Infection Control in Developing Nations
Dr. Benedetta Allegranzi, World Health Organisation
A Webber Training Teleclass

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Infection Control in Developing Countries

Benedetta Allegranzi, MD
Deputy Lead
First Global Patient Safety Challenge
WHO Patient Safety

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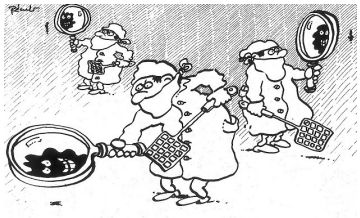
Estimates of the global burden of health care-associated infection are hampered by limited availability of reliable data



First Challenge area of work on the
burden of health care-associated infection

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IC constraints to IC in Africa at national level

Constraints

- Absence of policies
- Absence of guidelines for IC
- Insufficient funds
- Inappropriate organizational structures & coordination
- **Lack of data collection**
- Inadequate human resources
- Lack of monitoring & evaluation
- Insufficient commitment of partners
- Inadequate infrastructure
- Insufficient sensitization of HCWs to policies

First GPSC African workshop, Uganda, December 2007

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Definition of health care-associated infection

"An infection

occurring in a patient

during the process of care in a hospital or other health-care facility

which was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also

occupational infections among staff of the facility"

Ducel G et al. Prevention of hospital-acquired infections. A practical guide. WHO 2002

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Burden of major infections worldwide

MALARIA	HIV
• N°annual episodes: 300-500 mio • N°annual deaths: 1.5-2.7 mio • 90 countries at risk worldwide	• N°affected: 39.5 mio • N°new infections/year: 4.3 mio • N°deaths in 2006: 2.9 mio • Most countries affected with different infection rates
TUBERCULOSIS	**HEALTHCARE-ASSOCIATED INFECTIONS**
• N° new infections/year: 8 mio • N°deaths in 2005: 1.6 mio • 1/3 of the world currently affected	**?**

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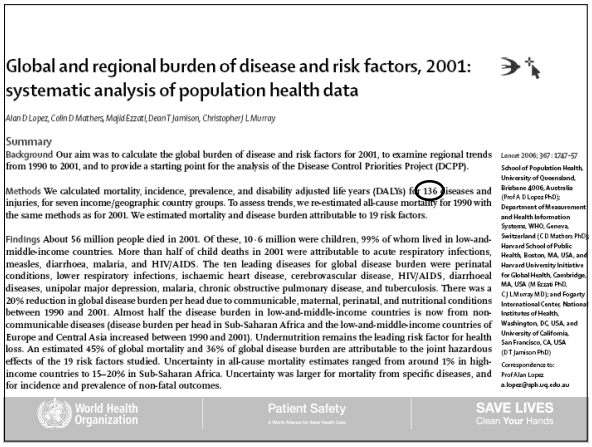

Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data

Alan D Lopez, Colin D Mathers, Majid Ezzati, Dean T Jamison, Christopher J L Murray

Summary

Background Our aim was to calculate the global burden of disease and risk factors for 2001, to examine regional trends from 1990 to 2001, and to provide a starting point for the analysis of the Disease Control Priorities Project (DCPP).

Methods We calculated mortality, incidence, prevalence, and disability adjusted life years (DALYs) for 136 diseases and injuries, for seven income/geographic country groups. To assess trends, we re-estimated all-cause mortality for 1990 with the same methods as for 2001. We estimated mortality and disease burden attributable to 19 risk factors.

