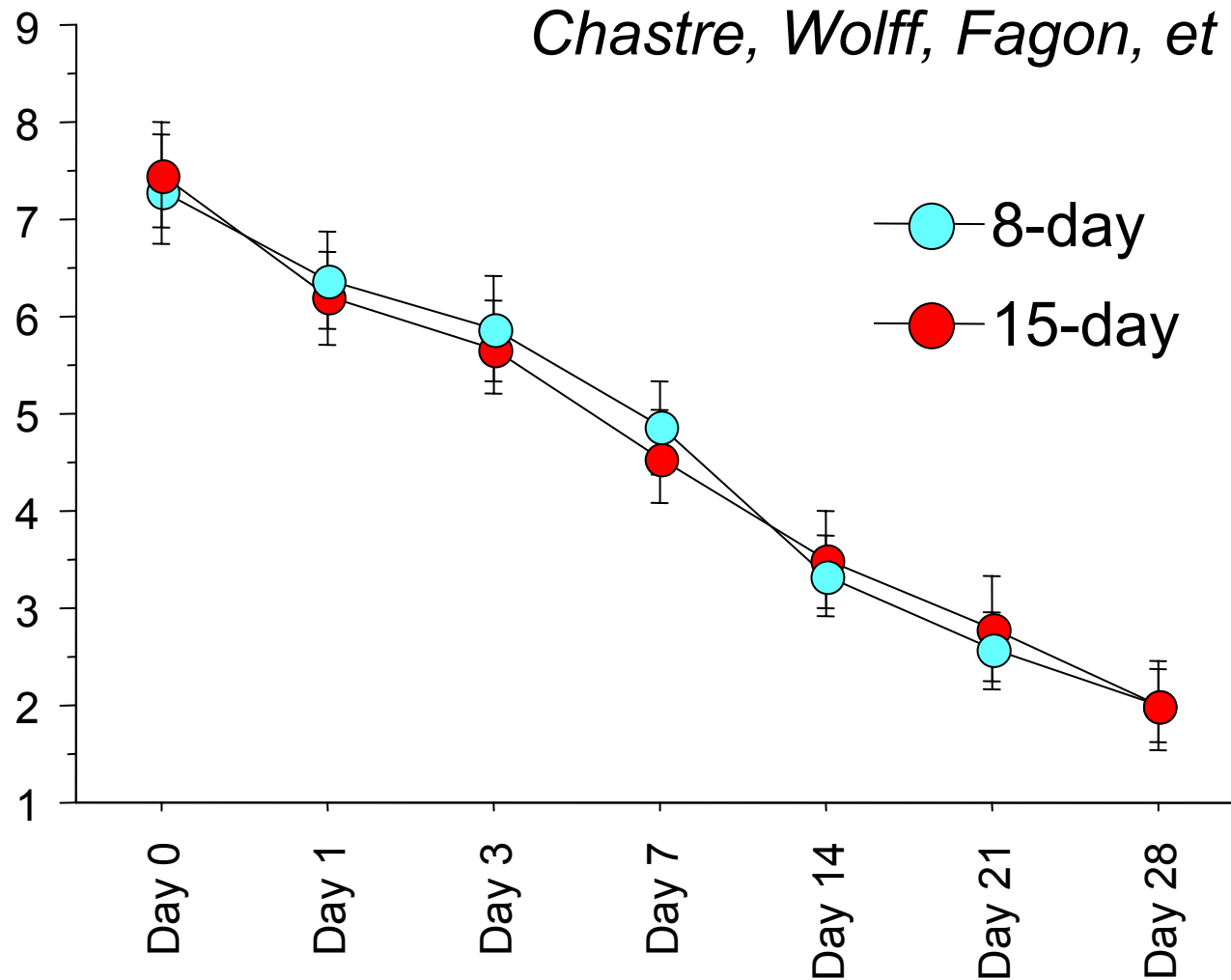
Stage B-Step 4: Shortening Duration of Therapy

- 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.

