

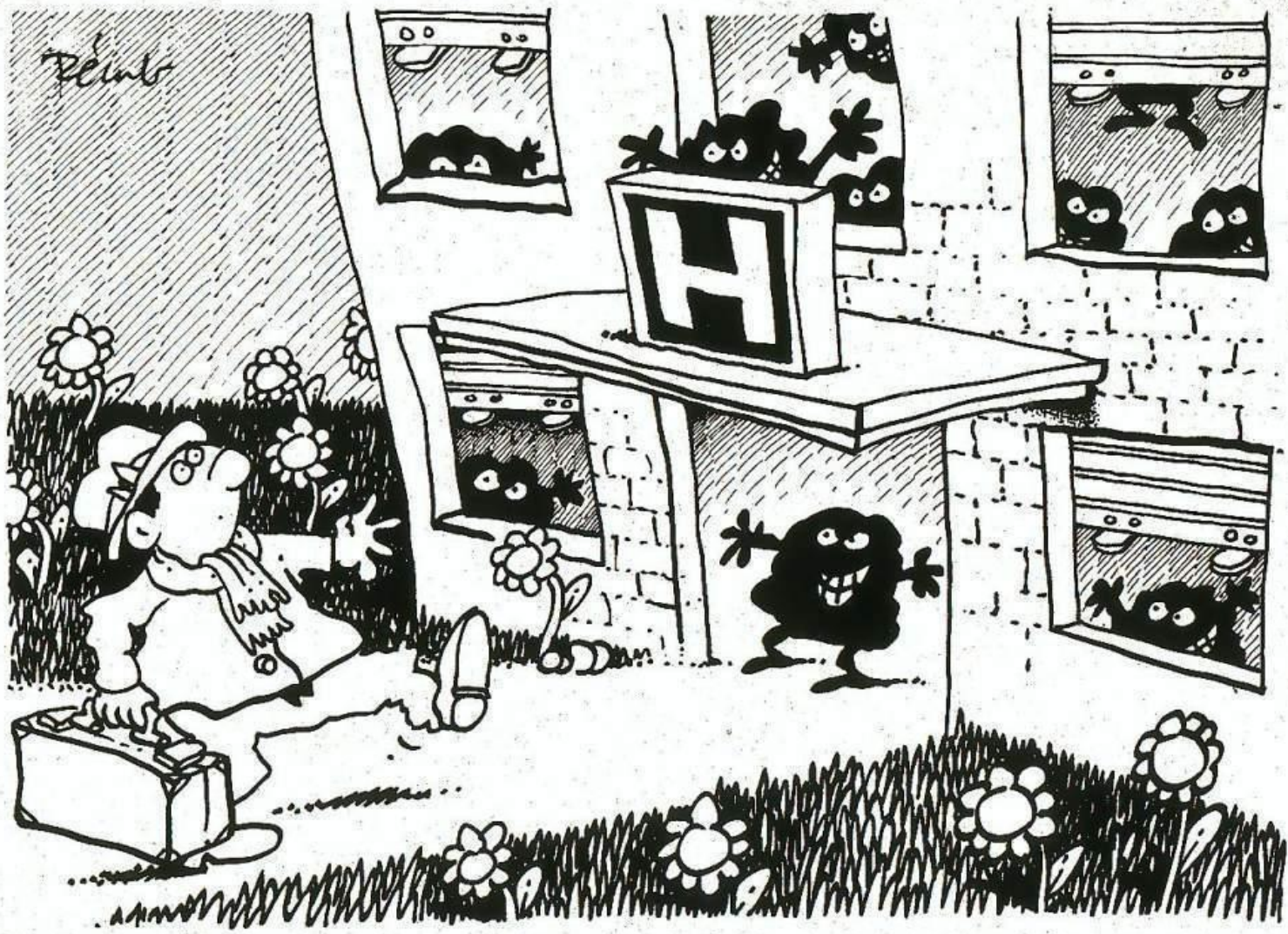


Nosocomial infection

OR

Hospital acquired infection

Dr. Marashi





*The very first
requirement in a
hospital is that it
should do the
sick no harm*

Florence Nightingale, 1820 - 1907



2million patients suffer from hospital-acquired infections every year
And
Nearly 100,000 of them die

تعریف

۱. عفونتی که بعد از ۴۸ ساعت از بستری شدن

۲. ۳ روز بعد از مرخص شدن

۳. ۳۰ روز بعد از اعل



اہمیت عفونت بیمارستانی

۱) جنبہ انسانی

۲) جنبہ اقتصادی



Attributable Costs: HAI Cost Analysis, January 2001–June 2004⁷

Type of HAI	Attributable Costs Mean (SD)	Range
Surgical site	\$25,546 (39,875)	\$1783 to \$134,602
Vascular catheter-associated infection	\$36,441 (37,078)	\$1882 to \$107,156
Ventilator associated-pneumonia	\$9669 (2920)	\$7904 to \$12,034
Catheter-associated urinary tract infections	\$1006 (503)	\$650 to \$1361

فکتورهای موثر در گسترش عفونت بیمارستانی

Patient susceptibility

Environmental factors



Microbial agents

Bacterial resistance

Patient susceptibility

Table 1 Factors that predispose to nosocomial infections.