Findings About 56 million people died in 2001. Of these, 10·6 million were children, 99% of whom lived in low-and-middle-income countries. More than half of child deaths in 2001 were attributable to acute respiratory infections, measles, diarrhoea, malaria, and HIV/AIDS. The ten leading diseases for global disease burden were perinatal conditions, lower respiratory infections, ischaemic heart disease, cerebrovascular disease, HIV/AIDS, diarrhoeal diseases, unipolar major depression, malaria, chronic obstructive pulmonary disease, and tuberculosis. There was a 20% reduction in global disease burden per head due to communicable, maternal, perinatal, and nutritional conditions between 1990 and 2001. Almost half the disease burden in low-and-middle-income countries is now from non-communicable diseases (disease burden per head in Sub-Saharan Africa and the low-and-middle-income countries of Europe and Central Asia increased between 1990 and 2001). Undernutrition remains the leading risk factor for health loss. An estimated 45% of global mortality and 36% of global disease burden are attributable to the joint hazardous effects of the 19 risk factors studied. Uncertainty in all-cause mortality estimates ranged from around 1% in high-income countries to 15–20% in Sub-Saharan Africa. Uncertainty was larger for mortality from specific diseases, and for incidence and prevalence of non-fatal outcomes.

Lancet 2006; 367: 1747–57

School of Population Health, University of Queensland, Brisbane 4076, Australia (Prof A D Lopez PhD); Department of Measurement and Health Information Systems, WHO, Geneva, Switzerland (C D Mathers PhD); Harvard School of Public Health, Boston, MA, USA, and Harvard University Initiative for Global Health, Cambridge, MA, USA (M Ezzati PhD, C J L Murray M D); and Fogarty International Center, National Institutes of Health, Washington, DC, USA, and University of California, San Francisco, CA, USA (D T Jamison PhD)

Correspondence to: Prof Alan Lopez a.lopez@sph.uq.edu.au

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CALCULATING ROUGH ESTIMATES OF THE HAI BURDEN…

HAI RATES IN MEMBER STATES

Average HAI rate: 10%

Average HAI attributable mortality: 5%

ALL countries affected worldwide

Global hospital admissions per year: ?

Affected patients/year: ?

N° deaths/year: ?

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Health care-associated infection *is a major patient safety problem*

Affects hundreds of millions of individuals worldwide each year

Multifaceted causation related to:

- systems and processes of care provision
- economic constraints on systems and countries
- human behaviour

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Health care-associated infection *is a major patient safety problem*

• Data to assess the size and nature of the problem and to create the basis for monitoring the effectiveness of actions

• ***Patient safety gap:***

Some healthcare institutions and systems control the risk to patients much better than others

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HCAI burden in USA

- Incidence: 5–6%; 1.7 million affected patients
  - Urinary Tract Infection: 36%; 561,667 episodes, 13,088 deaths
  - Surgical Site Infection: 20%; 274,098 episodes (1.98%)
  - Catheter Related Bloodstream Infections: 11%; 250,000 episodes, 28,000 deaths
  - Ventilator Associated Pneumonia: 11%; 5.4/1000 ventilator-days
- Attributable mortality: 3.6%, approximately 99,000 deaths
- Annual economic impact: about US$ 4,5 billion

Klevens RM, et al. *Public Health Reports* 2007

Surveillance network, study period, setting	CR-BSI*	VAP*	CR-UTI*
NNIS, 2006–2007, PICU	2.9	2.1	5.0
NNIS, 2006–2007, Adult ICU (med/surg)	2.0	3.3	3.3

* Overall (pooled mean) infection rates/1000 device-days

NHSN report. *Am J Infect Control* 2008

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HCAI burden in Europe

- **Europe:** prevalence 3.5–14.8%
- **Norway:** nation-wide prevalence of 5.7% in 2007 (Eurosurveillance)
- **France:** in a 4-year multicentre study (2001–2004), HCAI prevalence of 6.1%, varying from 1.9% (low risk patients) to 15.2% (high risk patients) (Floret N, et al. *JHI* 2004)
- **Italy:** in a region-wide prevalence study in in 2003, HCAI prevalence of 7.6% (Pellizzer P, et al. *Infection* 2008)
- **Switzerland:** in 18 health-care facilities across the country, overall HCAI prevalence of 10.1%; 70,000 cases/year; annual cost: CHF 230-300 mio (Sax H, et al. *Arch Int Med* 2002)
- **UK and Republic of Ireland:** overall prevalence of 7.6% (Smyth ETM et al. *JHI* 2008)
- **Scotland:** overall prevalence 9.5% in acute hospitals; additional length of stay 3.2-13.7 days; annual costs: £183 mio per year (Reilly E et al. *JHI* 2008)

