14th European Patients' Rights Day

XIV EUROPEAN PATIENTS' RIGHTS DAY

ONE health approach, MULTIPLE answers:
Citizens' engagement & stakeholders' actions to tackle antimicrobial resistance and sustain EU progress

DIGITAL CONFERENCE
18th & 19th November 2020

REDUCING HEALTHCARE-ASSOCIATED INFECTIONS INCIDENCE BY A PROBIOTIC-BASED SANITATION SYSTEM: A MULTICENTRE, PROSPECTIVE, INTERVENTION STUDY

Luca Arnoldo

Introduction

1. Air pollution and climate change
2. Non communicable diseases (NCDs)
3. Global influenza pandemic
4. Fragile and vulnerable settings
5. **Antimicrobial resistance**
6. Ebola and other high-threat pathogens
7. Weak primary healthcare
8. Vaccine hesitancy
9. Dengue
10. HIV

Figure 4. *Klebsiella pneumoniae*. Percentage of invasive isolates resistant to third-generation cephalosporins (cefotaxime or/and ceftriaxone or/and ceftazidime), by country, EU/EEA, 2019

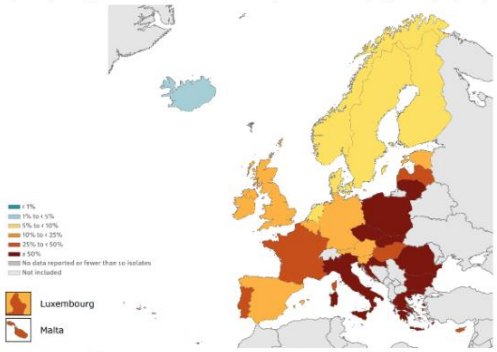


Figure 5. *Klebsiella pneumoniae*. Percentage of invasive isolates resistant to carbapenems (imipenem or/and meropenem), by country, EU/EEA, 2019

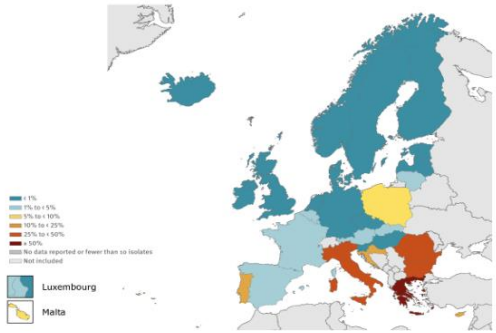


Figure 6. *Pseudomonas aeruginosa*. Percentage of invasive isolates with resistance to carbapenems (imipenem or/and meropenem), by country, EU/EEA, 2019

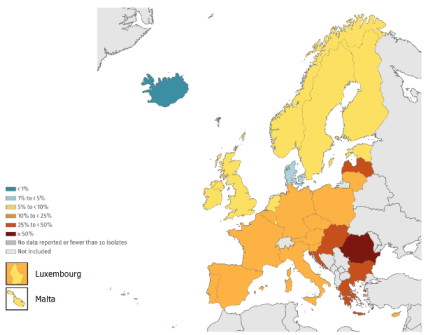


Figure 8. *Staphylococcus aureus*. Percentage of invasive isolates resistant to meticillin (MRSA), by country, EU/EEA, 2019

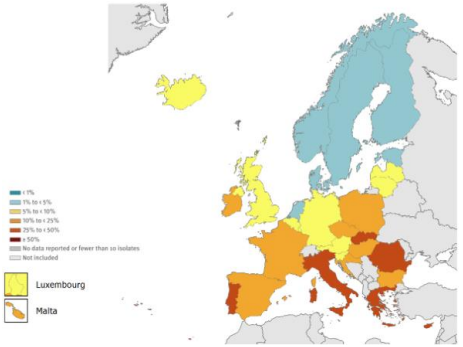


Figure 10. *Enterococcus faecium*. Percentage of invasive isolates resistant to vancomycin, by country, EU/EEA, 2019

