

Infection Control for the Neutropenic Patients

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HCAI is a Global Problem

- There is no
 - Healthcare facility
 - Healthcare system
 - Country

That can claim that have solved the problem of HCAIs

HCAIs

- 5–15% of hospitalized patients and 9–37% of those admitted to intensive care units develop HCAIs
- 5 million HCAIs are estimated to occur in acute care hospitals in Europe annually
- 25 million extra days of hospital stay
- Economic burden of €13 to 24 billion.

Point Prevalence, 2012

Region	N. Hospitals	N. Patients	% Patients with HAI	% Patients on Antibiotics
GR	37	8.247	9,0%	54,7%
EU*	785	200.770	6,0%	37,1%

Achilleas Gikas, Prof. Infectious Diseases
University of Crete

Most frequent sites of infection and their risk factors

URINARY TRACT INFECTIONS

34%

Urinary catheter
Urinary invasive procedures

Advanced age
Severe underlying disease
Urolithiasis
Pregnancy
Diabetes

13%

LOWER RESPIRATORY TRACT INFECTIONS

Mechanical ventilation
Aspiration
Nasogastric tube

Central nervous system depressants
Antibiotics and anti-acids
Prolonged health-care facilities stay
Malnutrition
Advanced age
Surgery
Immunodeficiency

SURGICAL SITE INFECTIONS

17%

Inadequate antibiotic prophylaxis
Incorrect surgical skin preparation
Inappropriate wound care

Surgical intervention duration
Type of wound
Poor surgical asepsis
Diabetes
Nutritional state
Immunodeficiency
Lack of training and supervision

14%

BLOOD INFECTIONS

Vascular catheter
Neonatal age
Critical care

Severe underlying disease
Neutropenia
Immunodeficiency
New invasive technologies
Lack of training and supervision

LACK OF
HAND
HYGIENE

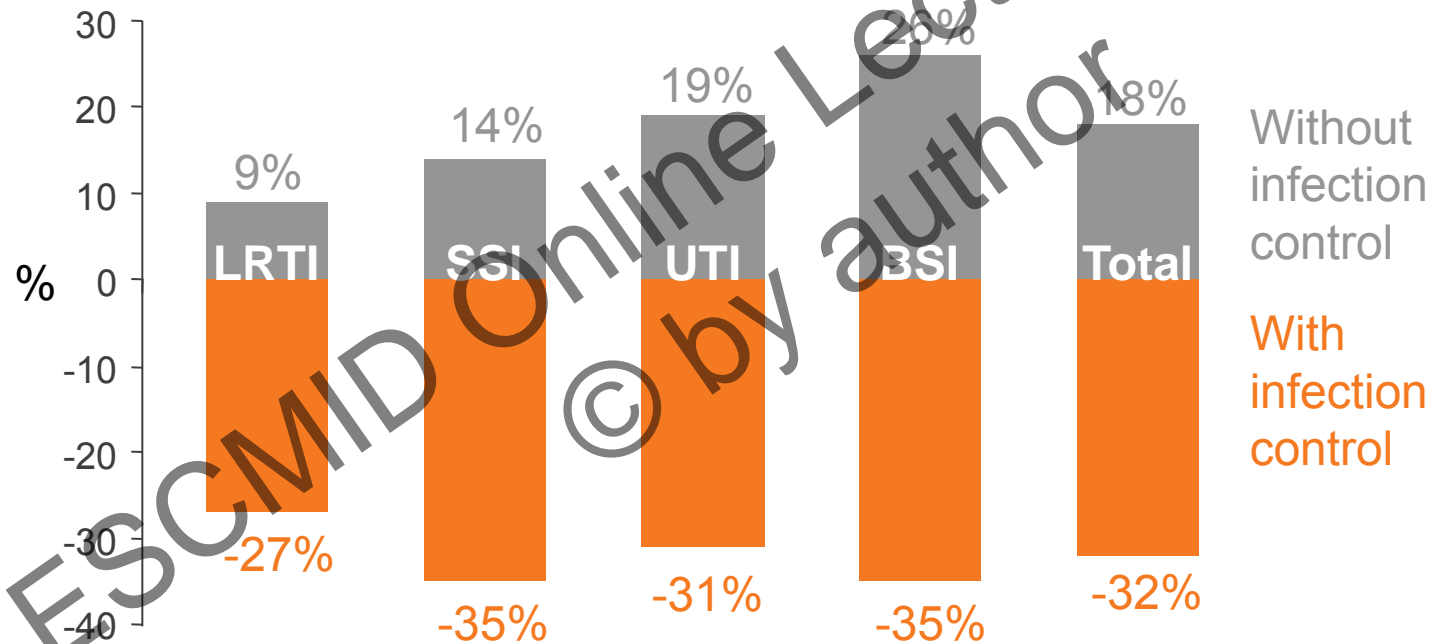
Prevention of HCAs

- 50% of HCAs are preventable
- The infection control measures are
 - simple
 - Have minimal cost,
 - Can be implemented in any healthcare facility

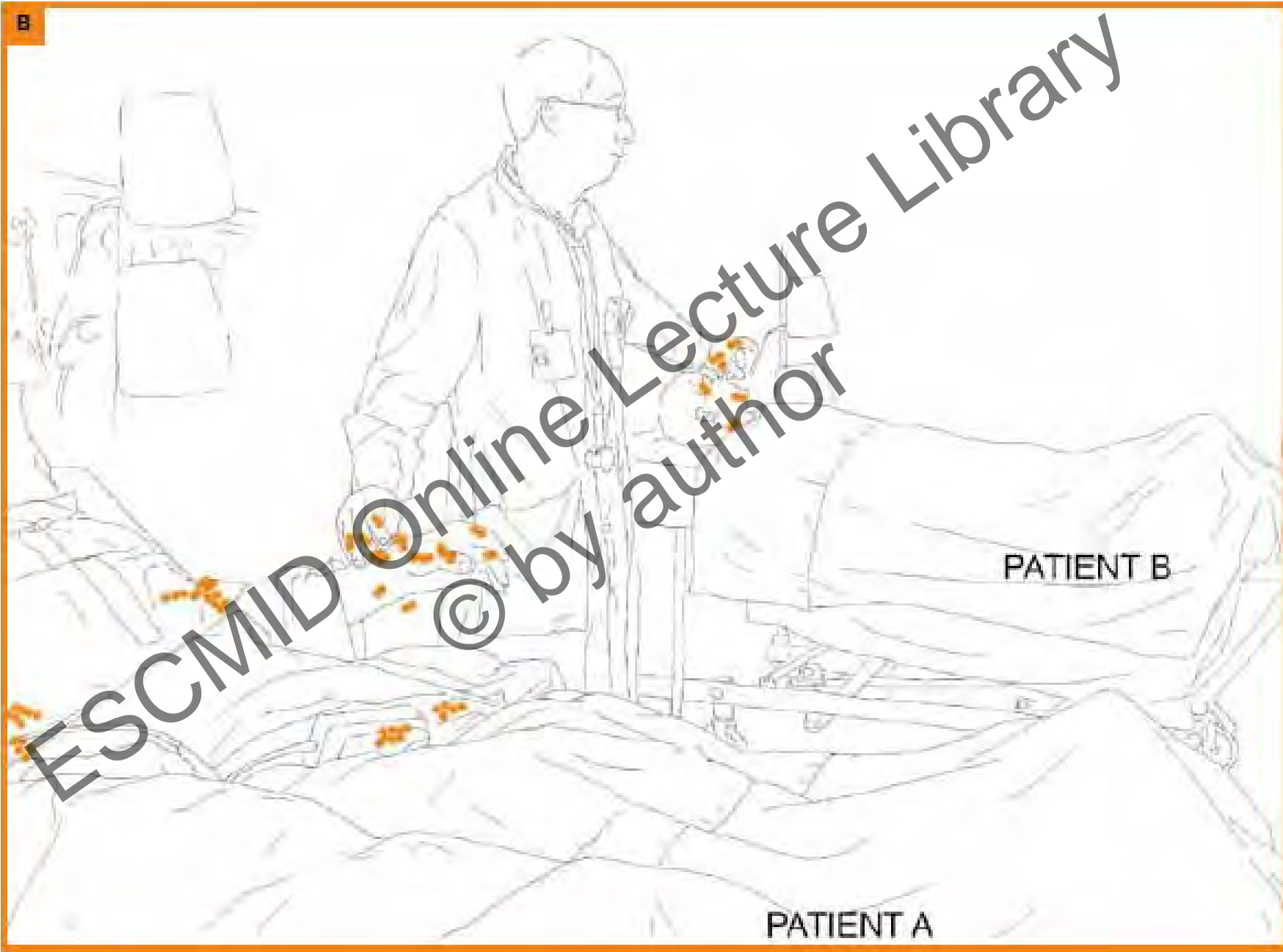
SENIC study: Study on the Efficacy of Nosocomial Infection Control