*EPIC study risk factors

Factors that predispose to nosocomial infection

Related to underlying health status

Advanced age

Malnutrition

Alcoholism

Heavy smoking

Chronic lung disease

Diabetes

Related to acute disease process

Surgery

Trauma*

Burns

Related to invasive procedures

Endotracheal or nasal intubation*

Central venous catheterisation*

Extracorporeal renal support

Surgical drains

Nasogastric tube

Tracheostomy

Urinary catheter*

Related to treatment

Blood transfusion

Recent antimicrobial therapy

Immunosuppressive treatments

Stress-ulcer prophylaxis*

Recumbent position

Parenteral nutrition

Length of stay*

TABLE 5. Distribution of Selected Pathogens Associated With Cases of Surgical Site Infection Reported to the National Healthcare Safety Network, January 2006–October 2007, by Type of Surgery

Pathogen	Total no. of pathogenic isolates	No. (%) of pathogenic isolates, by type of surgery ^a							
		Abdominal (n = 1,376)	Cardiac (n = 1,536)	Neurological (n = 650)	Ob/Gyn (n = 335)	Orthopedic (n = 963)	Transplant (n = 86)	Vascular (n = 203)	Other (n = 142)
CoNS	965	135 (6.4)	423 (21.9)	123 (16.2)	59 (12.4)	173 (15.3)	8 (6.4)	24 (7.8)	20 (10.9)
<i>Staphylococcus aureus</i>	2,108	268 (12.7)	627 (32.5)	387 (50.9)	134 (28.3)	548 (48.6)	14 (11.2)	96 (31.3)	34 (18.5)
<i>Enterococcus</i> species									
<i>E. faecalis</i>	345	165 (7.8)	52 (2.7)	9 (1.2)	30 (6.3)	57 (5.1)	13 (10.4)	8 (2.6)	11 (6.0)
<i>E. faecium</i>	194	121 (5.7)	17 (0.9)	1 (0.1)	4 (0.8)	13 (1.2)	25 (20.0)	3 (1.0)	10 (5.4)
NOS	249	114 (5.4)	40 (2.1)	13 (1.7)	14 (3.0)	34 (3.0)	5 (4.0)	19 (6.2)	10 (5.4)
<i>Candida</i> species									
<i>C. albicans</i>	115	58 (2.7)	27 (1.4)	3 (0.4)	2 (0.4)	2 (0.2)	9 (7.2)	4 (1.3)	10 (5.4)
Other <i>Candida</i> spp. or NOS	30	9 (0.4)	10 (0.5)	0 (0.0)	0 (0.0)	2 (0.2)	4 (3.2)	3 (1.0)	2 (1.1)
<i>Escherichia coli</i>	671	395 (18.6)	116 (6.0)	28 (3.7)	45 (9.5)	34 (3.0)	11 (8.8)	26 (8.5)	16 (8.7)
<i>Pseudomonas aeruginosa</i>	390	129 (6.1)	136 (7.1)	32 (4.2)	15 (3.2)	38 (3.4)	3 (2.4)	27 (8.8)	10 (5.4)
<i>Klebsiella pneumoniae</i>	213	80 (3.8)	72 (3.7)	14 (1.8)	9 (1.9)	14 (1.2)	7 (5.6)	8 (2.6)	9 (4.9)
<i>Enterobacter</i> species	293	100 (4.7)	74 (3.8)	35 (4.6)	9 (1.9)	37 (3.3)	10 (8.0)	10 (3.3)	18 (9.8)
<i>Acinetobacter baumannii</i>	42	7 (0.3)	15 (0.8)	6 (0.8)	2 (0.4)	10 (0.9)	0 (0.0)	2 (0.7)	0 (0.0)
<i>Klebsiella oxytoca</i>	47	22 (1.0)	12 (0.6)	3 (0.4)	0 (0.0)	5 (0.4)	1 (0.8)	2 (0.7)	2 (1.1)
Total no. of pathogenic isolates ^b	7,025	2,118	1,929	760	474	1,128	125	307	184

Table 2 Common pathogens associated with nosocomial infections in ICU patients.