Cumulative Survival Estimates According to Duration of Antimicrobial Treatment



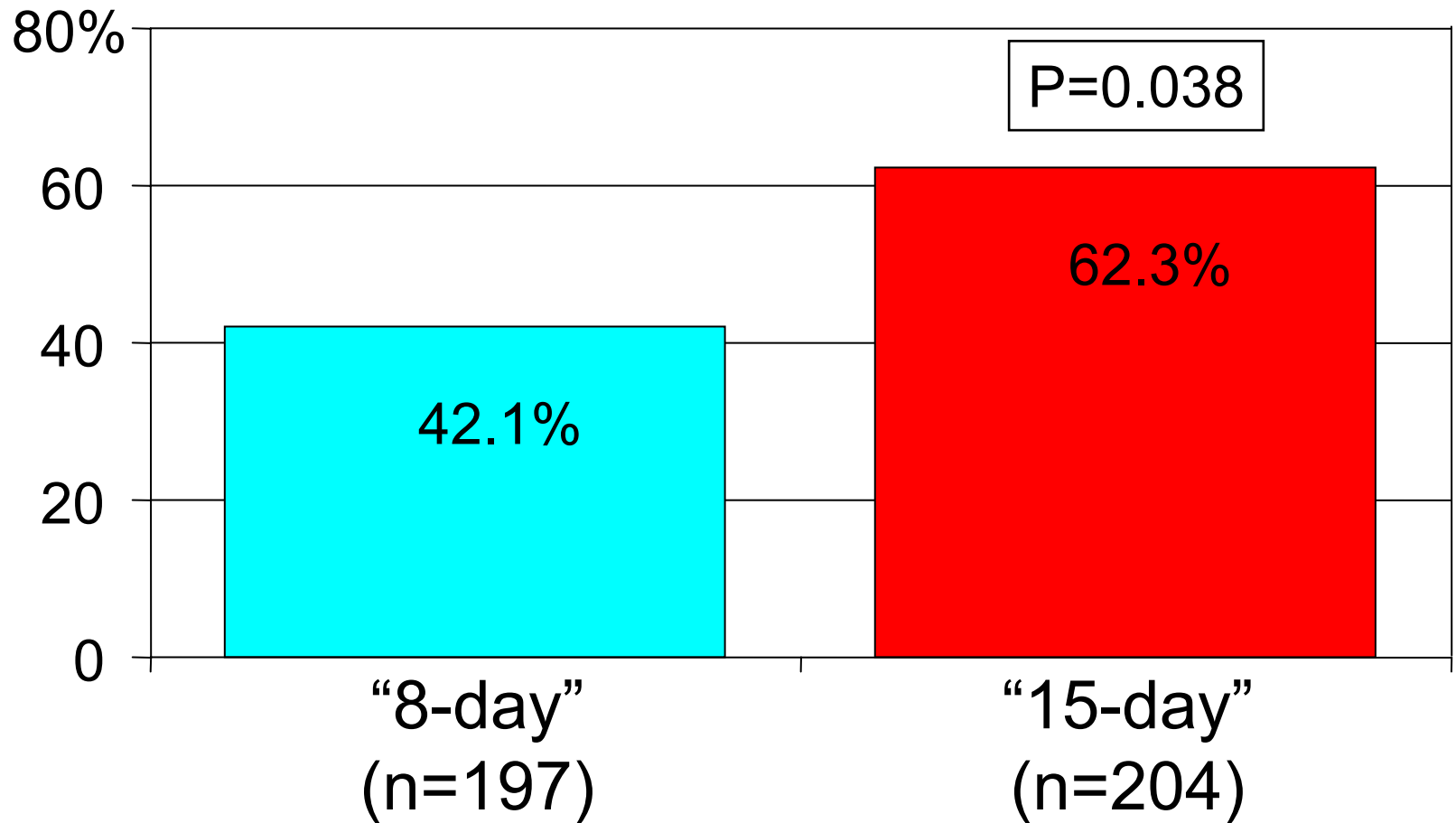
Changes in SOFA score from admission to day 28

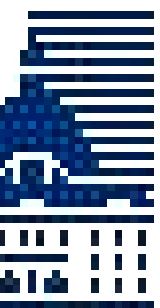


Emergence of Multiresistant Pathogens for Patients Who Had Pulmonary Infection

Prevalence

Chastre, Wolff, Fagon, et al. JAMA 200

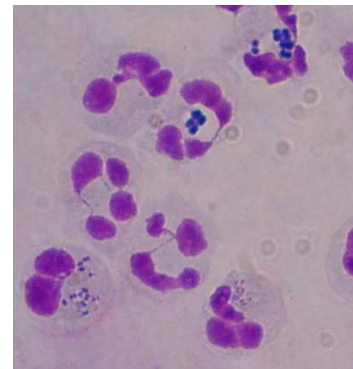




Nosocomial pneumonia in the ICU: Still a disease?