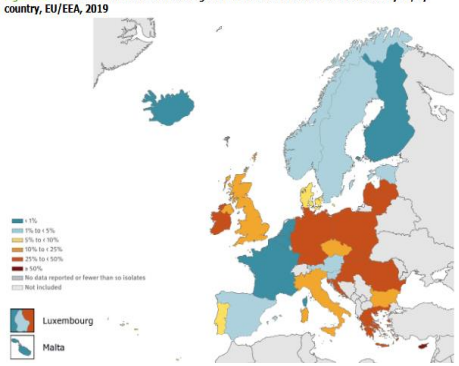


Figure 7. *Acinetobacter* species. Percentage of invasive isolates with resistance to carbapenems (imipenem or/and meropenem), by country, EU/EEA, 2019

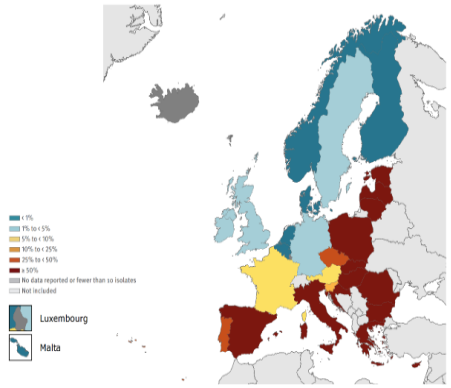


Figure 1. *Escherichia coli*. Percentage of invasive isolates resistant to fluoroquinolones (ciprofloxacin or/and levofloxacin or/and ofloxacin), by country, EU/EEA, 2019

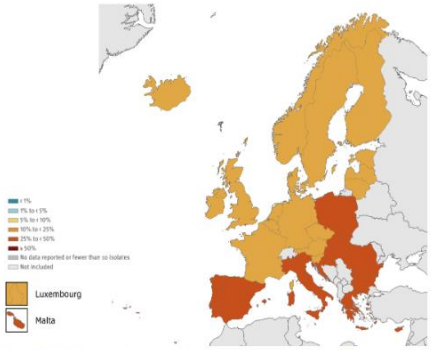
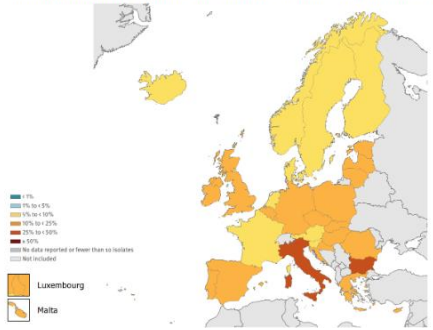


Figure 2. *Escherichia coli*. Percentage of invasive isolates resistant to third-generation cephalosporins (cefotaxime or/and ceftriaxone or/and ceftazidime), by country, EU/EEA, 2019



https://www.ecdc.europa.eu/en/publications-data/downloadable-tables-antimicrobial-consumption-annual-epidemiological-report-2019