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The impact of HCAI

HCAI can cause:

- more serious illness
- prolongation of stay in a health-care facility
- long-term disability
- excess deaths
- high additional financial burden
- high personal costs on patients and their families

Facts about health-care associated infection in developing countries (1)

- The risk of infection is 2-20 times higher than in developed countries, and the proportion of patients infected can exceed 25% (Allegranzi B & Pittet D. ICHE 2007;28:1323-27)
- The rates of BSI in neonates are 3-20 times higher in developing countries, and, in some countries, approximately half of the patients in neonatal ICUs acquire an infection, and case fatality rates may reach 52% (Zaidi AKM et al. *Lancet* 2005; 365:1175-1188)
- The rates of VAP vary from 10 to 41.7 per 1000 ventilator-days; VAP is associated with a crude mortality ranging from 16% to 94% and with increased ICU LOS (Arabi Y et al. Int J Infect Dis 2008;12:505-12)

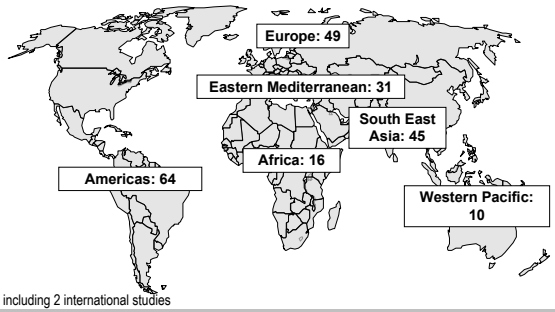
Facts about health-care associated infection in developing countries (2)

- **Unsafe blood transfusion** causes every year:
  - 16 million hepatitis B infections,
  - 5 million hepatitis C infections, and
  - 160 000 cases of HIV
- **Reuse of contaminated syringes** caused in 2000:
  - 21 million hepatitis B infections (33% of new infections)
  - 2 million hepatitis C infections (40% of new infections)
  - 260 000 HIV infections (5% of new infections)
- **Unsafe waste disposal:** in 22 developing countries, the proportion of facilities using inappropriate waste disposal methods ranges from 18% to 64%

Systematic literature review on HAI rates in developing countries 1995-2008

Page 16

Selected full papers on HAI rates from developing countries (1995-2008): 215*



* including 2 international studies

HCAI rates reported from developing countries

Type of survey	Prevalence (%)	Incidence (%)	Incidence (per 1000 patient-days)	Incidence (per 1000 device-days)
Hospital-wide	4.6–19.1	2.5–5.1	9.7–41.0	
Adult ICU	18.4–77.2	4.1–38.9	18.2–90.0	
Neonatal ICU		2.9–57.7	2.6–62.0	
SSI		1.2–38.7		
VAP				2.9–23.0
CR*-BSI				1.7–44.6
CR*-UTI				3.2–51.0

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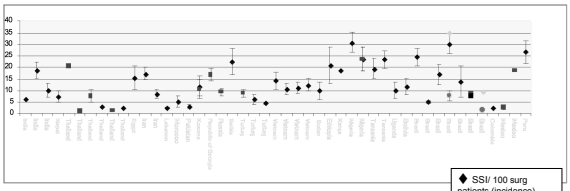
Device-associated infection rates in ICUs in developing countries compared to NNIS rates

Surveillance network, study period, country	Setting	N° patients	CR-BSI*	VAP*	CR-UTI*
INICC, 2003–2005, 5 developing countries†[1]	PICU	1,529	16.1	10.6	5.3
NNIS, 2006–2007, USA[2]	PICU#	/	2.9	2.1	5.0
INICC, 2002–2007, 18 developing countries‡[3*]	Adult ICU	43,114	9.2	19.5	6.5
NNIS, 2006–2007, USA[2]	Adult ICU#	/	1.5	3.1	2.3

* Overall (pooled mean) infection rates/1000 device-days
INICC = International Nosocomial Infection Control Consortium; NNIS = National Nosocomial Infection Surveillance system; PICU = paediatric intensive care unit; CR-BSI = catether-related bloodstream infection; VAP = ventilator-associated pneumonia; CR-UTI = catheter-related urinary tract infection.