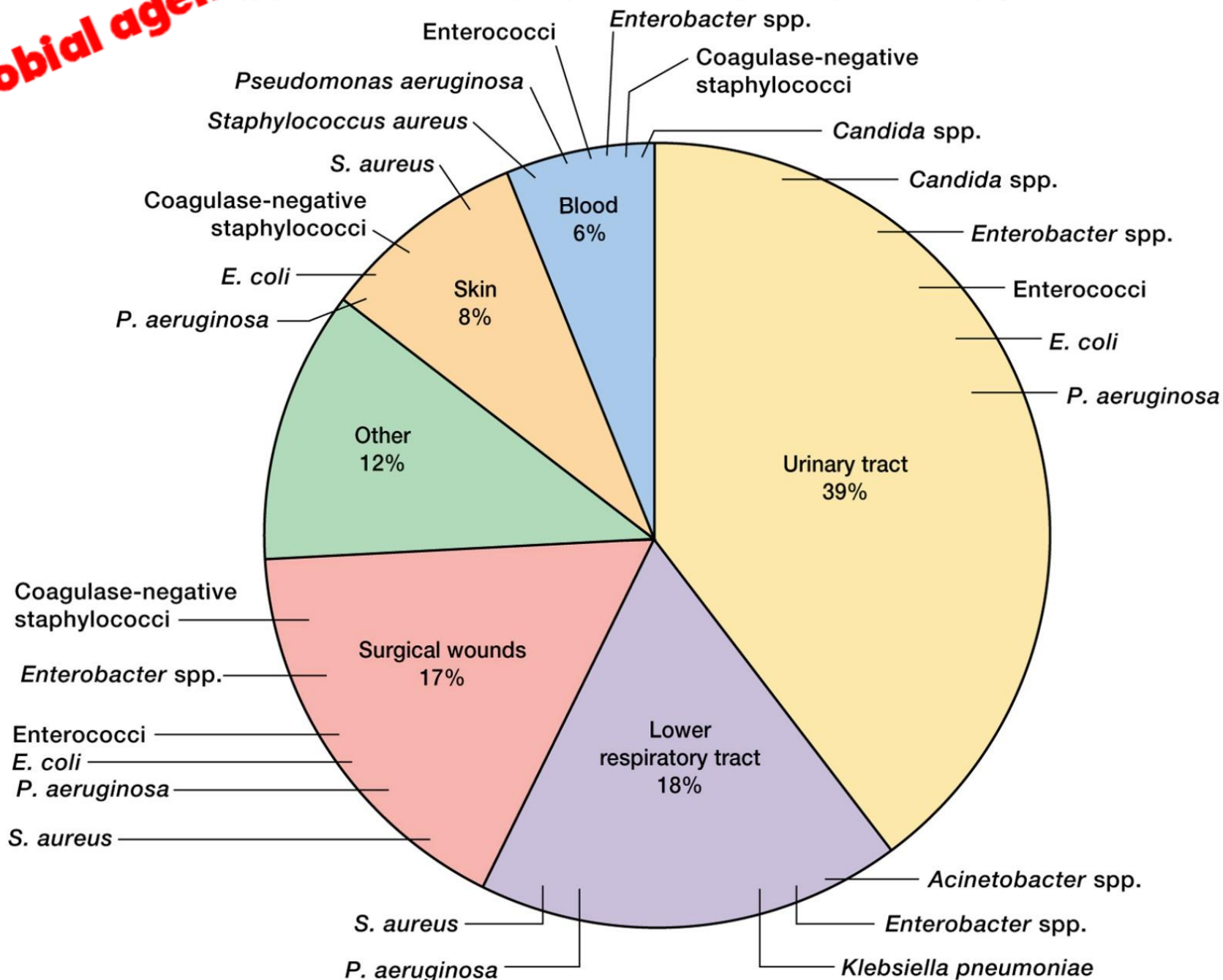
National Nosocomial Infections Surveillance System January 1989–June 1998.

BSI = bloodstream infection; PNEUM = pneumonia; UTI = urinary tract infection;

SSI = surgical site infection

	Relative percentage by site of infection				
	BSI	PNEUM	UTI	SSI	Others
Coagulase-negative staphylococci	39.3	2.5	3.1	13.5	15.5
<i>Staphylococcus aureus</i>	10.7	16.8	1.6	12.3	13.7
<i>Pseudomonas aeruginosa</i>	3.0	16.1	10.6	9.2	8.7
<i>Enterococci</i> spp.	10.3	1.9	13.8	14.5	5.9
<i>Enterobacter</i> spp.	4.2	10.7	5.7	8.8	6.8
<i>Escherichia coli</i>	2.9	4.4	18.2	7.1	4.0
<i>Candida albicans</i>	4.9	4.0	15.3	4.8	4.3
<i>Klebsiella pneumoniae</i>	2.9	6.5	6.1	3.5	37.7
Others	21.8	37.1	25.6	26	3.5