- >30% of HCAI are preventable

Relative change in NI in a 5 year period (1970–1975)



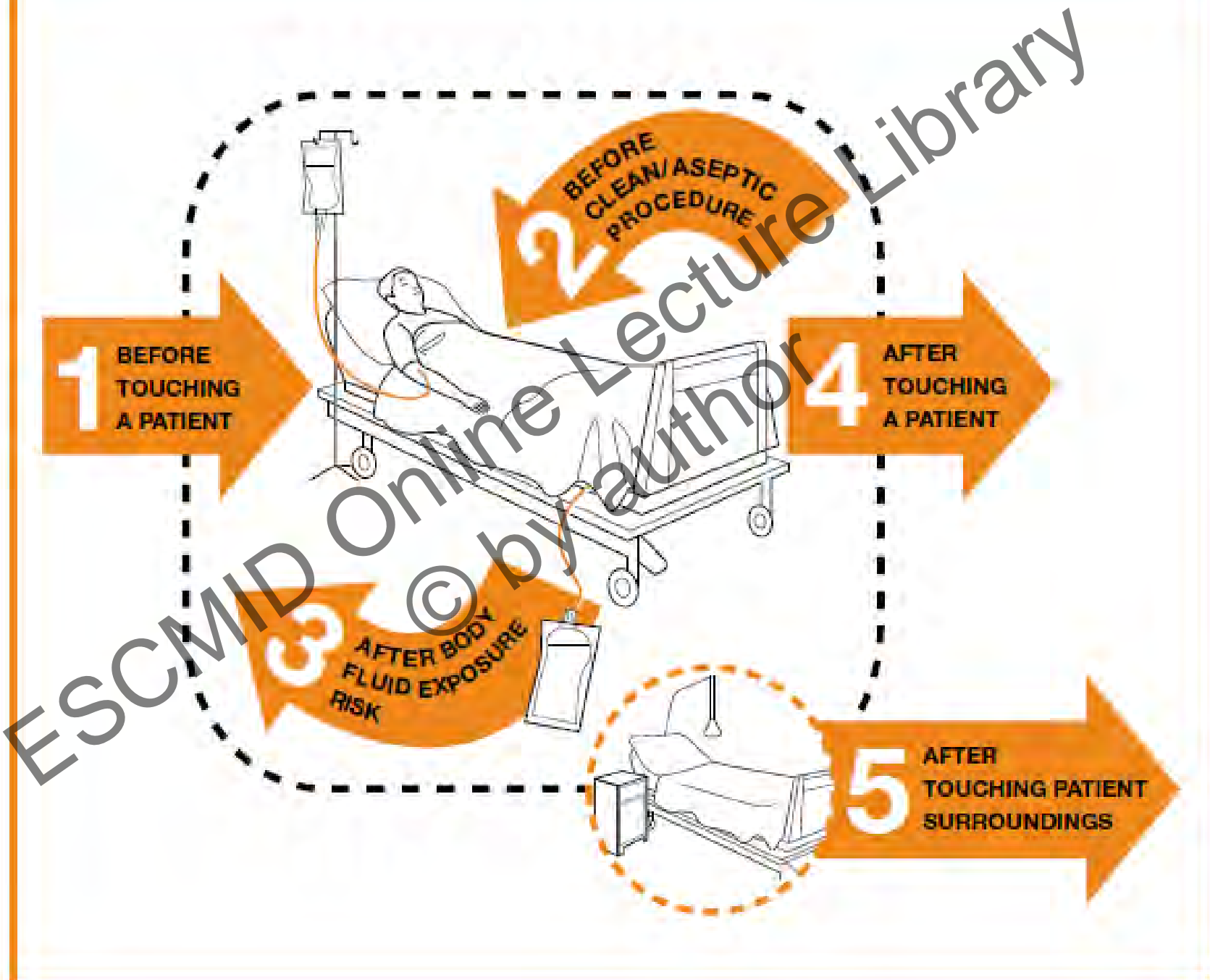
Haley RW et al. *Am J Epidemiol* 1985



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PATIENT B

PATIENT A



Hand Hygiene Compliance

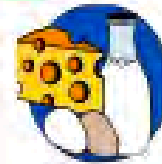
[Am J Infect Control.](#) 2011 Aug;39(6):517-20

Hospital	% overall HH compliance (95% CI)	% HH compliance of doctors (95% CI)	% missed HH actions with gloves	% total HH actions performed with ABHR	Hospital ABHR consumption 2007/2008 (L/1000 pt-days)
1	19 (15-23)	25 (16-38)	20	42	23.1
2	75 (70-80)	59 (45-71)	29	87	27.3
3	27 (24-29)	18 (13-24)	92	90	8.3
4	39 (35-44)	40 (27-55)	39	34	7.5
5	14 (11-18)	8 (4-16)	40	0	1.5
6	25 (21-30)	34 (24-41)	41	93	23.9
7	76 (71-81)	60 (48-71)	28	38	11.4
8	50 (45-56)	52 (43-62)	31	65	36.6
9	67 (62-72)	72 (62-80)	18	97	No data
10	56 (51-60)	19 (11-31)	6	99	35.3
Overall	40 (38-41)	37 (33-40)	38	71	