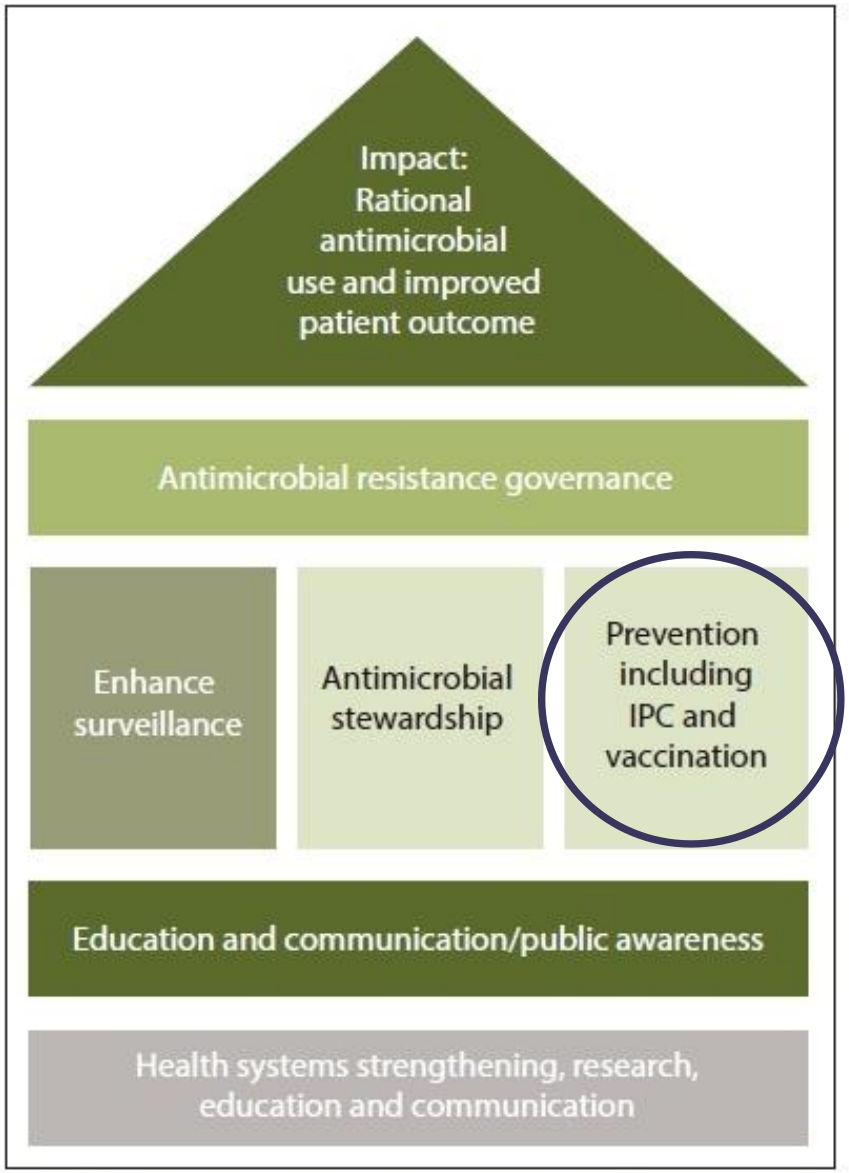
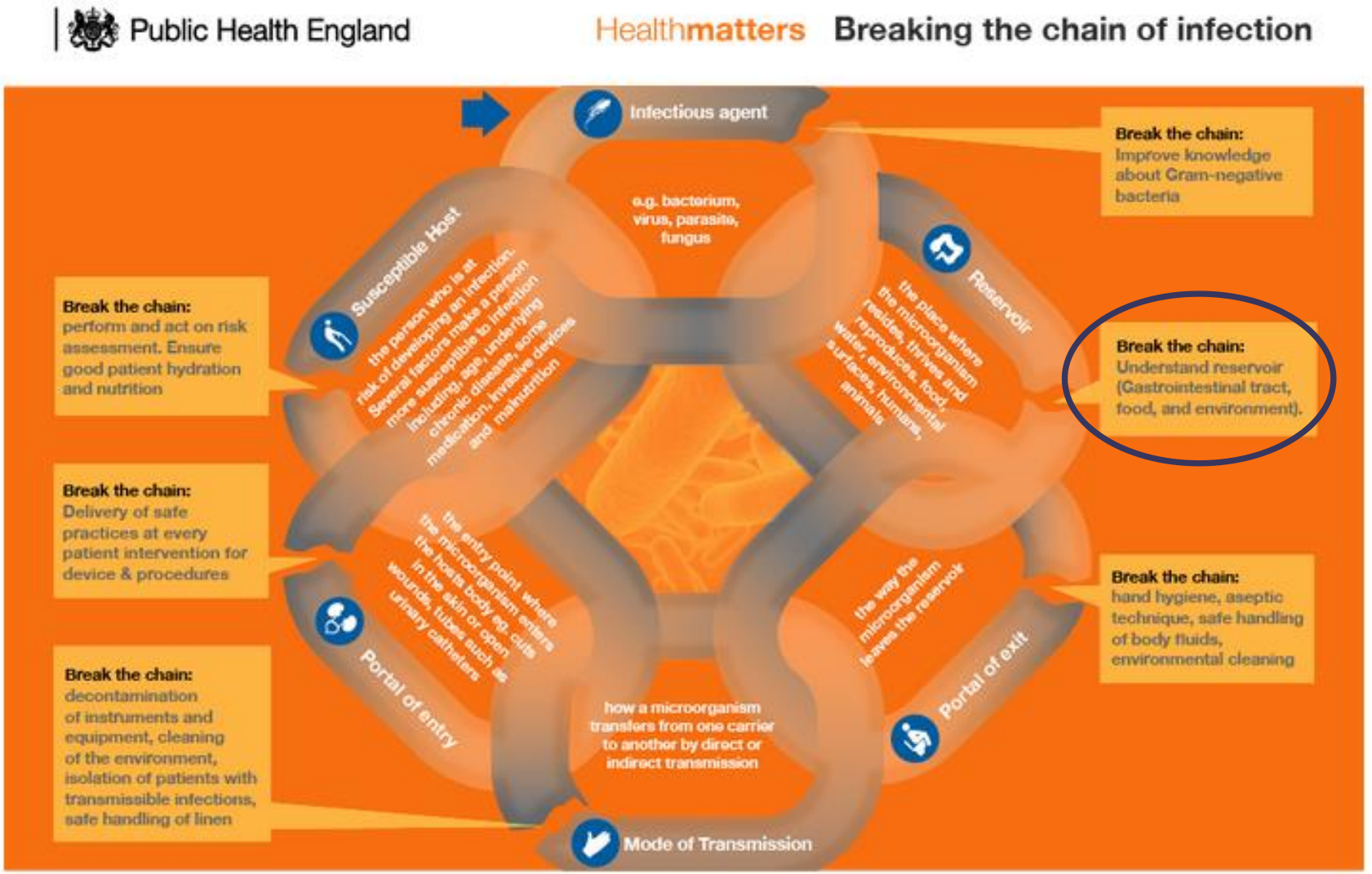