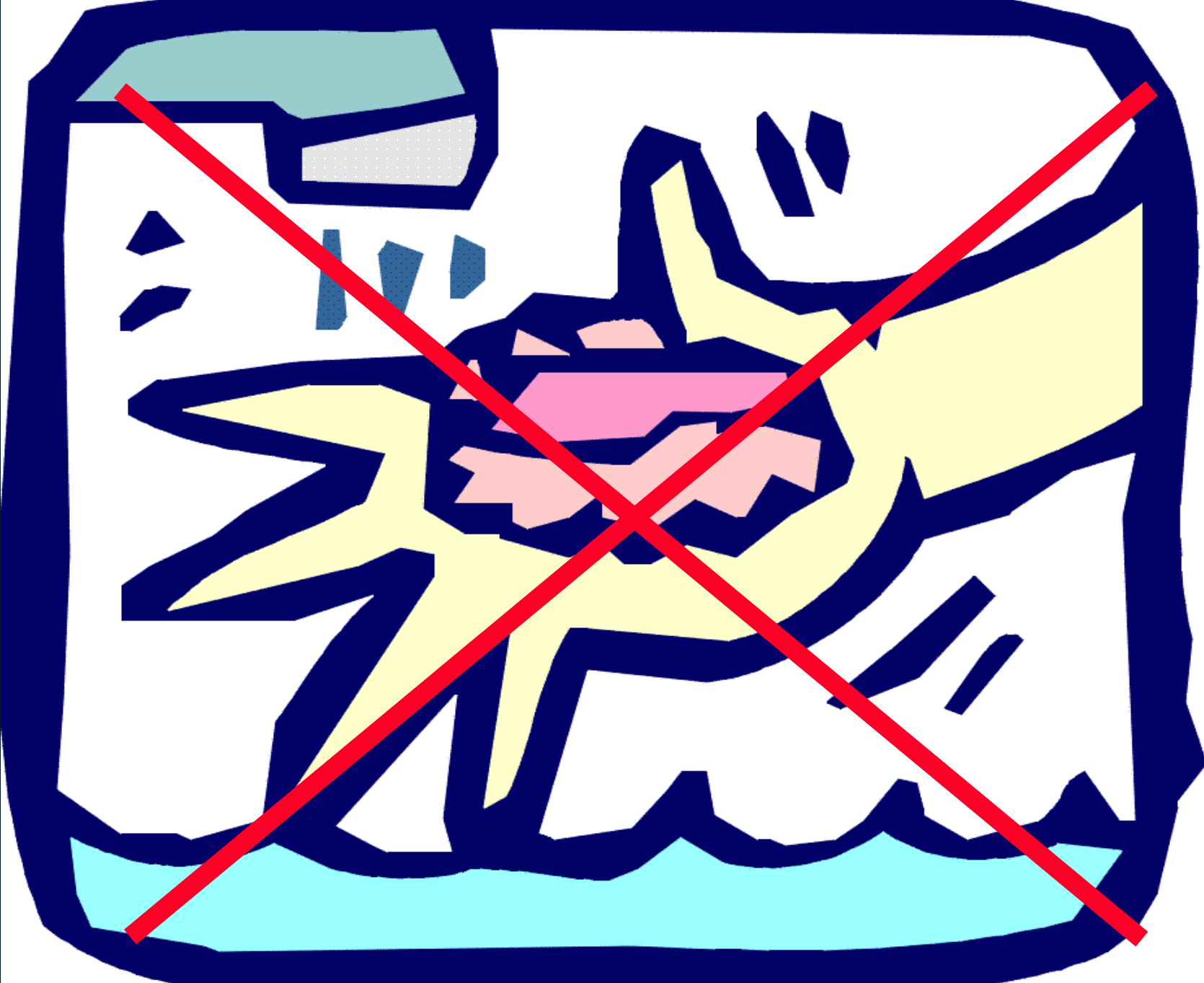
- Recent changes in epidemiology
- Avoiding overuse of antibiotics
- *Implementing an effective preventive strategy*