MOSAR WP4 study centres

Main Modes of Transmission

- Contact
 - Direct contact
 - Common vehicle
- Droplet (large aerosols)
- Airborne
 - tiny aerosols (droplet nuclei) over long distance



PPE for Standard Precautions

- **BASED ON RISK ASSESSMENT**
- **IF** there is the risk of spills onto the body and face:
 - Gloves PLUS gown PLUS
 - Face protection (mask plus eye protection goggle **or** visor; face shield)



+



+



OR



OR



PPE for Specific Precautions

- ⇒ Directed to specific diseases
- ⇒ Some disease may require a combination of specific precautions

- **Contact Precautions**

- Gloves PLUS gown



+



- **Droplet Precaution**

- Medical mask



- **Airborne Precaution**

- Particulate respirator



General measures for Neutropenic Patients

- Ideally, neutropenic patients should stay in single rooms
- At a minimum, standard precautions should be followed for all patient contacts
- When indicated on the basis of coexisting conditions, patients should also be placed on airborne, droplet, or contact precautions in addition to standard precautions.
- Protective environment is recommended for allogenic HCT

Protective Environment Rooms

- Well-sealed rooms
- ≥ 12 air exchanges/hour
- Central HEPA filters with 99.97% efficiency for removing particles $\geq 0.3 \mu\text{m}$
- Consistent positive air pressure between the patient's room and the hallway

Commonsense measures (Diet)

- Ground meat products need to be thoroughly cooked.
- Any fruits that cannot be peeled should be washed thoroughly.
- Avoid salads and use boiled vegetables
- Food products that inherently contain infectious organisms should be avoided, including undercooked eggs
- Beano, pepper, and other spices are known to have recovery of *Aspergillus* organisms when cultured.

Commonsense measures (Diet)

- Blue cheeses have molds spiked into the cheese wheel and should be avoided.
- Soft cheeses carry the potential risk of *Listeria*
- Yogurt contains *Lactobacillus* that, rather than causing gut problems has been found to cause infection in other sites, including the lungs after aspiration events.

Cleaning

- Hematology Units should be cleaned at least once daily with special attention to dust control

Surveillance for mold infections

- Monitoring for clinical cases of aspergillosis and other invasive mold infections should be performed, with enhanced surveillance of microbiologic, pathologic, and radiologic data to identify trends suggesting an environmental mold source
- HCT recipients may benefit from wearing N95 respirators while outside of HEPA-filtered areas, especially during periods of health care facility construction and renovation

MDRO

- Hand hygiene according to WHO recommendations
- Use contact precautions for patients colonized or infected with MDRO, including the use of gloves and gowns
- Ensure adherence to standard environmental cleaning with an effective disinfectant.

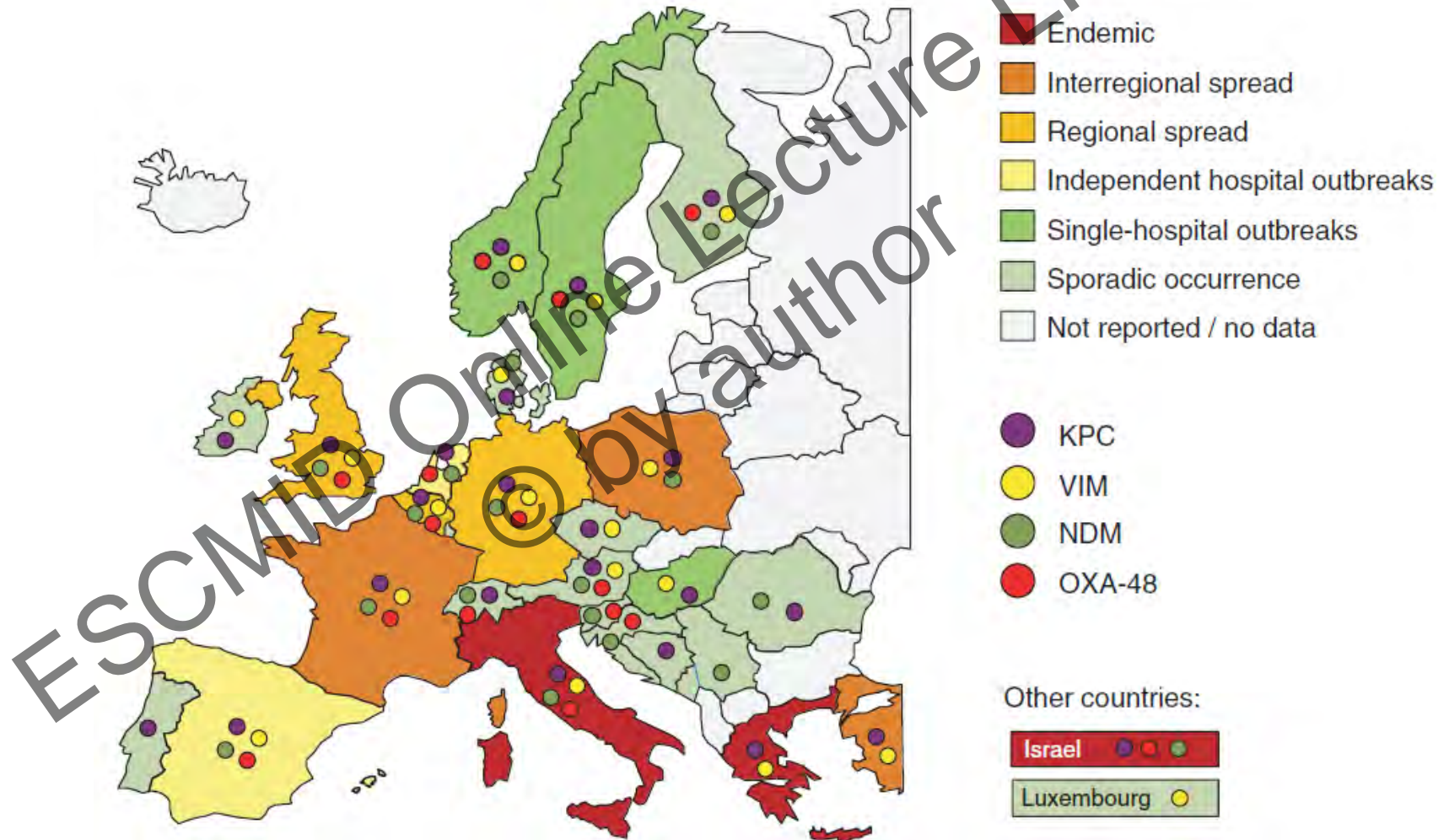
MRSA

- If high rates of MRSA persist despite implementation of basic infection control practices, centers should consider adjunctive strategies
 - MRSA surveillance cultures on admission and serially (eg, weekly)
 - routine bathing of patients with chlorhexidine;
 - cohorting of MRSA patients in designated areas
 - assigning care to dedicated staff

VRE

- Active surveillance cultures with rectal swabs to identify colonized patients can be considered if there is evidence for ongoing transmission of VRE on a hematology unit
- Separate carriers from non-carriers