Fig. 1. Pillars of the South African antimicrobial stewardship strategy framework.[6] (IPC = infection prevention and control.)

http://dx.doi.org/10.7196/samj.2018.v108i7.13149

Preventing infections



Aim

- Evaluate the impact of environmental cleanliness through the Probiotic Cleaning Hygiene System (PCHS) on the incidence of healthcare-associated infections (HAIs) in acute care settings
- Probiotic Cleaning Hygiene System (PCHS)
  - Ecosustainable detergen conteings spores of *Bacillus spp.* – non pathogens

Data are available

RESEARCH ARTICLE

Reducing healthcare-associated infections incidence by a probiotic-based sanitation system: A multicentre, prospective, intervention study

Elisabetta Caselli[1,2]*, Silvio Brusaferro[3], Maddalena Coccagna[2], Luca Arnoldo[3], Filippo Berloco[4], Paola Antonioli[5], Rosanna Tarricone[6], Gabriele Pelissero[7], Silvano Nola[8], Vincenza La Fauci[9], Alessandro Conte[3], Lorenzo Tognon[10], Giovanni Villone[11], Nelso Trua[12], Sante Mazzacane[2], for the SAN-ICA Study Group[1,2,3,4,5,6,7,8,9,10,11,12¶]

PLoS One. 2018 Jul 12;13(7):e0199616

pathogens

MDPI

Article

A Probiotic-Based Sanitation System for the Reduction of Healthcare Associated Infections and Antimicrobial Resistances: A Budget Impact Analysis

Rosanna Tarricone [1,2], Carla Rognoni [1,*], Luca Arnoldo [3], Sante Mazzacane [4] and Elisabetta Caselli [4,5]

Pathogens 2020 Jun 23;9(6):502

Infection and Drug Resistance

Dovepress

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Open Access Full Text Article

ORIGINAL RESEARCH

Impact of a probiotic-based hospital sanitation on antimicrobial resistance and HAI-associated antimicrobial consumption and costs: a multicenter study