1 Aygun C at al. *APIC* 2006
2 NHSN report. *Am J Infect Control* 2008
3 Rosenthal V et al. *Am J Infect Control* 2008
† Argentina, Colombia, Mexico, Peru, Turkey
‡ Argentina, Brazil, Colombia, Costa Rica, Cuba, El Salvador, India, Kosova, Lebanon, Macedonia, Mexico, Morocco, Nigeria, Peru, Philippines, Turkey, Uruguay
Attributable ICU mortality:38-45%
Medical/surgical ICUs

Surgical Site Infection rates (47 studies)



Range: 2.6-30.9%

♦ SSI/ 100 surg patients (incidence)
◊ SSI/ 100 surg patients (prevalence)
■ SSI /100 operations (Incidence)
● SSI / 100 operations inpatients
♦ SSI/ 100 operations outpatients

Health care-associated infection: *solutions to the problem*

- Prevention strategies reduce infections in developed, transitional and developing countries
- Most solutions are simple and not resource-demanding
- Several health-care settings have succeeded in reducing the risk to patients, but others have not

Conditions leading to higher HAI burden in developing countries

- Inadequate hygiene conditions
- Poor infrastructure
- Inadequate / insufficient equipment
- Lack of microbiological information
- Understaffing
- Overcrowding
- Lack of knowledge and low staff preparedness
- Inappropriate use of antibiotics
- More diseased population
- Unfavorable social background
- Lack of national policies and programs
- Costs falling on individual patients

Allegranzi B, Pittet D. Infect Control Hosp Epidemiol 2007;28:1323-27

Consequences

- Unsafe invasive procedures
- Nosocomial outbreaks of introduced community pathogens
- Spread of multiresistant organisms
- Higher health care-associated infection rates

1st principle of infection prevention

at least 35-50% of all healthcare-associated infections are associated with only 5 patient care practices:

- Use and care of urinary catheters
- Use and care of vascular access lines
- Therapy and support of pulmonary functions
- Surveillance of surgical procedures
- Hand hygiene and standard precautions

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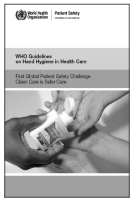
WHO Guidelines on Hand Hygiene in Health Care



Hand Hygiene: the entrance door to safer patient care & infection control

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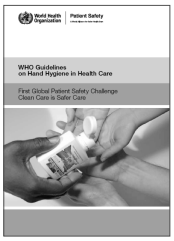
Implementation strategy and toolkit for the WHO Guidelines on Hand Hygiene in Health Care

Knowledge → Action



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WHO Multimodal Hand Hygiene Improvement Strategy

Evidence from the WHO Guidelines on Hand Hygiene in Health Care (2009), **5 core components,** to improve hand hygiene in health-care settings

ONE System change
Alcohol-based handrubs at point of care and access to safe continuous water supply, soap and towels

TWO Training and education
Providing regular training to all health-care workers

THREE Evaluation and feedback
Monitoring hand hygiene practices, infrastructure, perceptions, & knowledge, while providing results feedback to health-care workers

FOUR Reminders in the workplace
Prompting and reminding health-care workers

FIVE Institutional safety climate
Individual active participation, institutional support, patient participation

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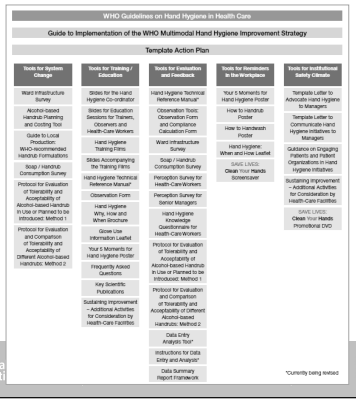
Revised implementation toolkit