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 H₂O
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

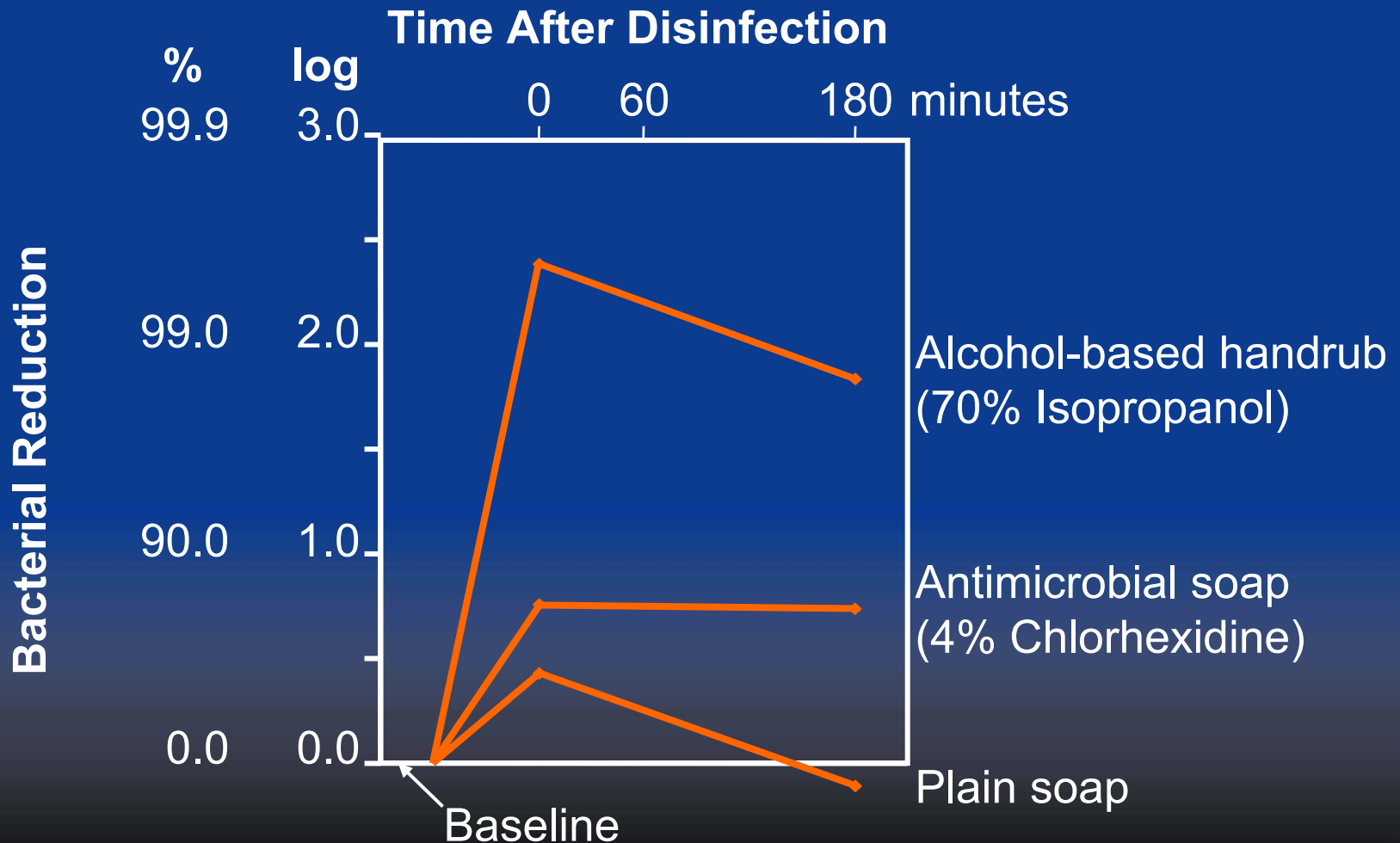


ICU Staffing and Risk of Infection

Author	Year	Journal	Predictor Variable	Outcome
Adkin	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 between nursing hours:patient day and nosocomial infection rate found ($r = -0.4$, $P = 0.003$)
Barth	1999	ICHE	Normal versus Under-staffed periods	Rates of nosocomial infection caused by <i>E. cloacae</i> increased 6-fold (CI 2.2-16.4) in an ICU during understaffed periods
Bedleman	2002	NEJM	Hours of care provided by RN	Rates of HAP and UTI decreased 2.7% and 3.6% for every additional hour of patient care provided by an RN
Manove	2003	ICHE	Float nurse activity	IVDR BSI 2.6x greater in patients receiving >60% of their care from float nurses



