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Education and awareness of healthcare personnel about infection control: how can we do best in developing countries?

Benedetta Allegranzi
Internal Lead
Clean Care is Safer Care
WHO Patient Safety
ESCMID Post-Graduate School
Infection Control in Developing Countries: Problems and Solutions

Key questions

- Is education important?
- What should be the focus?
- Successful examples?

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Infection Prevention and Control in Health Care, EPR, WHO

Core components for infection prevention and control program

Report by Benedetta Allegranzi, et al.

Geneva, Switzerland
26-27 June 2008

<http://www.who.int/>

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Response to Infection Control Challenges in the Deployed Setting: Operations Iraqi and Enduring Freedom

Journal of Hospital Infection (2007) 67, 217-224

Available online at www.sciencedirect.com

Journal of Hospital Infection (2007) 65(2), 155-157

Available online at www.elsevier.com

Simple measures save lives: An approach to infection control in countries with limited resources

Nizam Damani*

Infection control with limited resources: Why and how to make it possible?

*JB Sarma, GU Ahmed

Requirements for improvement

- introducing appropriate infection control teaching in medicine, nursing and laboratory trainee curricula
- improving infrastructure and facilities for basic hygiene, isolation precautions, sterilisation and waste disposal
- specific interventions in endemic HIV and tuberculosis areas
- promoting good infection control practices in relation to hand cleaning, dressing techniques and surgical procedures
- identifying staff with a specific responsibility for, and interest in, infection control, with support from clinicians and hospital management
- training and awareness for staff in infection control
- improving laboratory facilities to detect specific pathogens, susceptibility testing and to guide antimicrobial use
- setting up surveillance networks to build up data on hospital infections and changing prevalence of bacterial resistance
- setting up national and regional infection control networks.

Shears, J Hosp Infect 2007

The importance of education within hand hygiene promotion strategies (1975- June 2008)

- Staff education represents one of the cornerstones for improvement of hand hygiene practices
- 29/51 major studies to assess the effectiveness of hand hygiene promotion included an education component
- 21/39 identified risk factors for poor hand hygiene or perceived obstacles that could be addressed through better education
- Most successful hand hygiene programmes include an education component
- Education was a core component of hand hygiene promotion in 17/18 national/sub-national campaigns in 2007
- However, educational programmes alone are inadequate for long-lasting improvement

WHO Guidelines on Hand Hygiene in Health Care 2009

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Impact of hand hygiene promotion on HAI

| Year | Authors | Setting | Intervention | HH compliance | Impact on MRSA infection |
|------|-------------------|---|--|---|--|
| 2000 | Larson E et al | MICU/ICU | Multiple components intervention - organizational culture change | NA | No significant change in MRSA |
| 2000 | Pittet D et al | Hospital-wide | Alcohol-based HR, HH observation, training, performance feedback | From 48% to 66% | Significant reduction annual prevalence of HAI (42%) and MRSA cross-transmission rates (87%) |
| 2004 | MacDonald A et al | Hospital-wide | Alcohol-based HR, HH observation, posters, performance feedback, formal discussion | NS increase in HH compliance | Significant reduction in MRSA cases (from 10.5 to 6.5 per 1000 patient-days) |
| 2005 | Johnson et al | Hospital-wide | Alcohol-based HR, HH observation, training, posters, HH gadgets | From 21% to 42% | Significant reduction (57%) in MRSA infections |
| 2008 | Grayson ML et al | 1) 6 pilot hospitals 2) all public hospitals in Victoria (Australia) | Alcohol-based HR, HH observation, posters, HH gadgets | From 21% to 85% From 20% to 53% | Significant reduction in MRSA infections |
| 2008 | Cromer AL et al | Hospital-wide | Direct observation, feedback | From 72.5% to 90.3% | 0.85 to 0.24 per 1000 patient-days |
| 2009 | Lederer JW et al | Hospital-wide, seven acute care facilities | HH observation and feedback, posters, memos, ward communications, visitor education, external marketing campaign | From 49% to 98% with sustained rates >90% | Significant reduction of MRSA cases from 0.59 to 0.24 per 1000 patient-days |
| 2009 | McLaws et al | Hospital-wide in 208 public hospitals (statewide) | Alcohol-based HR introduction, HH observation, training, performance feedback, posters | From 47% to 61% | Significant reduction of overall MRSA infections/10,000 patient-days. 16% reductions in MRSA infection in non-sterile sites in ICU and 25% in sterile sites in non-ICU wards |
| 2010 | Cheng VCC et al | Adult ICU | Alcohol-based HR introduction, briefing and discussion sessions, posters, HH observation | From 29% to 64% | Significant reduction of incidence density of ICU onset bacteraemic and non bacteraemic MRSA infection |