Distribution of Carbapenemases in Europe



CPE Colonization

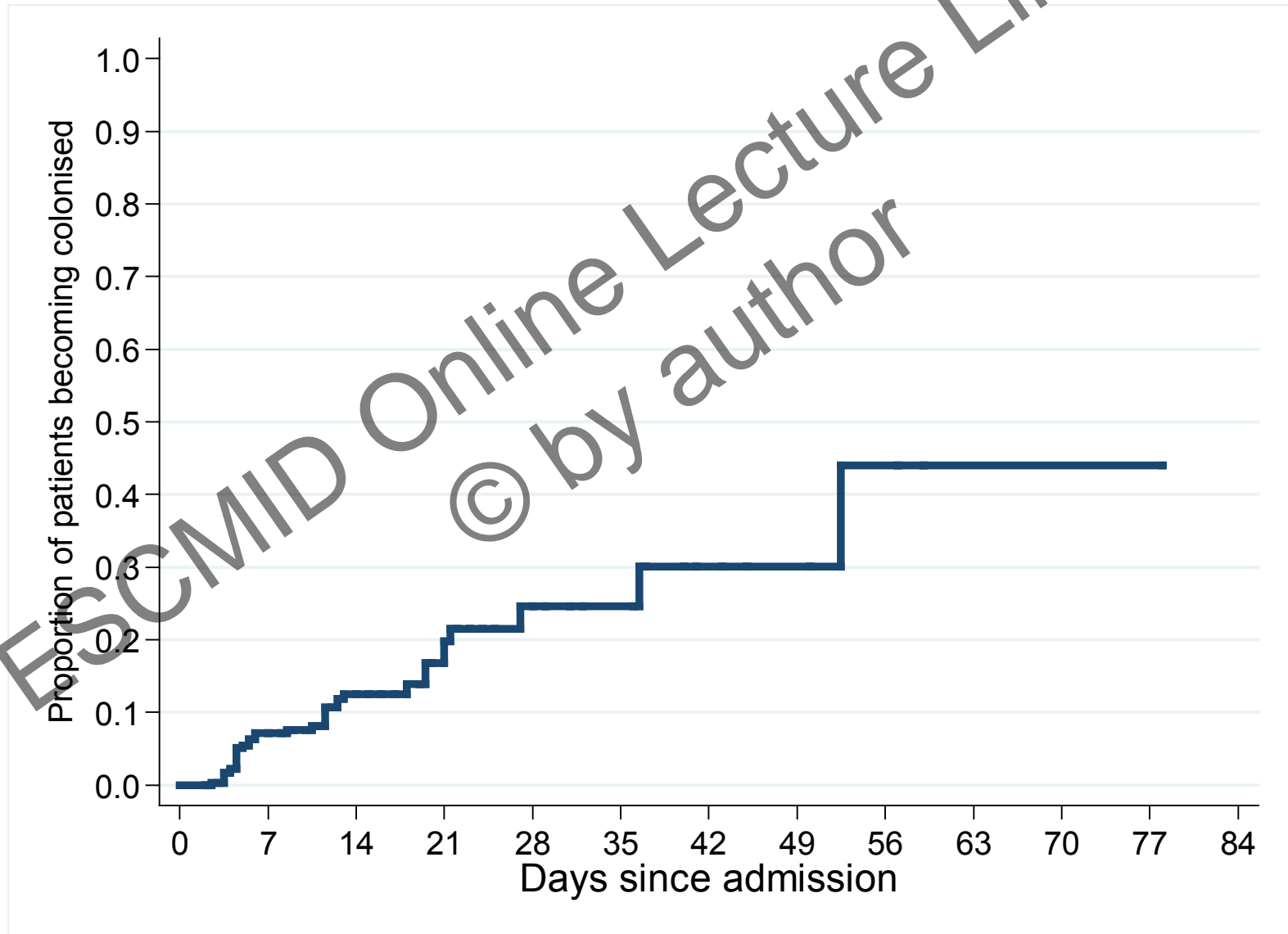
- Median carriage time at least 3 months
- 10% of CPE colonized patients progress to infection. In the presence of neutropenia this subset is higher 20%
- During carriage, shedding and transmission to other patients may take place
- Transmission of mobile genetic elements containing the carbapenamase gene to other strains colonizing the GIT may occur, resulting in new CPE clones and species

Saidel-Odes et al *Infect Control Hosp Epidemiol* 2012; 33: 14–19

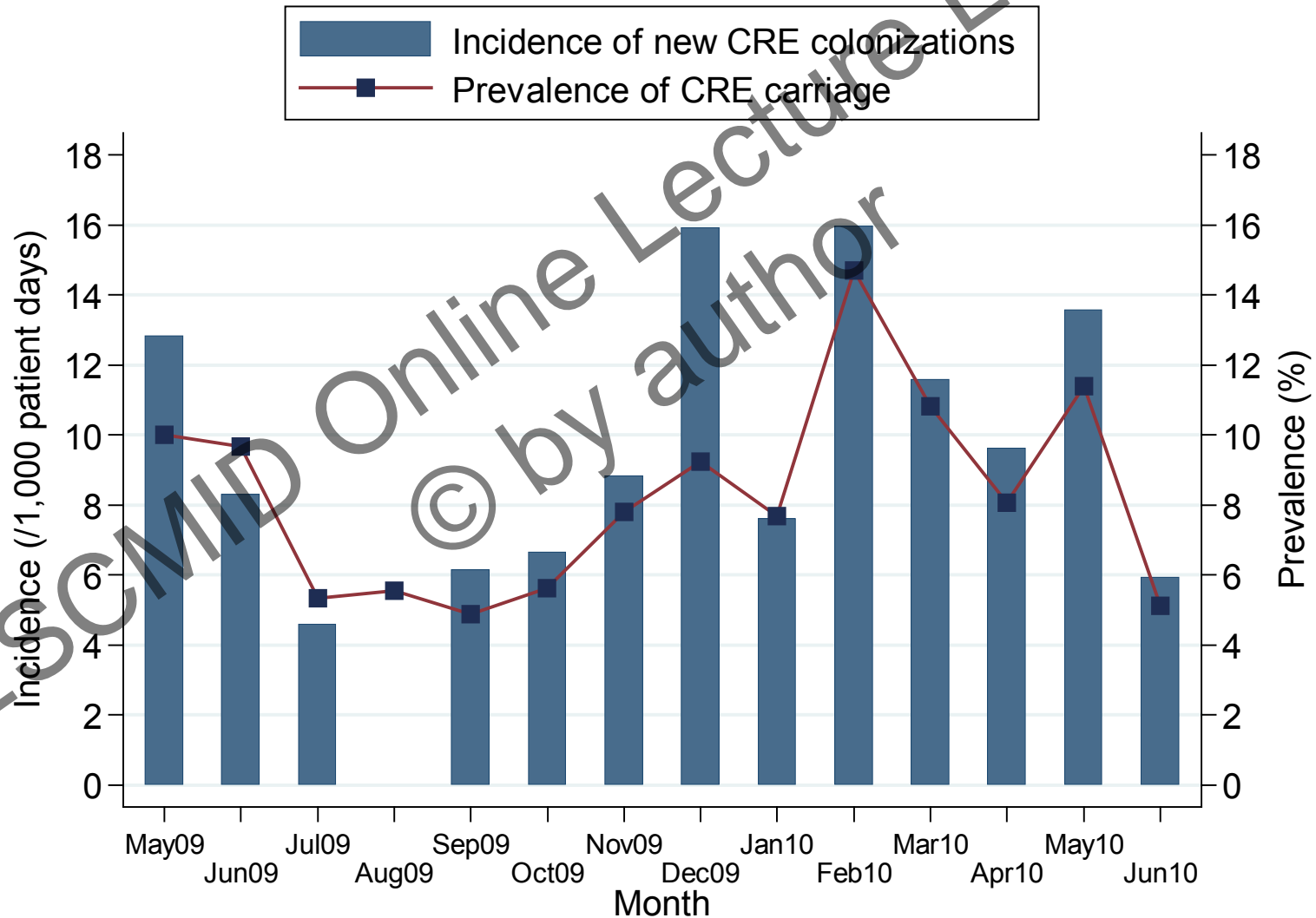
Borer A et al *Am J Infect Control* 2011