Microbial agents





Before selection



After selection



Final population



Resistance level



Low

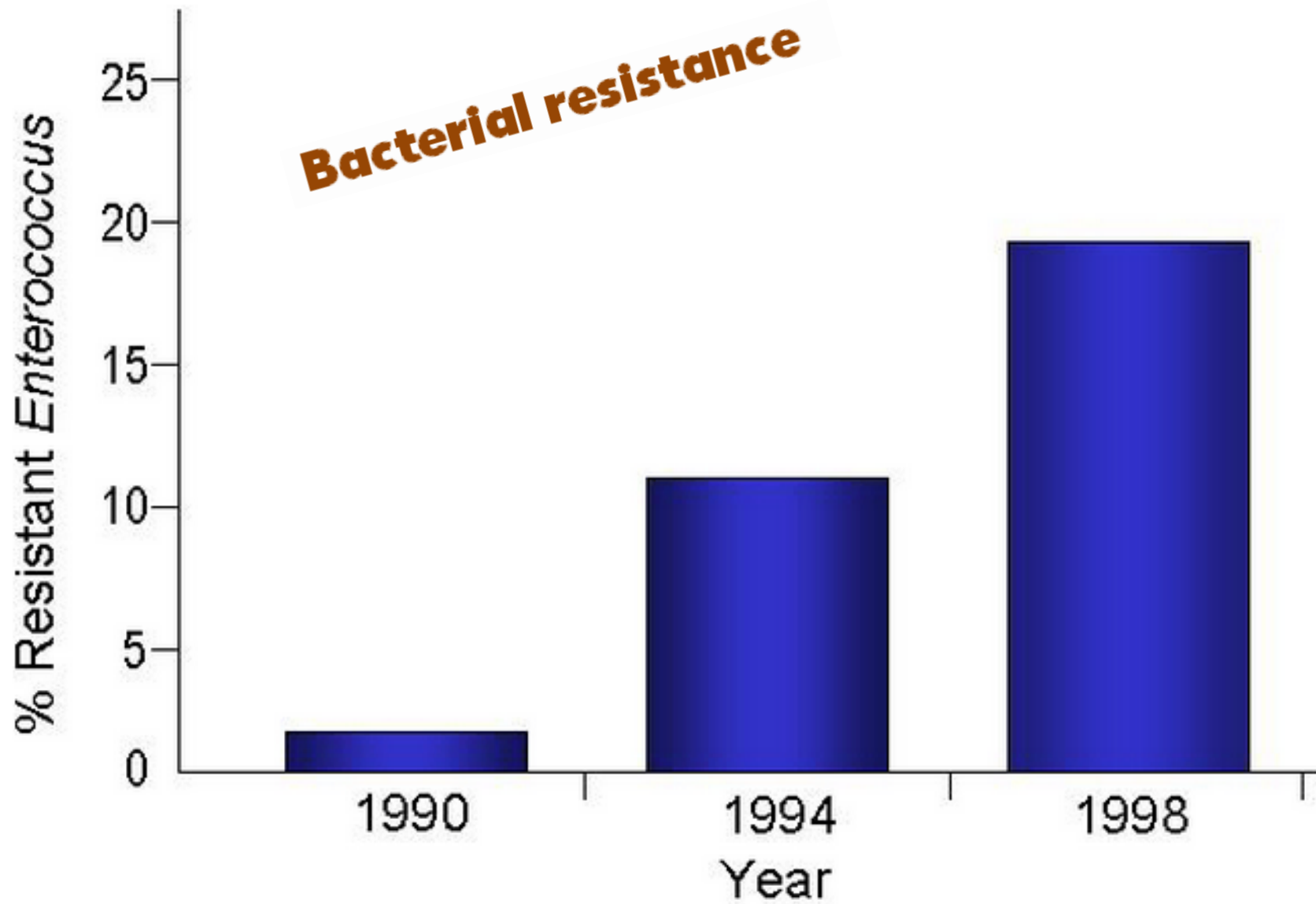
High

Impact of Antibiotic Resistance

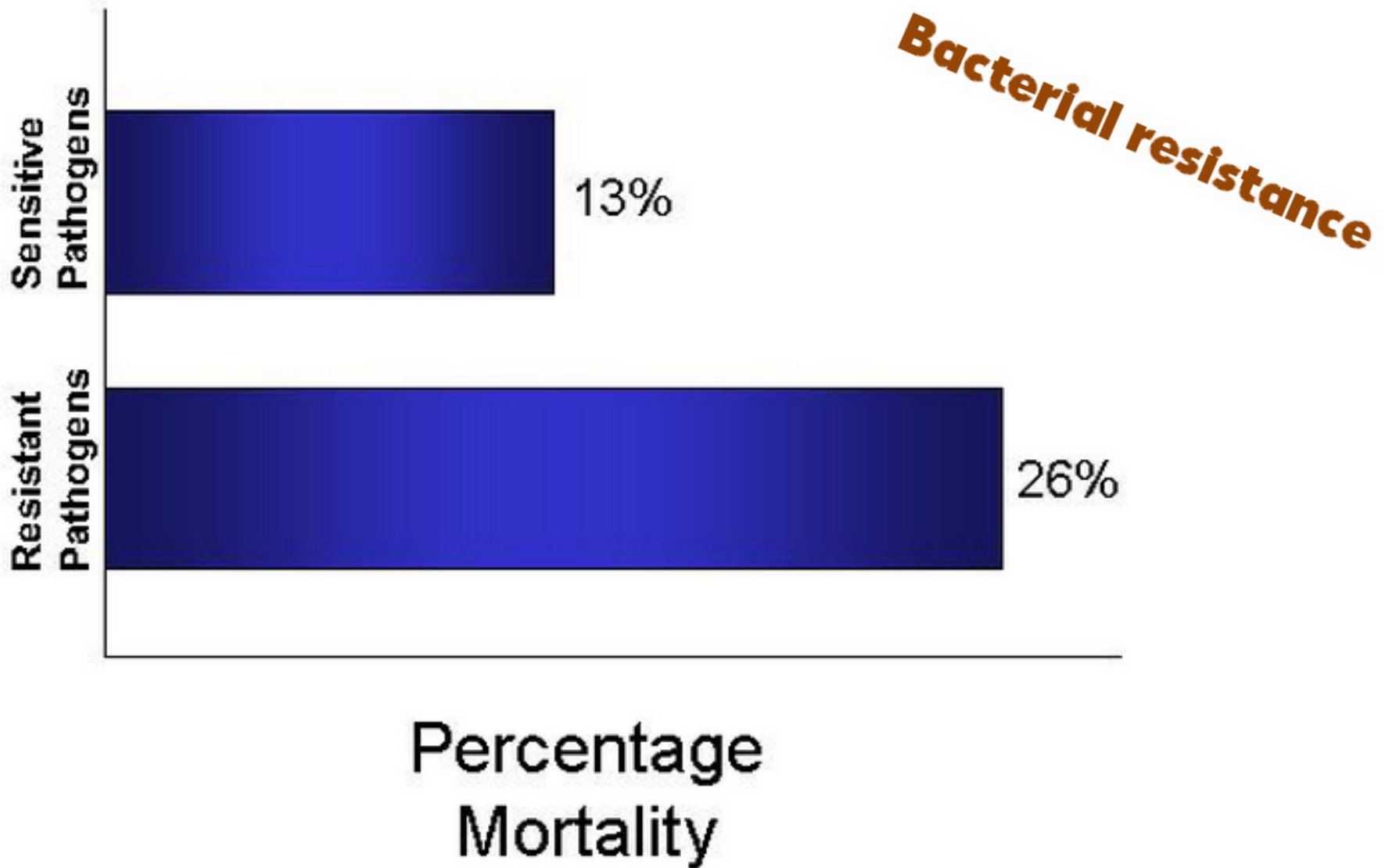
Bacterial resistance

- Increased rates of treatment failure
- Poor patient outcomes
- Increased mortality
- Increased need for combination therapy
- Increased cost of treatment

Antibiotic resistance is a growing problem and contributes to increased rates of treatment failure and poor prognosis. Nearly 70% of the bacteria responsible for hospital-acquired infections are resistant to at least one common antibiotic.

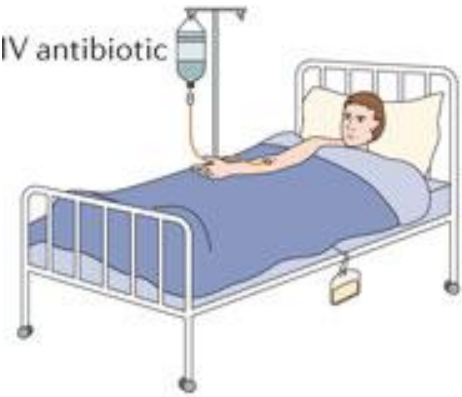


There has been a ten-fold increase in rates of vancomycin resistance among gram-positive enterococci between 1990 and 1998. Vancomycin is often considered as the last option for the treatment of serious gram-positive infections.



Mortality rates are twice as high among patients infected with pathogens resistant to antibiotic therapy compared with those that are susceptible. Tygacil (tigecycline) has demonstrated its efficacy against gram-negative and gram-positive pathogens.