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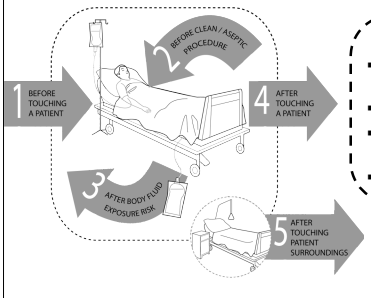
The "My 5 Moments for Hand Hygiene" approach



Proposes a unified vision:
- for trainers, observers and health-care workers
- to facilitate education
- to minimize inter-individual variation
- to increase adherence

Sax H et al. *Journal Hospital Infection* 2007

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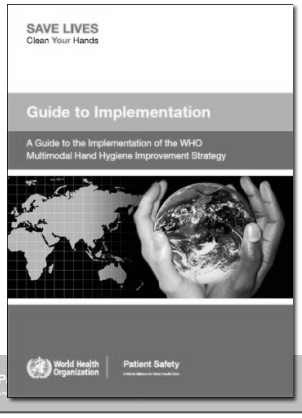
Implementation tools: key tools

- Guide to Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy
- Template Action Plan



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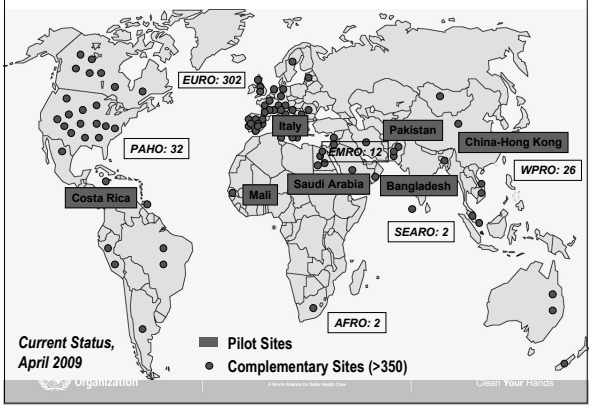
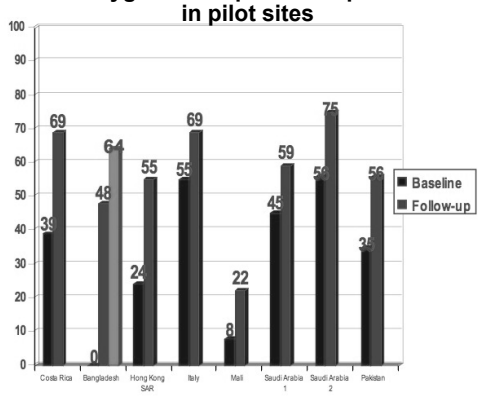
Field testing the implementation



Hand hygiene compliance improvement in pilot sites

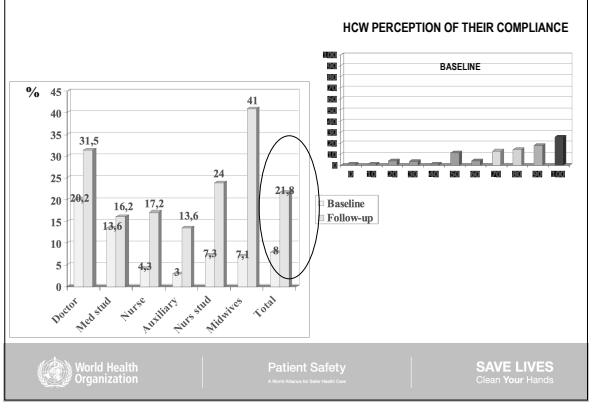


University Hospital Point G

Local production of ABHR according to the WHO formulation

Commitment of ministerial and hospital authorities (Mali)