Infect Drug Resist. 2019 Feb 27;12:501-510

Methods

- Pre-post interventional study
- 5 acute hospitals were included:
  - general medicine, geriatrics and neurological wards;
  - from different part of Italy: 3 in the north, 1 in centre and 1 in south
- Timetable:
  - 6 months of pre-interventional survey:
    - January-June 2016 for three hospitals: I_1
    - May-October 2016 for the other two: I_2
  - Pause period for the PCHS system start-up:
    - 6 months for I_1
    - 2 months for I_2
  - 6 months of survey during PCHS application: January-June 2017 for all the five hospitals
- 1 control hospital especially included for the evaluation of the environmental impact

Patients characteristics

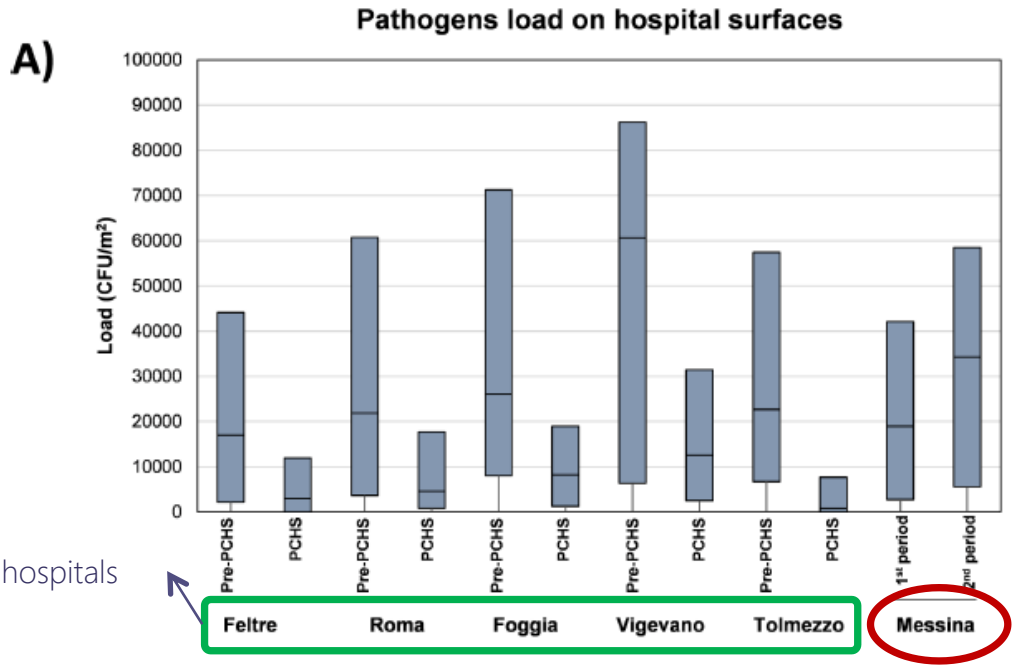
Table 2. Patient characteristics of the I_1-I_2 hospitals in the pre-PCHS and PCHS periods (11,461 patients).

Patients characteristics	Pre-PCHS	PCHS
	Total patients No. (%)	Total patients No. (%)
Total	5,930	5,531
Gender: male	2,977 (50.2%)	2,928 (52.9%)
Age <65	1,518 (25.6%)	1,265 (22.9%)
Age 65–74	1,261 (21.3%)	1,177 (21.3%)
Age 75–84	1,821 (30.7%)	1,753 (31.7%)
Age ≥85	1,330 (22.4%)	1,336 (24.2%)
Incontinence	1,448 (24.4%)	1,369 (24.8%)
Disorientation	804 (13.6%)	747 (13.5%)
Self-sufficiency	3,671 (61.9%)	3,632 (65.7%)
Pressure sores	393 (6.6%)	237 (4.3%)
Surgery 30 day before	122 (2.1%)	80 (1.4%)
Ventilation	215 (3.6%)	161 (2.9%)
Parenteral nutrition	200 (3.4%)	141 (2.5%)
ATB 2 week before	566 (9.5%)	294 (5.3%)
MDRO at admission	131 (2.2%)	83 (1.5%)
Infection at admission	1,216 (20.5%)	1,089 (19.7%)
Urinary catheter (any type)	1,368 (23.1%)	1,166 (21.1%)
CVC	264 (4.5%)	260 (4.7%)