Environmental factors



Faecal contamination



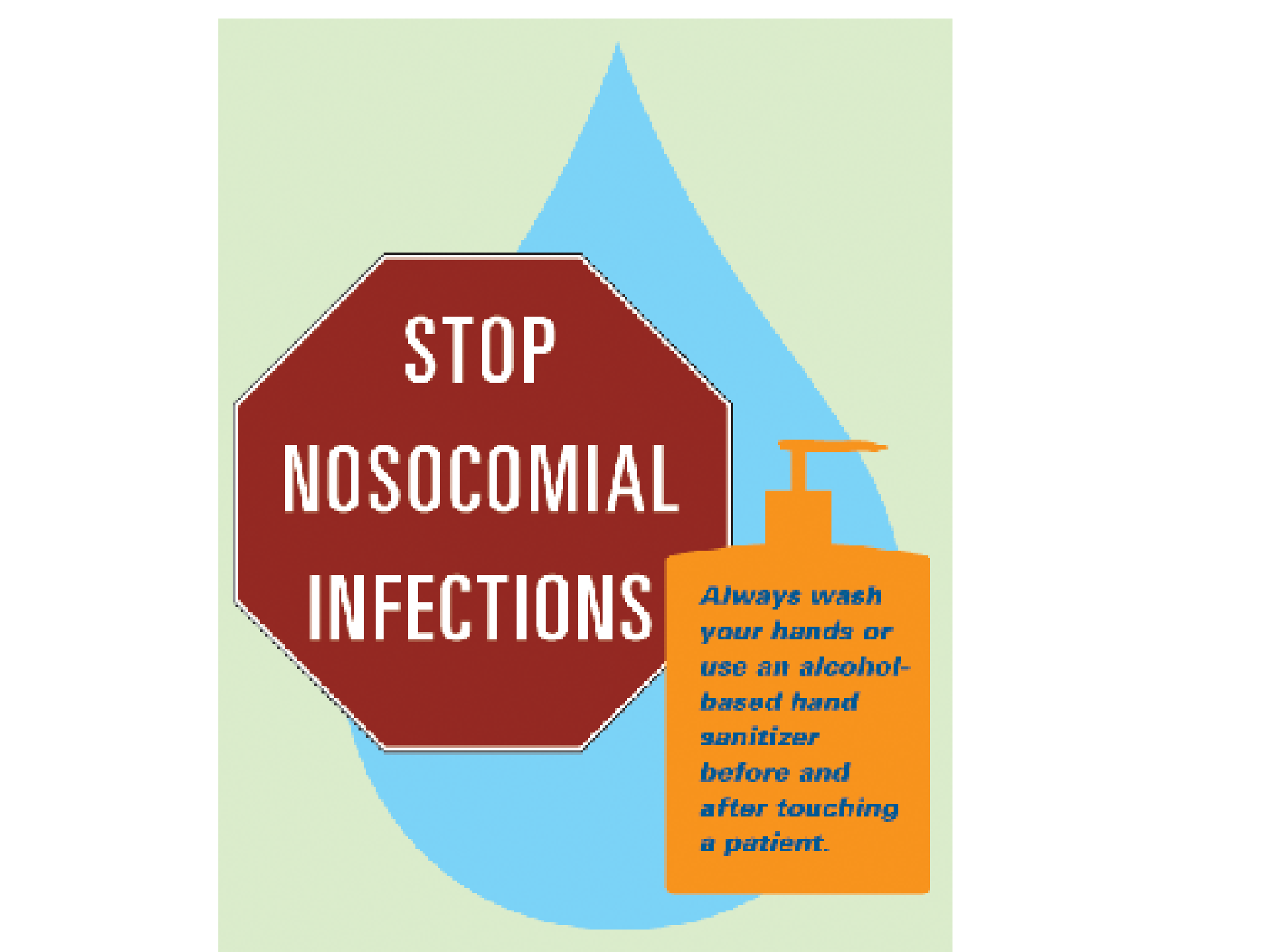
Oral acquisition



Calculating hospital acquired infection rates

- HAI rates (i.e. Cdiff, MRSA, VRE)

$$= \left(\frac{\text{Number of new cases of hospital acquired infection}}{\text{Total number of patient days}} \right) \times 1000$$



**STOP
NOSOCOMIAL
INFECTIONS**

*Always wash
your hands or
use an alcohol-
based hand
sanitizer
before and
after touching
a patient.*