Schechner V et al *Clinical Microbiology Infection* 2012

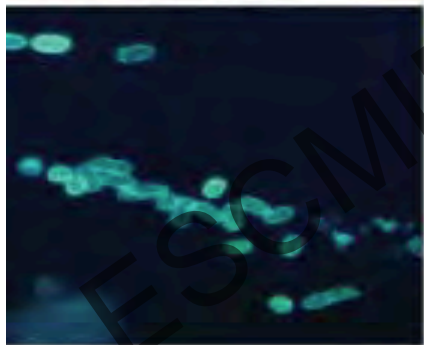
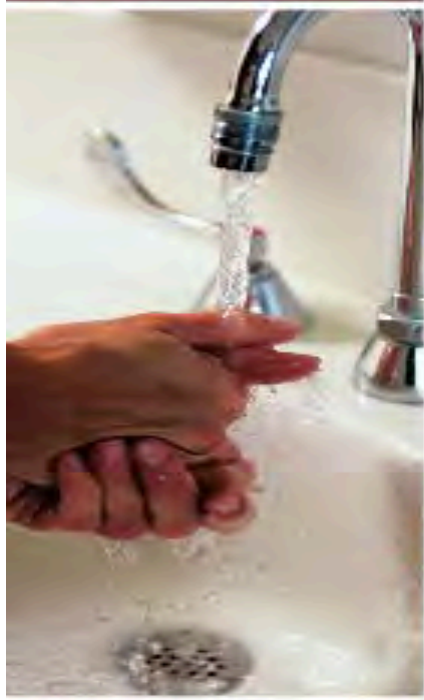
Kaplan-Meier estimate of the probability of becoming colonized within a surgical unit



Monthly Incidence and Prevalence of CPE Colonization in a Surgical Unit



Coordinated effort involving all stakeholders including healthcare facilities and providers, public health authorities, and industry



Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE)

2012 CRE Toolkit

Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE)



Basic Principles

- Recognize these organisms as epidemiologically important
- Understand the prevalence in your region
- Identify colonized and infected patients when present in the facility
- Implement regional and facility- based interventions designed to stop the transmission of these organisms

Core Measures for All Acute and Long-term Care Facilities



- ✓ Hand hygiene
- ✓ Contact Precautions
- ✓ Patient and staff cohorting
- ✓ Minimize use of invasive devices
- ✓ Promote antimicrobial stewardship
- ✓ Screen patient with epidemiologic links to CRE colonized or infected patients and/or conduct point prevalence surveys of units containing CRE patients

Supplemental Measures for Healthcare Facilities with CRE Transmission

✓ Conduct active surveillance testing

- Screen high-risk patients at admission or at admission and periodically during their facility stay for CRE.
- Preemptive contact precautions can be used while results of admission surveillance testing are pending
- Consider screening patients transferred from facilities known to have CRE at admission