Self-sufficiency, ability to provide for themselves autonomously, measured by SSM (Self Sufficiency Matrix) scale; ATB, antibiotics; MDRO, multi drug resistant organism; CVC, central vascular catheter.

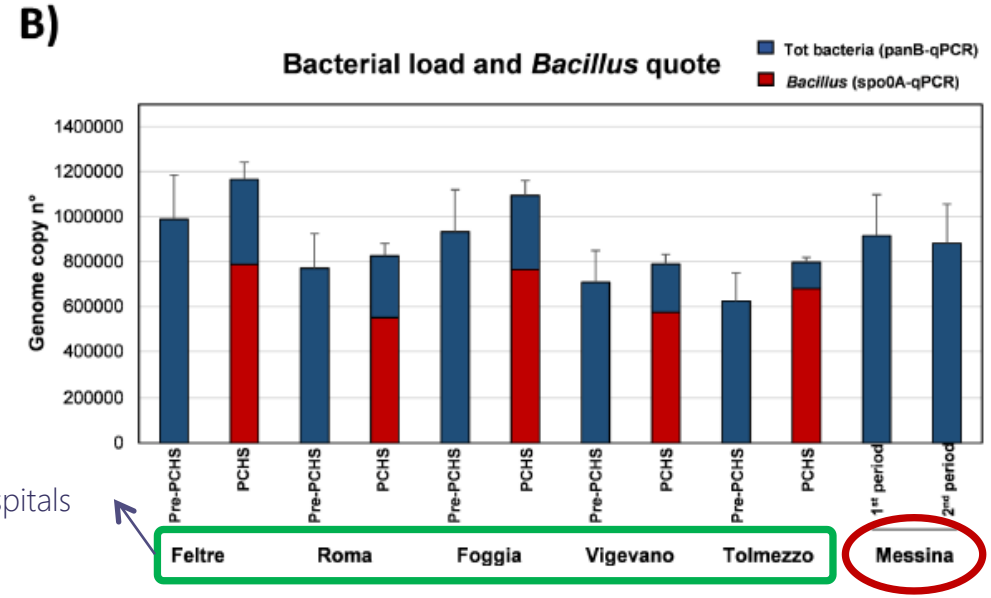
Evaluation of sample (sink, floor, bed footboard) for:

- *Staphylococcus spp.*
- *Enterobacteriaceae spp.*
- *Acinetobacter spp.*
- *Mycetes*
- *Pseudomonas spp.*
- *C. difficile*



Interventional hospitals

Control hospital



Interventional hospitals

Control hospital

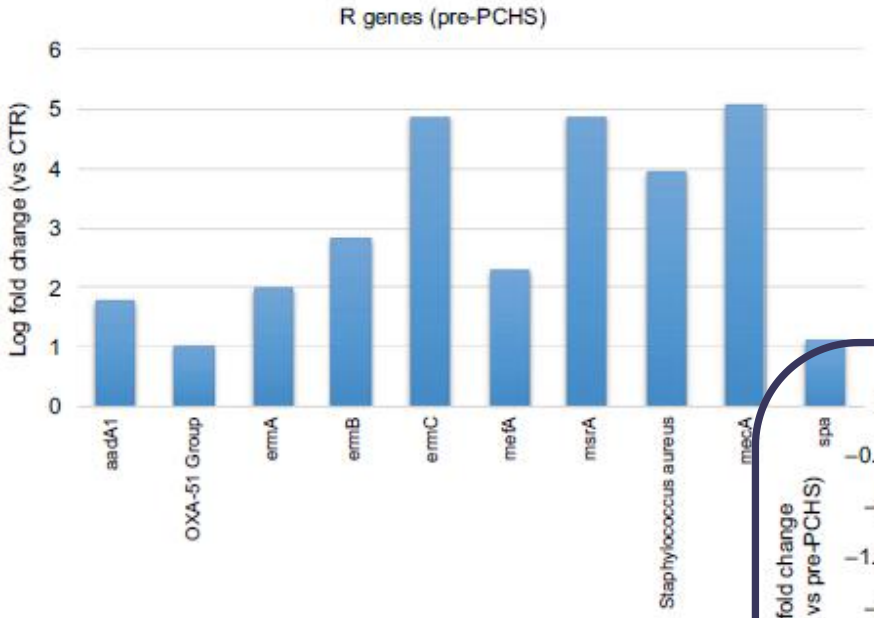
Table 1 Variations in individual pathogens' load on hospital surfaces during pre-PCHS and PCHS (CFU/m^2)