Ability of Hand Hygiene Agents to Reduce Bacteria on Hands



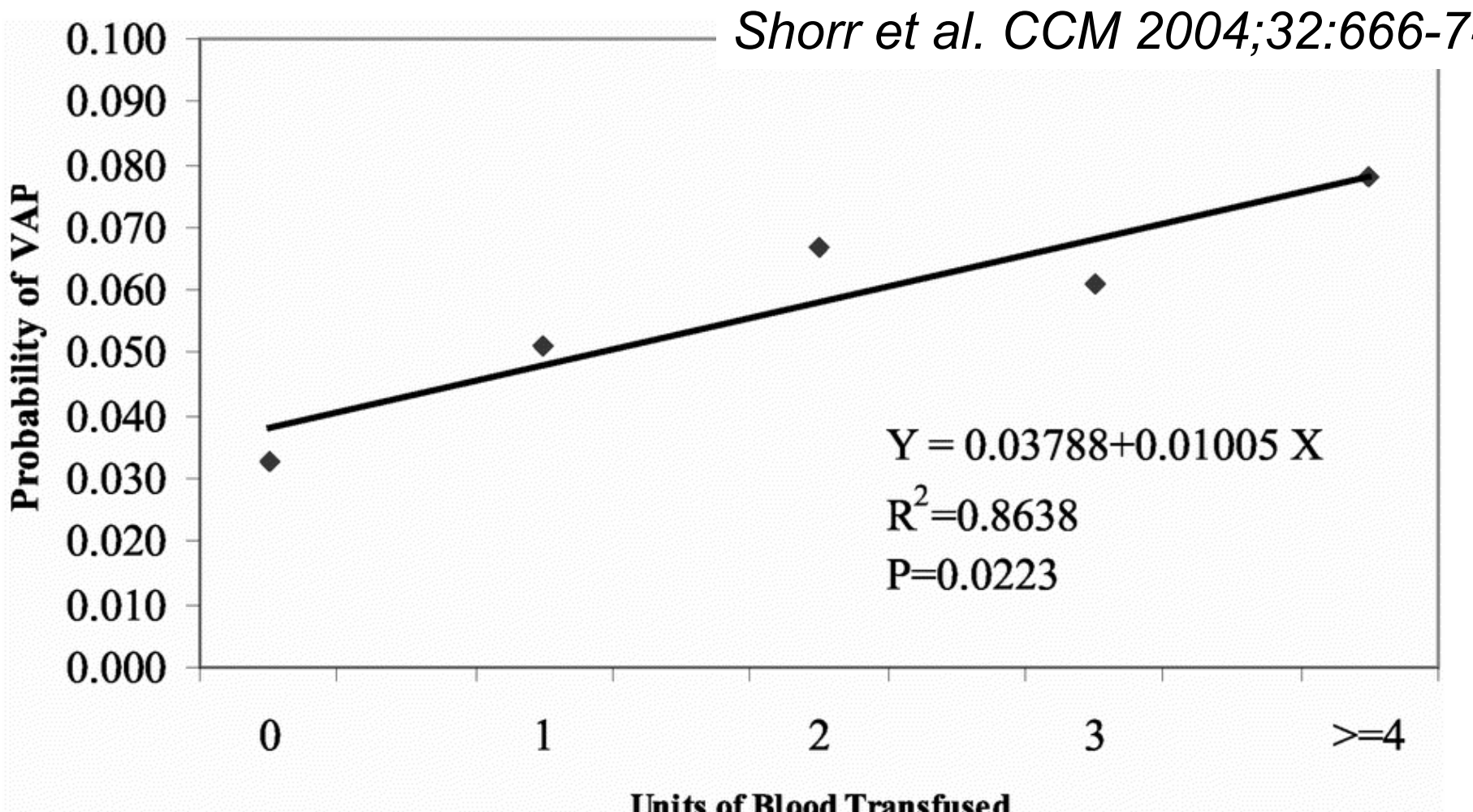
Time Spent Cleansing Hands: one nurse per 8 hour shift