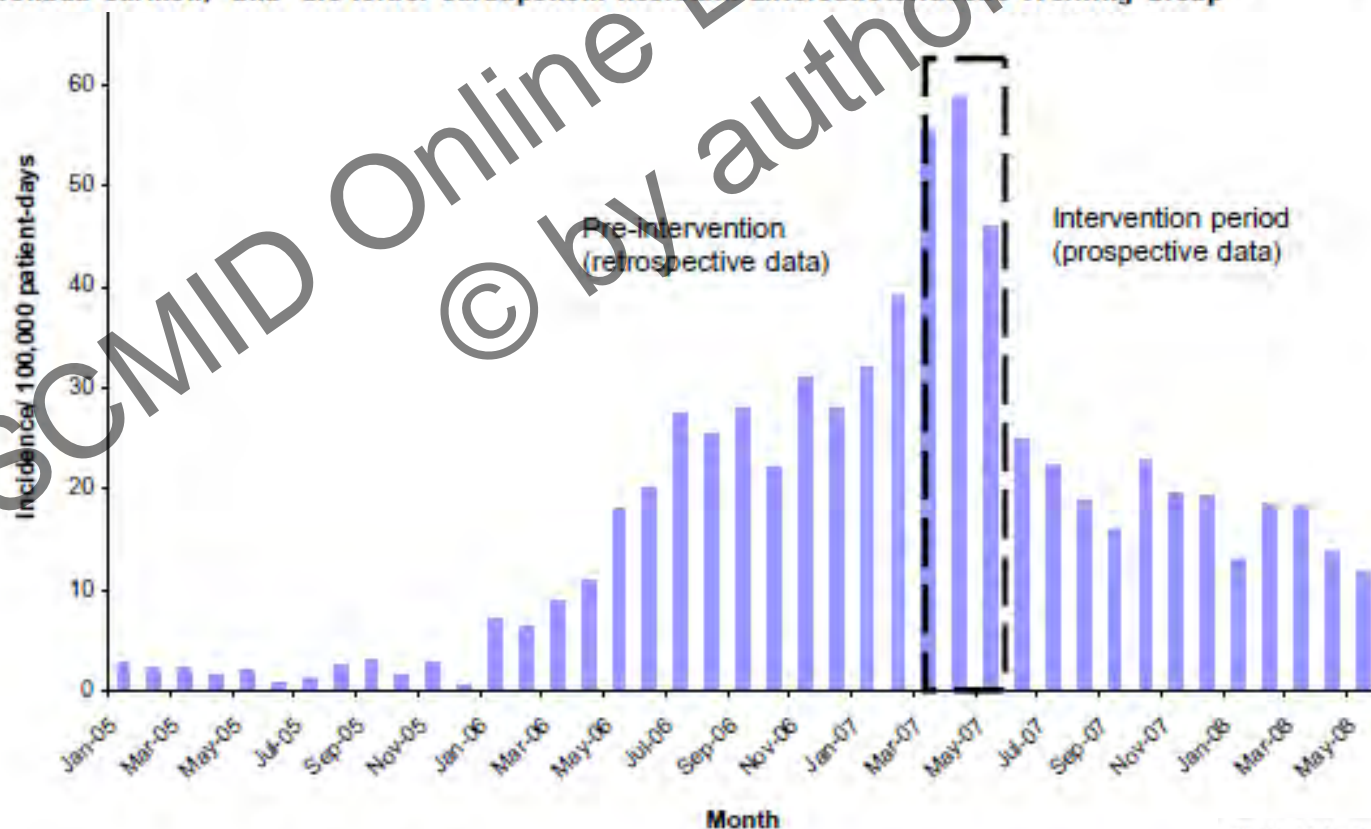
✓ Chlorhexidine bathing

- Bathe patients with 2% chlorhexidine

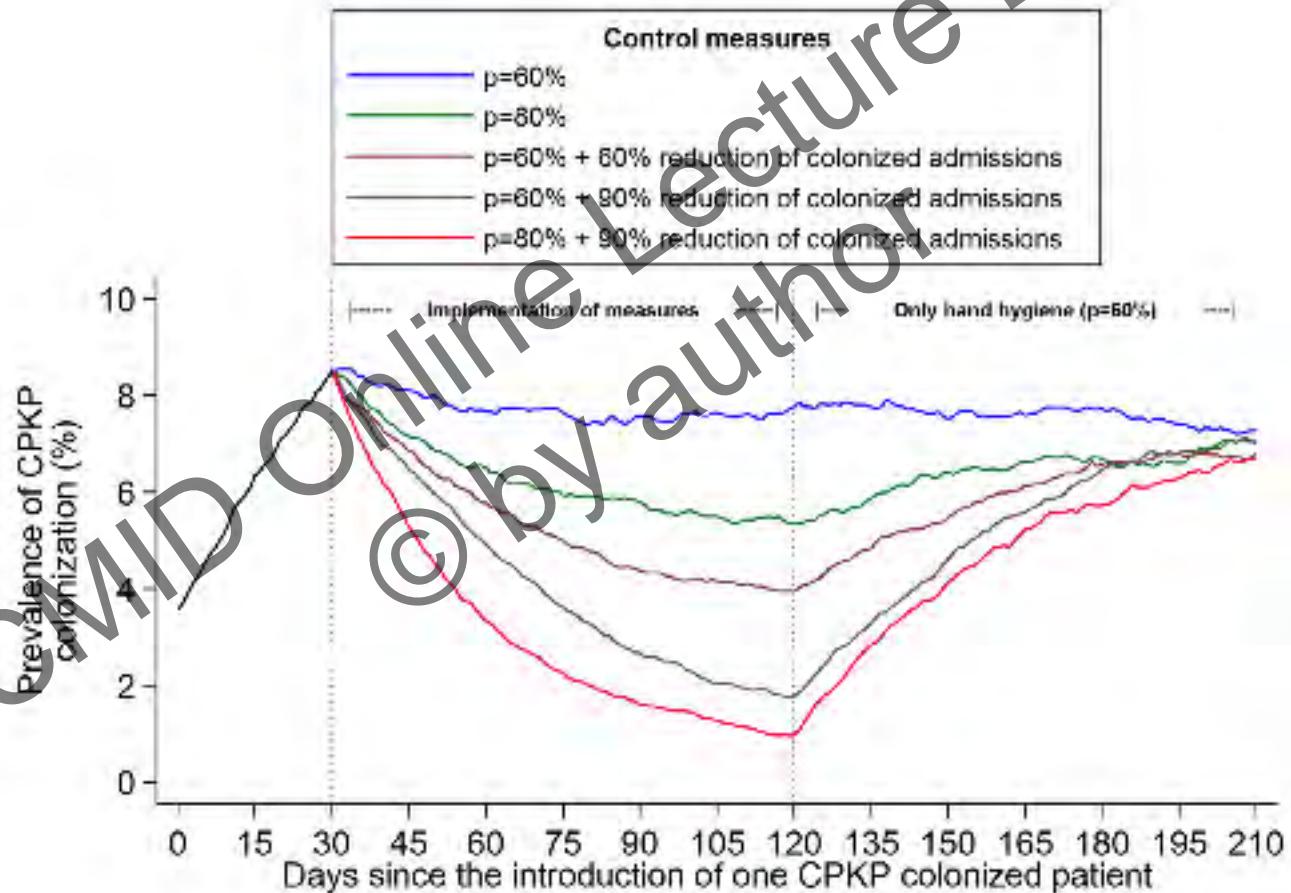


Containment of a Country-wide Outbreak of Carbapenem-Resistant *Klebsiella pneumoniae* in Israeli Hospitals via a Nationally Implemented Intervention

Mitchell J. Schwaber,¹ Boaz Lev,² Avi Israeli,² Ester Solter,¹ Gill Smollan,¹ Bina Rubinovitch,¹ Itamar Shalit,¹ Yehuda Carmeli,¹ and the Israel Carbapenem-Resistant Enterobacteriaceae Working Group^a



Impact of Infection Control measures on Transmission of CPKP in an Endemic Setting