Mali - Impact on hand hygiene practices



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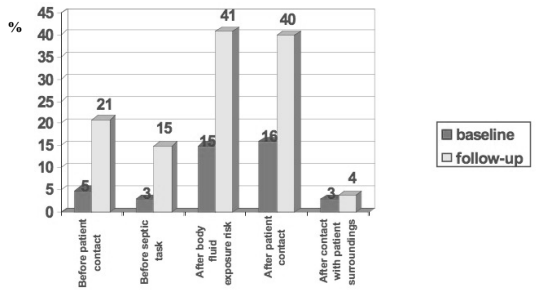
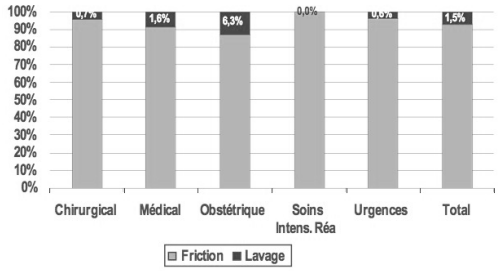
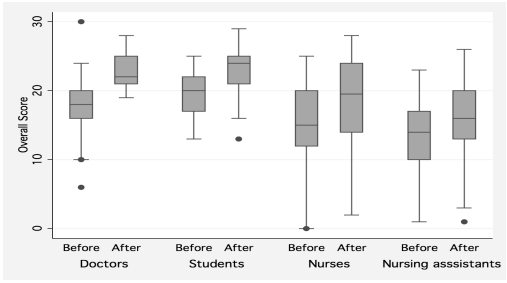
Compliance according to the indication



Impact on hand hygiene technique:
HR vs HW at follow-up

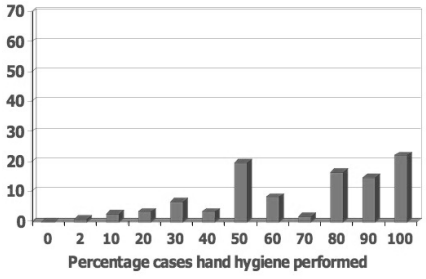


Knowledge on hand hygiene before and after training sessions by professional category



Bangladesh - Chittagong Medical Hospital
162% bed occupancy

Perception Survey at baseline –
What is the average percentage of cases where health-care workers in your hospital really perform hand hygiene (%)



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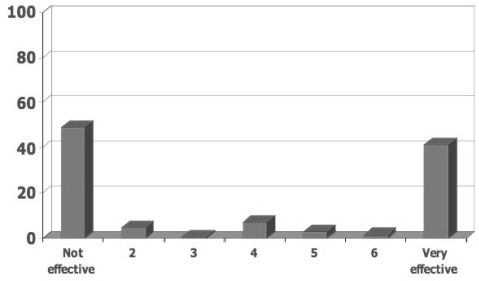
20. In your opinion, how effective would the following actions be to increase hand hygiene permanently in your institution?

20.b. The health-care facility makes **alcohol-based handrub available** at each point of care (%)



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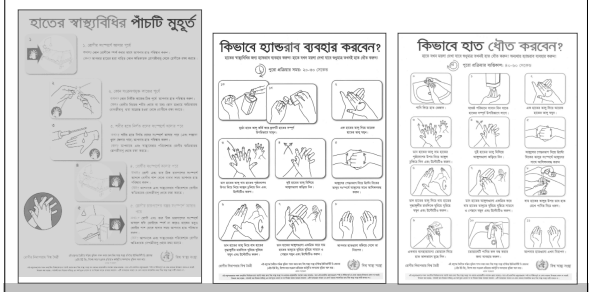
WHO posters translated in local languages