- 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 ~**

Table 2. Multivariate analysis of independent risk factors for all ventilator-associated pneumonia

Variable	Adjusted Odds Ratio ^a	95% CI	p
Male	1.54	1.15–2.07	
Female	Ref	—	
Admitting diagnosis			
Trauma	1.68	1.15–2.47	
Other diagnoses	Ref	—	
Intubation			
Continuous sedation (yes/no)	1.43	1.07–1.92	
Functional status			
Early enteral nutrition	2.65	1.93–3.63	<
PN	3.27	2.24–4.75	<
Oral intake	Ref	—	
Transfusion			
<2 units transfused	1.90	1.28–2.82	
2–4 units transfused	1.87	1.24–2.82	
No transfusion	Ref	—	
Transfusion (yes/no) ^b	1.89	1.33–2.68	
Duration of MV, days	1.50	1.33–1.70	<

Red Blood Cell Transfusion and VAP: A Prospective Cohort Study of 1518 Patients

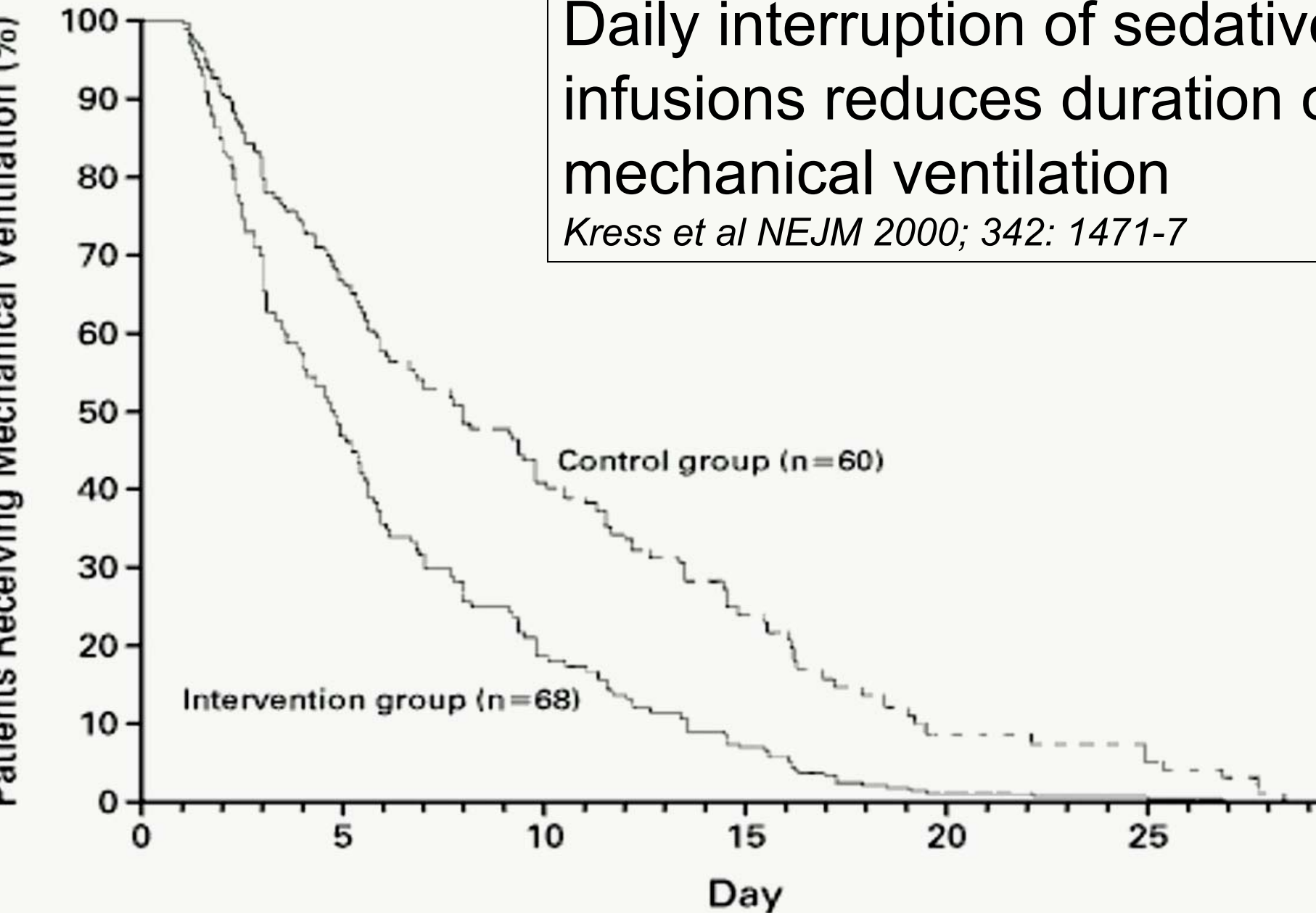


Prevention of Pulmonary Infections in the ICU: Duration of Exposure

- 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.

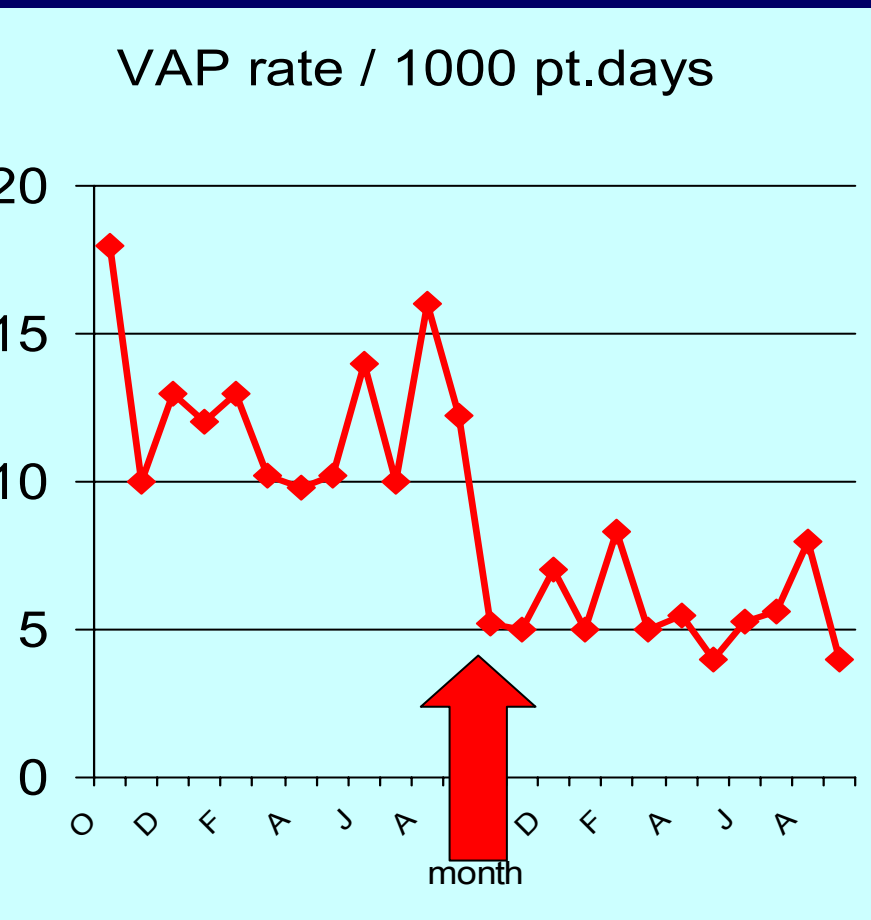
Daily interruption of sedative infusions reduces duration of mechanical ventilation

Kress et al NEJM 2000; 342: 1471-7



An education program for respiratory therapists and nurses 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 accidental extubation
- Avoid gastric overdistension
- Provide oral hygiene >1/day
- Drain condensate from respiratory circuit
- Use in-line adapters for aerosolized medication
- Use non-invasive MV when possible
- Avoid overuse of antibiotics
- Provide daily chlorhexidine oral rinse
- Immunize for influenza and S. pneum.