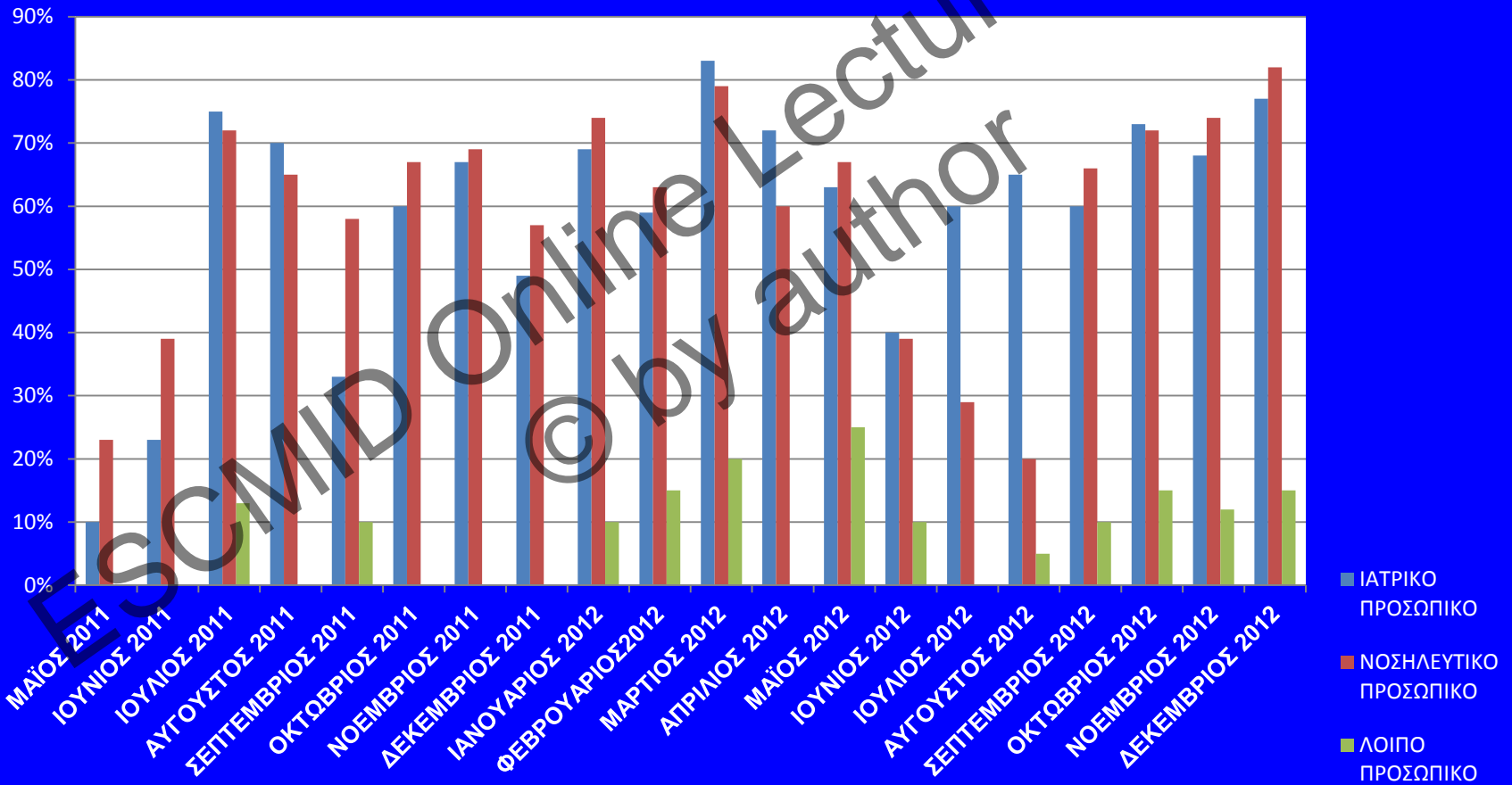
Laiko General Hospital Hematology Unit

- 31 beds (7 rooms of 3 beds, 3 of 2 beds, and 4 of 1 bed)
- Nurse:patient ratio
 - Morning shift 1:7
 - Afternoon and night shifts 1:15
- 80 to 90 admissions/month
- 800 to 900 pt-days/month

Intervention Measures in Hematology Unit (Laiko Hospital Athens, Greece)

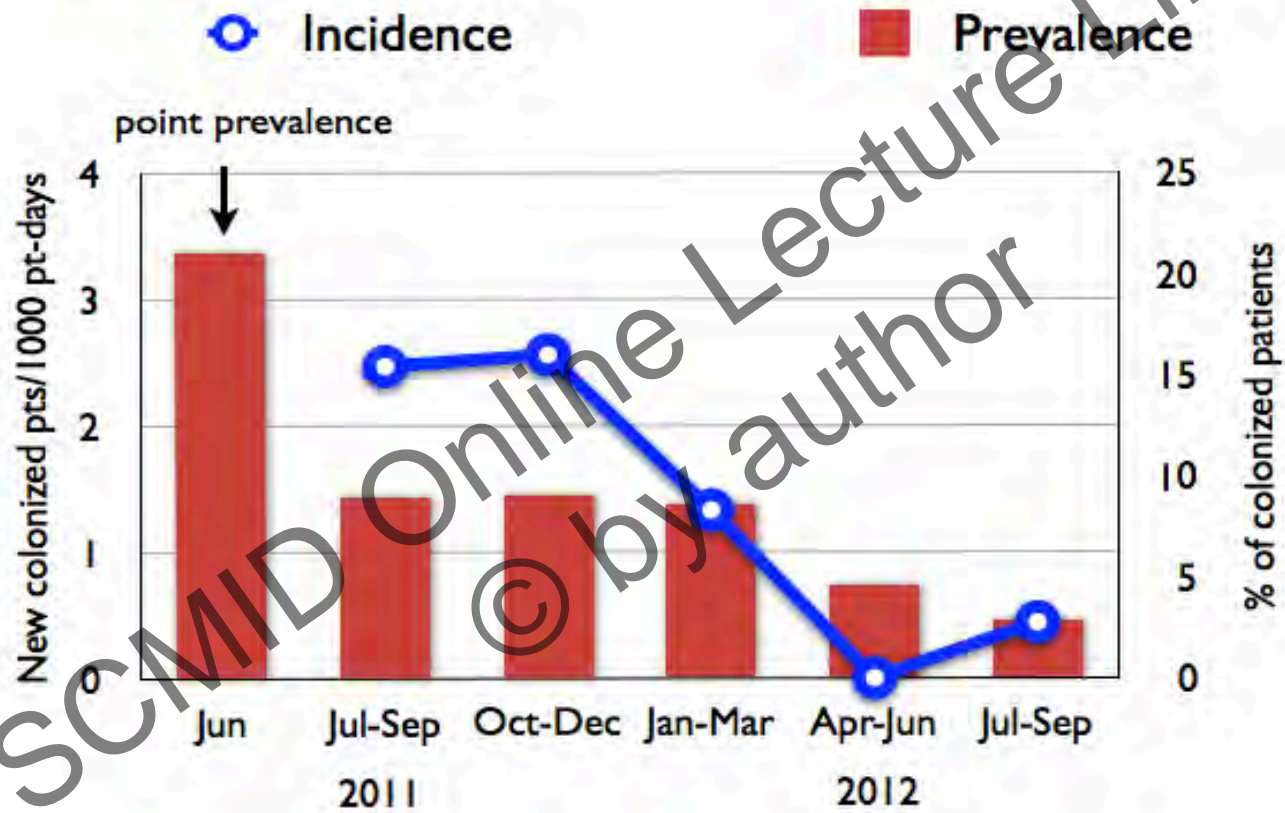
- Point prevalence
- Active surveillance upon admission and weekly thereafter
- Physical separation of CPE carriers
- Dedicated HCP when possible
- Promotion of hand hygiene
- Contact precautions
- Daily observations for compliance