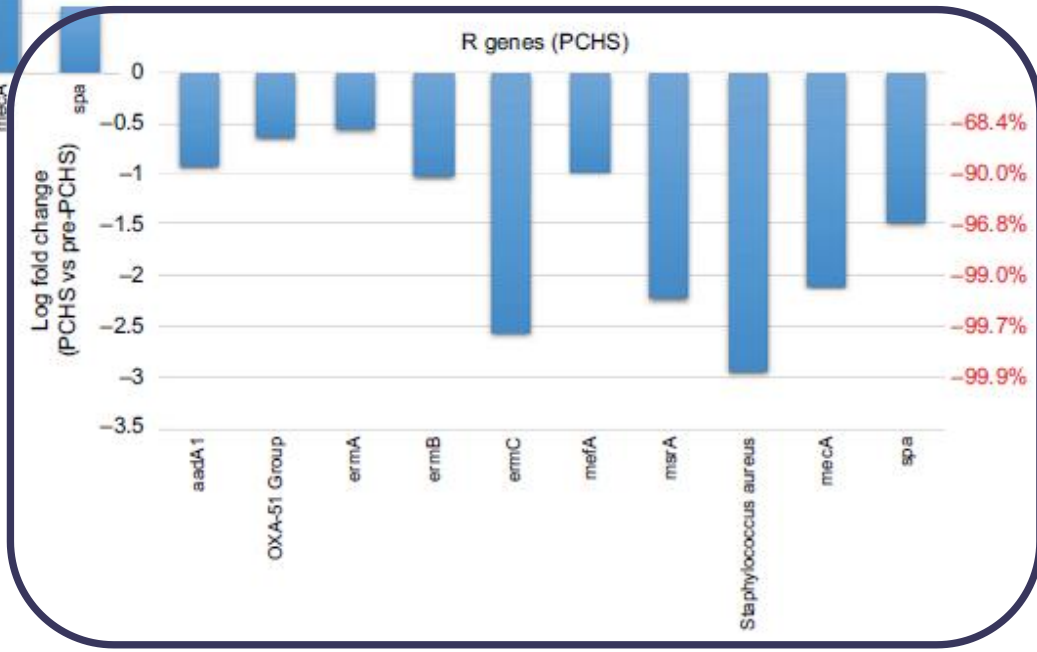
Pathogen type	Pre-PCHS[a]	PCHS[a]	Decrease (%)
Aspergillus spp.	181±307	12±6	93.3
Candida spp.	2,597±1,798	1,108±559	57.3
Clostridium difficile	334±290	132±219	60.5
Pseudomonas aeruginosa	970±982	415±350	57.2
Acinetobacter baumannii	2,844±841	520±726	81.7
Enterobacteriaceae spp.	1,774±901	189±135	89.3
Staphylococcus spp.	26,947±17,293	4,674±3,799	82.7

Note: [a]Results are expressed as mean value of CFU/m^2 ± SD detected in the five enrolled hospitals.

Abbreviations: PCHS, Probiotic Cleaning Hygiene System; CFU, colony forming units.