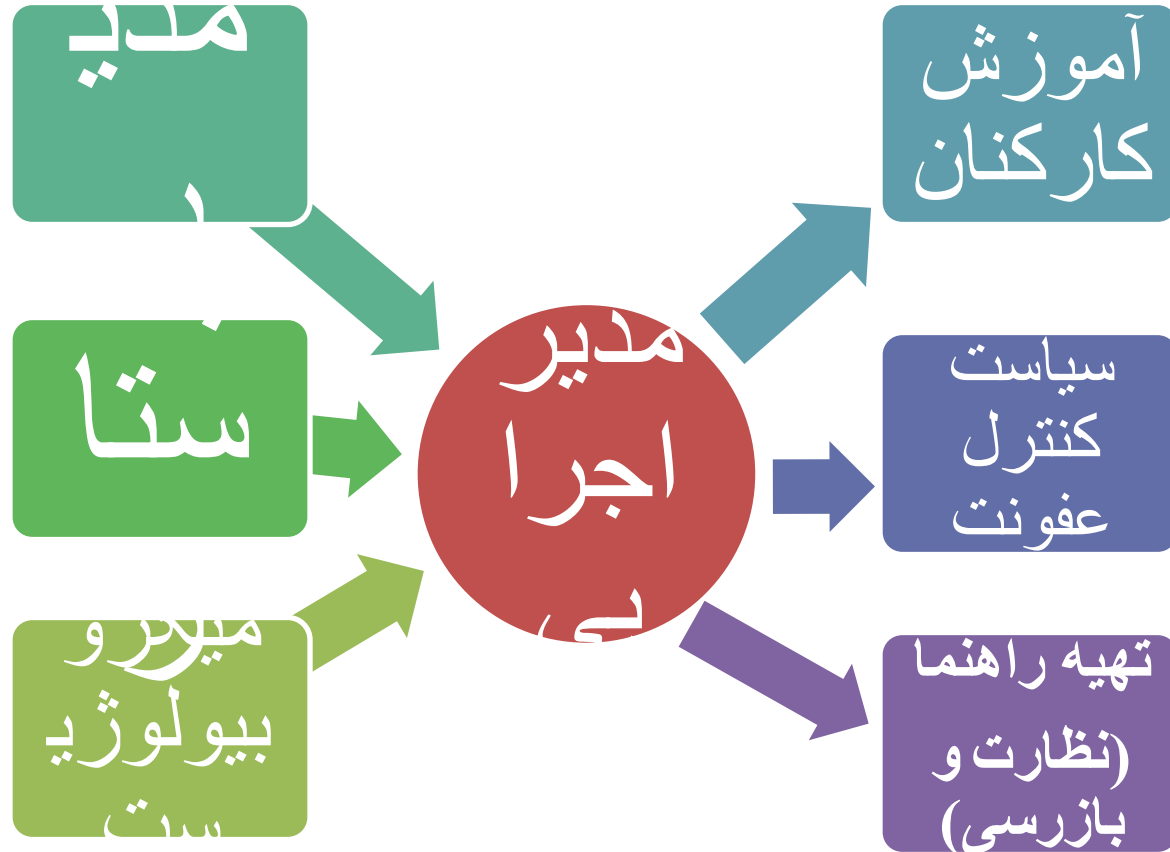
پیشگیری

Infection control

نظارت

درمان

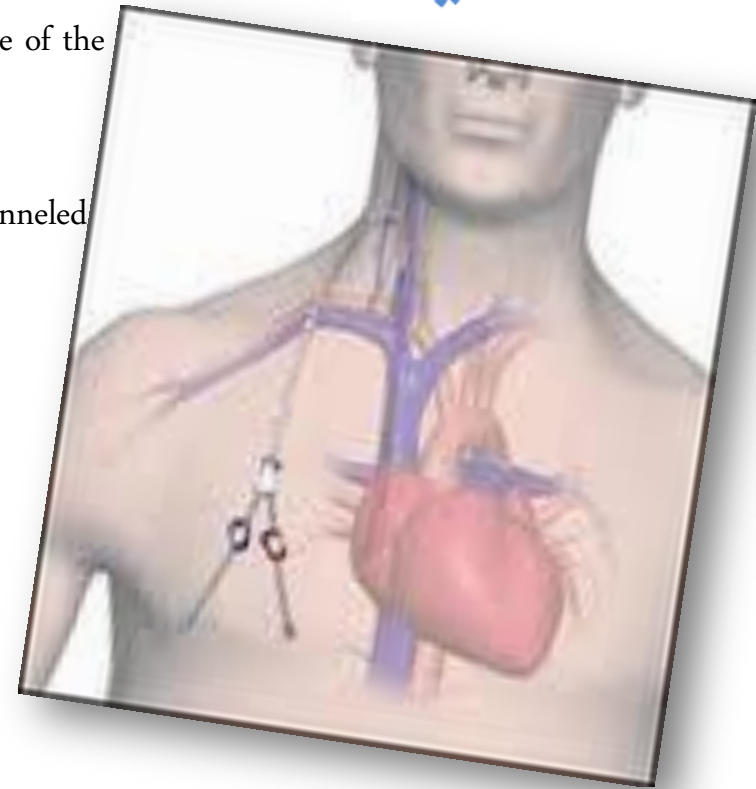
Infection control committee



vascular catheter-associated infections

1. Practice good hand hygiene
2. Use maximal barrier precautions during catheter insertion
3. Use chlorhexidine skin antiseptics when inserting and during the care of the insertion site
4. Use of optimal site selection -subclavian vein is preferred for non-tunneled catheters
5. Remove the catheter when it is no longer needed.