Hand Hygiene Compliance

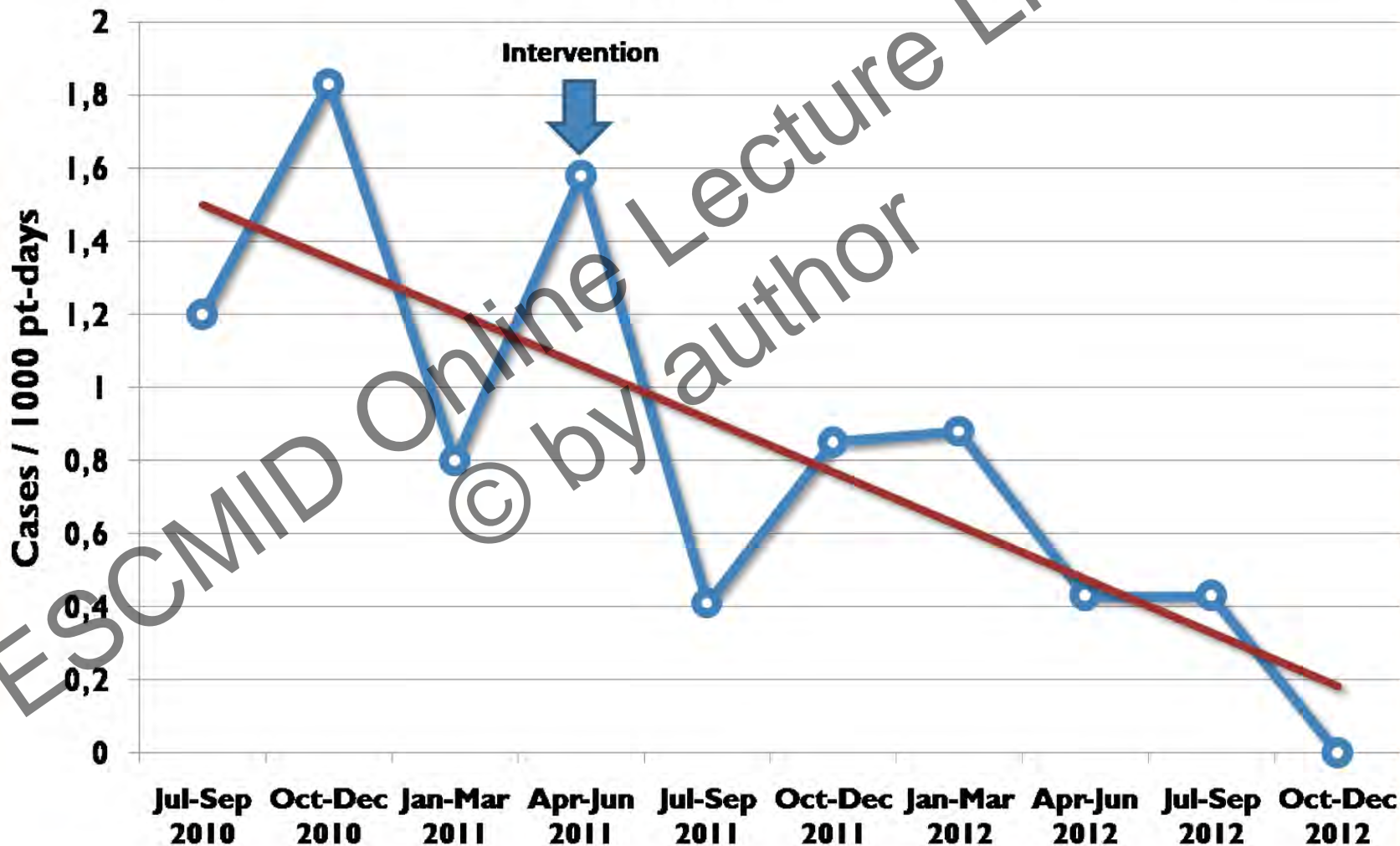


Hematology Unit

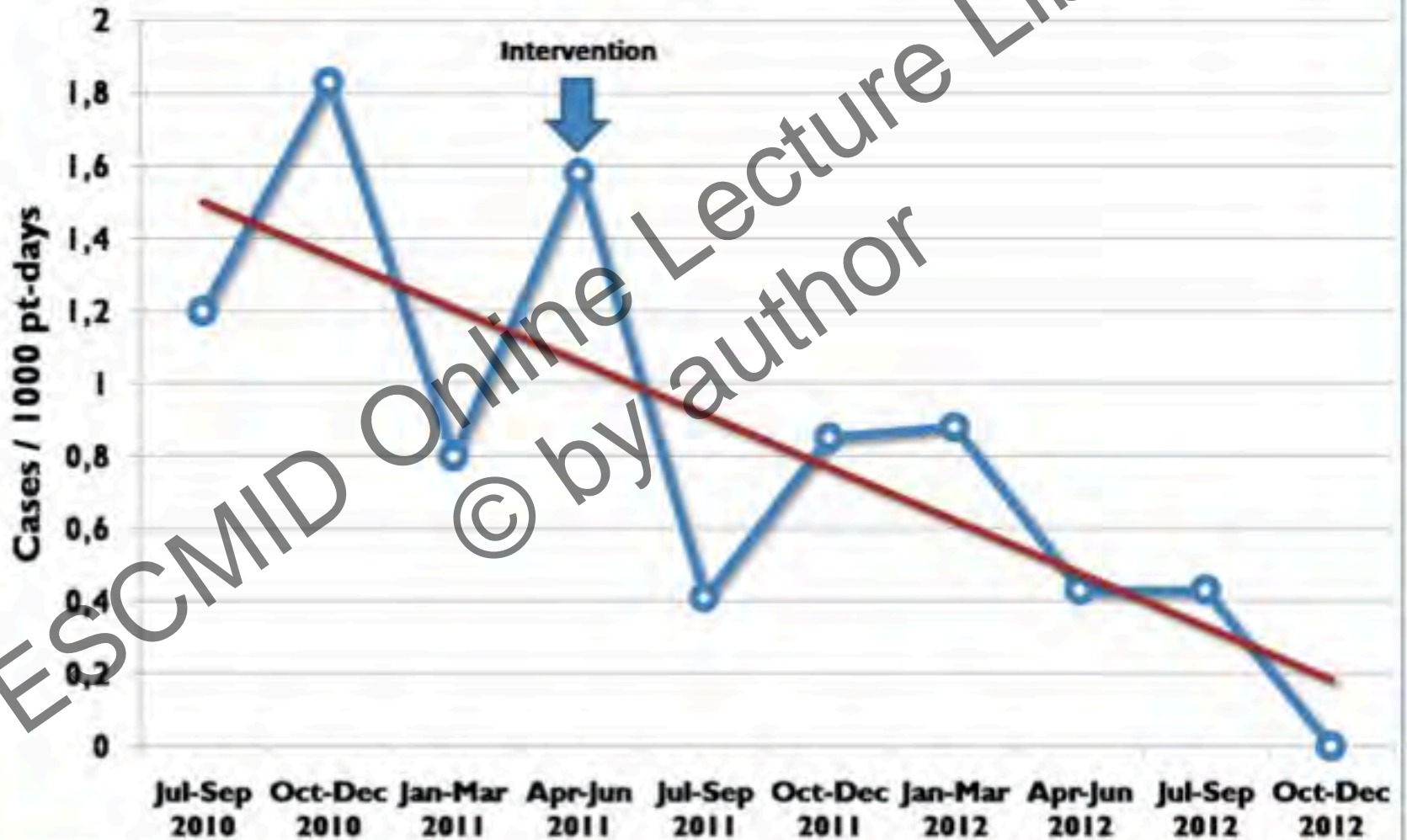
- Cohorting of colonized or infected pts 100%
- Dedicated nurse feasible only in the morning shift and not all the time
- Gowns and gloves available all the time for colonized/infected pts



Incidence of CPKP Bloodstream Infections in Hematology Unit



Incidence of CPKP Bloodstream Infections in Hematology Unit



Nosocomial Infection

- Indicator of health care quality
- Every nosocomial infection is acquired because of negligence of the health care providers
- Zero tolerance to protect our patients



THANK YOU FOR YOUR ATTENTION