Bacterial resistome





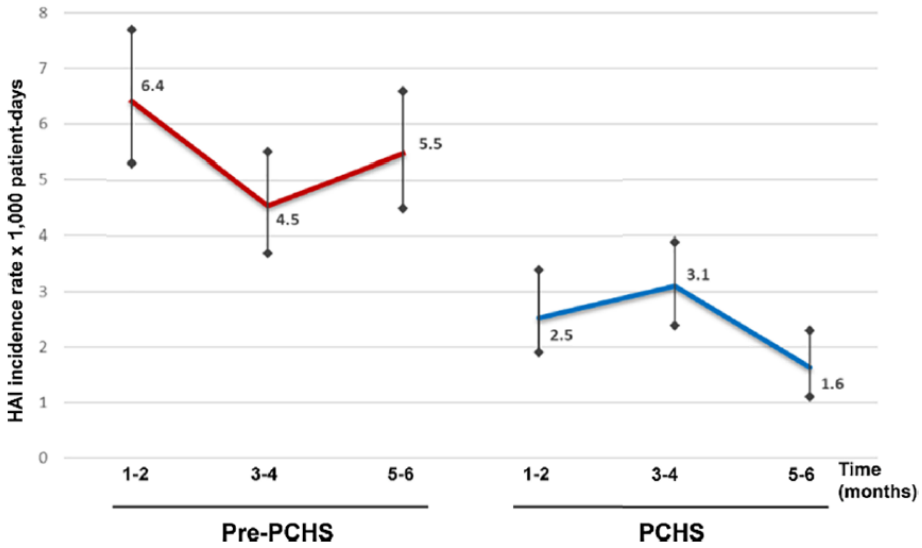
Comparison of HAI incidence between phases:

- pre-PCHS (Conventional Chemical Cleaning)

&

- PCHS

	All the population N. 11,461			Propensity score matching sample N. 8,320		
	Pre-PCHS	PCHS		Pre-PCHS	PCHS	
Cumulative incidence of patients with at least on HAI	4.8% (284/5,930)	2.3% (128/5,531)	OR 0.47 CI 95% 0.38-0.58	4.6% (191/4,160)	2.4% (100/4,160)	OR 0.47 CI 95% 0.37-0.60
Incidence rate x 1,000 hospitalisation days	5.4 (314/57,742)	2.4 (141/58,201)	OR 0.45 CI 95% 0.36-0.54	5.2 (210/40,111)	2.5 (111/44,751)	OR 0.47 CI 95% 0.38-0.60



Impact of risk factors on HAI onset

Table 5. Risk factors associated with HAI onset in patients of I_1-I_2 hospitals: Multivariable model*.

Population characteristics	*P*	OR	95% CI
Male	0.01812	0.78	0.63–0.96
Age 65–74 *vs* Age <65	0.0047	1.71	1.18–2.48
Age 75–84 *vs* Age <65	0.0004	1.88	1.33–2.67
Age 85 or more *vs* Age <65	0.0026	1.78	1.22–2.58
Length of stay	p<0.0001	1.08	1.07–1.09
Incontinence	0.2253	0.85	0.66–1.10
Disorientation	0.0226	1.37	1.05–1.76
Self-sufficiency	0.5600	0.92	0.69–1.43
Pressure sores	0.9757	0.99	0.69–1.44
Ventilation	0.7702	1.07	0.68–1.67
ATB 2 week before	0.8479	0.97	0.68–1.37
MDRO at admission	0.6230	0.86	0.47–1.57
Urinary catheter (any type)	p<0.0001	2.68	2.10–3.41
CVC	0.0001	1.99	1.40–2.82
PCHS	p<0.0001	0.44	0.35–0.54

Conclusions

- Data suggests a positive effect of PCHS application in order to prevent the HAIs onset in the involved wards
- PCHS effect seems to be higher for the HAIs transmitted by contact
- Important to sustain the further researches:
  - other time period
  - different care settings

THE ELECTRIC LIGHT DID NOT COME FROM THE CONTINUOUS IMPROVEMENT OF CANDLES

(OREN HARARI)