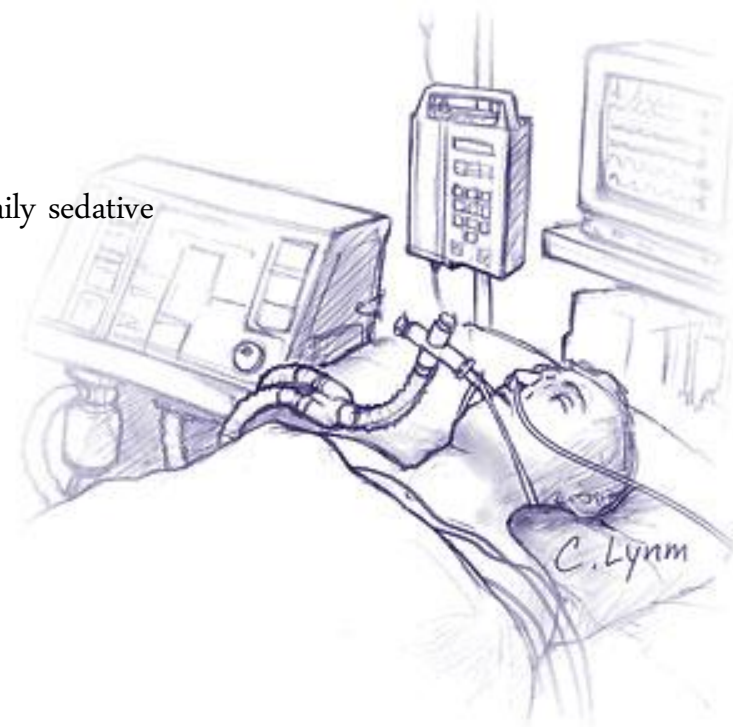
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Ventilator-associated pneumonias

پیشگیری

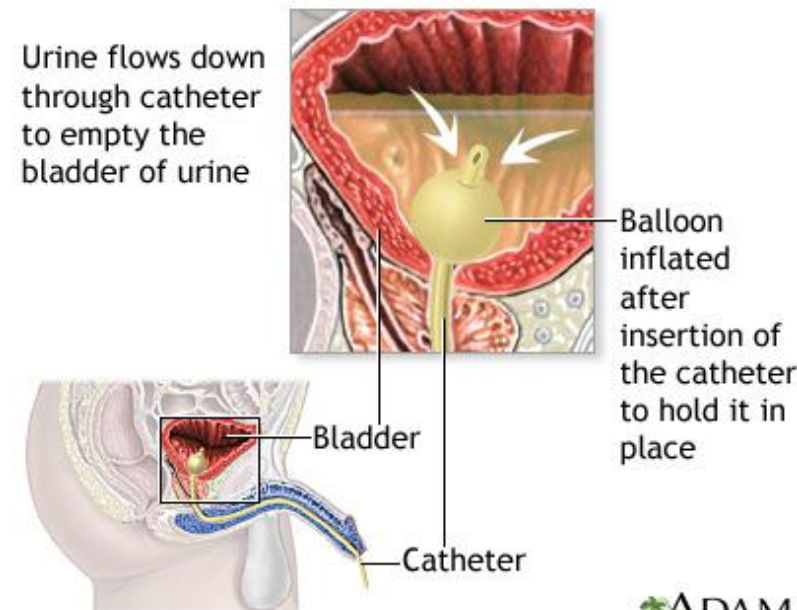
1. Elevation of the head of the bed to an angle between 30 and 45 degrees
2. Peptic ulcer disease prophylaxis,
3. Deep venous thrombosis prophylaxis
4. Removal of the intubation tubing when deemed unnecessary (e.g., daily sedative interruptions and daily assessment of readiness to extubate).