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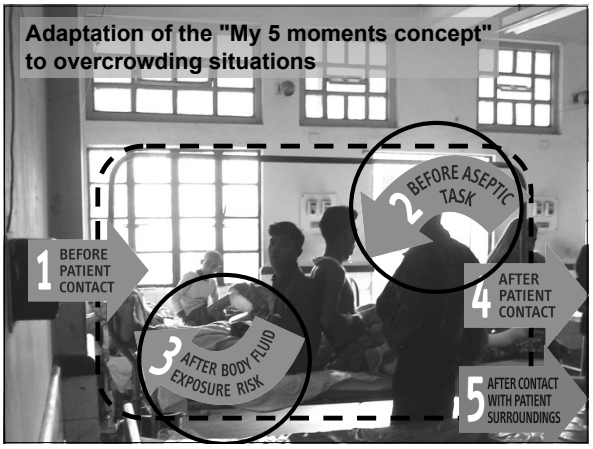
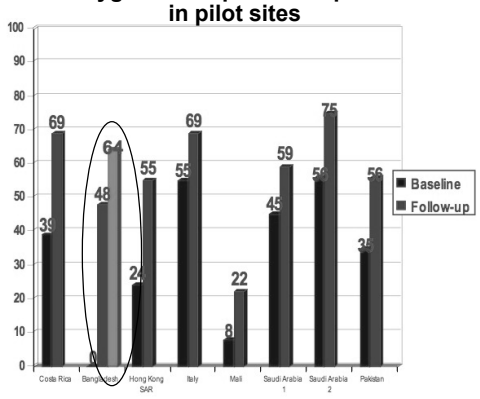
Adaptation of the "My 5 moments concept" to overcrowding situations



Local production cost: US$ 0.30/100 ml

Senior managers' strong support is key to success

Hand hygiene compliance improvement in pilot sites



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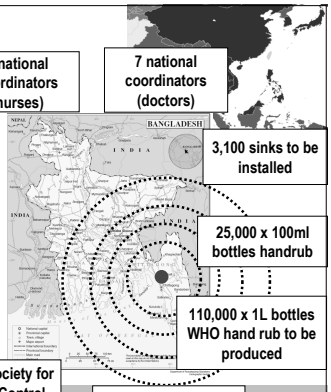
SEARO

6 national coordinators (nurses)

7 national coordinators (doctors)



3,100 sinks to be installed

25,000 x 100ml bottles handrub

110,000 x 1L bottles WHO hand rub to be produced

30,044 in-patient beds

National society for Infection Control launched

Following pilot testing at Chittagong Medical Hospital:

- Ministry of Health is planning national scale-up
- "Institutionalization of infection control and hand hygiene"

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Clean Care is Safer Care

The First Global Patient Safety Challenge

SAVE LIVES: Clean Your Hands
5 May 2009–2020

Through an annual day focused on hand hygiene improvement in health care, this initiative promotes continual, sustainable best practice in hand hygiene at the point of care in all health-care settings around the world

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WHO Patient Safety

WHO Collaborating Centres

International **collaborations**

Country **campaigns & activities** ***short and long term***

Facility **actions** ***including evaluation and feedback***

SAVE LIVES

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Registered health-care facilities - 2009

Work in progress….

Global Impact of SAVE LIVES: Clean Your Hands – 30 Sept 2009
57% health-care facilities [illegible] countries

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Save Lives: Clean Your Hands

5th May 2009

A WHO Initiative 2009

Encourage health-care facilities to show their commitment by signing up now on:

www.who.int/gpsc/5may

Clean Care is Safer Care

Global Patient Safety Challenge

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THANKS TO

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RECOMMENDED READING

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THE NEXT FEW TELECLASSES

29 Oct. 09	Prevention of Catheter-Associated Urinary Tract Infection: New Strategies from CDC/HICPAC Speaker: Russell Olmsted, St. Joseph Mercy Health System
05 Nov. 09	Viruses and Hand Hygiene Speaker: Prof. Syed Sattar, University of Ottawa
10 Nov. 09	(British Teleclass) Getting Guidelines Into Practice Speaker: Prof Carol Pellowe, Thames Valley University
12 Nov. 09	Clostridium difficile Associated Disease: A Financial Burden Analysis Speaker: Prof. Ralf-Peter Vonberg, Hanover Medical School, Germany
03 Dec. 09	Infection Control During and After Natural Disasters Speaker: Pam Falk, UTMB Healthcare
10 Dec. 09	Environmental Cleaning Audits: Do They Help Reduce the Spread of C. difficile and Antibiotic Resistant Organisms in Healthcare Facilities? Speaker: Dr. Michelle Alfa, Diagnostic Services Manitoba

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