Catheter-associated urinary tract infections

پیشگیری

1. Good hand hygiene
2. Good perineal care through adequate washing of the catheter and the site of insertion routinely
3. Securing the catheter to prevent biofilm dislodgement and irritation
4. Removing the catheter when no longer needed



All surgical site infections

1. Giving the patient the most appropriate, effective antibiotic within 1 hour of incision, discontinuing the antibiotic within 24 hours of incision Closure
2. Clippers for hair removal or not removing hair at all.
3. In cardiothoracic surgery patients, glucose levels should be monitored during the first 48 hours after surgery and maintained below 200 mg/dL.



How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

 Duration of the entire procedure: 40-60 seconds



0 Wet hands with water;



1 Apply enough soap to cover all hand surfaces;



2 Rub hands palm to palm;



3 Right palm over left dorsum with interlaced fingers and vice versa;



4 Palm to palm with fingers interlaced;



5 Backs of fingers to opposing palms with fingers interlocked;



6 Rotational rubbing of left thumb clasped in right palm and vice versa;



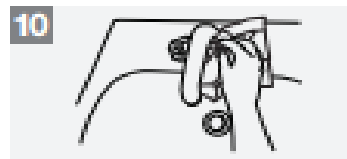
7 Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



8 Rinse hands with water;



9 Dry hands thoroughly with a single use towel;



10 Use towel to turn off faucet;



11 Your hands are now safe.



Prevention of hospital-acquired infections
A practical guide



World Health
Organization

Patient Safety

A World Alliance for Better Health Care

SAVE LIVES

Clean Your Hands

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How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds



Apply a palmful of the product in a cupped hand, covering all surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



Palm to palm with fingers interlaced;



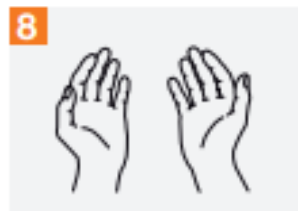
Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Once dry, your hands are safe.



Prevention of hospital-acquired infections
A practical guide



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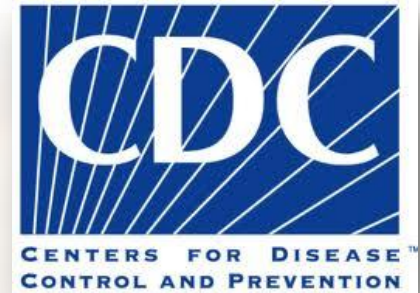
SAVE LIVES

Clean Your Hands

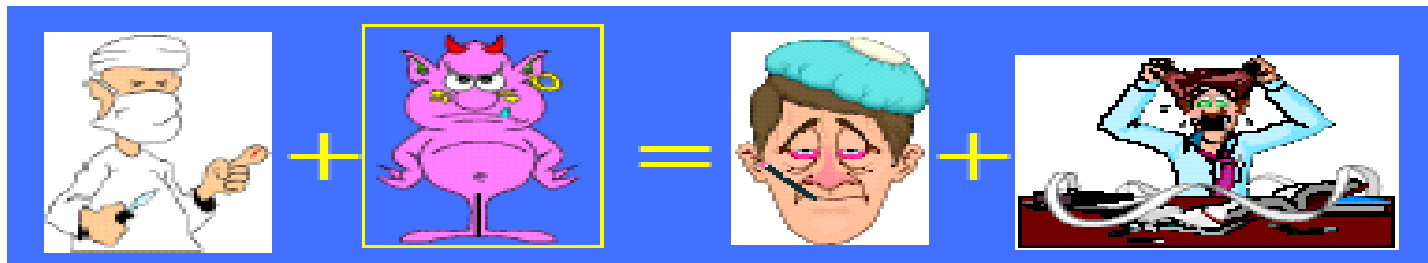
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When should you wash your hands?

- **Before**, during, and after preparing food
- **Before** eating food
- **Before** and after caring for someone who is sick
- **Before** and after treating a cut or wound
- **After** using the toilet
- **After** changing diapers or cleaning up a child who has used the toilet
- **After** blowing your nose, coughing, or sneezing
- **After** touching an animal, animal feed, or animal waste
- **After** touching garbage



Conclusion

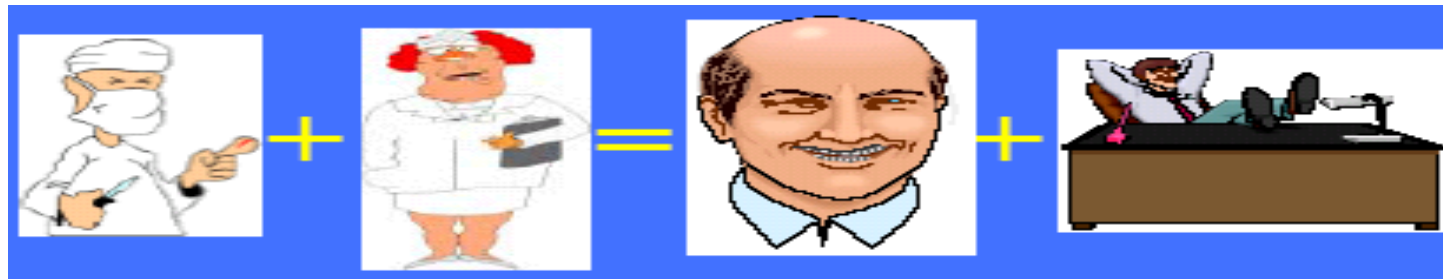


Hospital

Pathogen

Unhappy
patients

Unhappy
director



Hospital

Surveillance

Happy
Patients

Happy
director

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