Importance of structured training programs and good role models in hand hygiene in developing countries

Emine Alp^{1,2}, Ahmet Ozturk¹, Muhammed Guven¹, Ihsani Celik¹, Mehmet Doganay¹, Andreas Voss^{1,3}
 Journal of Infection and Public Health (2011) 4, 80-90

- In multivariate analysis, high (>80%) self reported adherence to hand hygiene was independently associated with:
- receipt of structured training in hand hygiene (OR 1.52, 95%CI 1.07-2.16)
- perceived good adherence by colleagues (OR 1.79, 95%CI 1.21-2.66)
- perception that hand hygiene is relatively easy to perform (OR 1.84, 95%CI 1.37-2.48)
- superiors' expectation for good adherence (OR 2.18, 95%CI 1.23-3.88)



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**First GPSC Regional workshop
Kampala, Uganda, December 2007**



Priorities in Infection Control at National and Hospital Level

Solutions to IC in the African Region at national level (1)

Solutions

- **Policies** (perform a situational analysis, declaration of principles, strategic plans / action plans)
- **Develop, disseminate & adapt national guidelines on IC**
- **Develop training materials** (curriculum development, training of trainers)
- **Structures & coordination** (IC focal point, linkages with implementers & partners)
- **Communication with the hospital: high-profile team leader**
- **Strengthen data collection** (hospital information management systems, develop indicators, baseline surveys)
- **Monitor & evaluate for sustainability**



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IC constraints and minimum standards for IC in the African Region at facility level

Constraints

- Lack of financial resources
- Lack of knowledge and skilled staff
- Lack of equipment
- **Negative attitudes, unaccountability**
- System barriers
- **Cultural barriers**

Minimum requirements

- Improve HH practices
- Raising administrators' awareness
- Establish an IC Committee
- **Training and Education**
- Monitoring and Evaluation
- HCW protection
 - Vaccination
 - PEP



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A successful training programme

TABLE 1. Topics and Schedule of Training Sessions in an Intensive Infection Control Course for Latin American Healthcare Workers

| Training session, by topic | Course days | Total duration, hours |
|--|----------------------------|-----------------------|
| Lecture sessions | | |
| 1. Infectious processes and definitions of nosocomial infection | 1-5 | 10 |
| 2. Hospital epidemiology and statistics | 8-14 | 10 |
| 3. Prevention and control of infections | 15-19 | 10 |
| 4. Infection control program management | 20-21 | 10 |
| Practical sessions | | |
| 1. Nosocomial infection surveillance | 1-26 | 20 |
| 2. Evaluation of compliance with infection control policies and procedures | 1-2 | 10 |
| 3. Investigation of outbreaks | 5-26 | 8 |
| 4. Design and development of policies and procedures for infection control | 15-26 | 7 |
| 5. Microbiology laboratory | 1-5 | 7.5 |
| 6. Planning, design, and development of training | 25, 26 | 4 |
| 7. Use of fpl info ^a | 6, 13, 20, 27 ^b | 16 |
| 8. WHONET ^c | 6, 13, 20, 27 ^b | 16 |

^a Sessions on WHONET, a free open internet system for monitoring antimicrobial resistance, were offered in 2005 but not in 2006. WHONET subject matter was less relevant to the 2006 trainees, given their interests and specificities. In 2006, sessions on fpl info were offered instead, in the same format and on the same subjects. Sessions were offered on each Saturday of the 4-week course.

Caniza et al. ICHE 2007



Cost saving measures; wasteful practices that should be eliminated

- (1) Excessive swarming of the environment to monitor standard of cleanliness
- (2) Excessive fumigation of isolation rooms with formaldehyde
- (3) Excessive use of disinfectants for environment cleaning, e.g. floors and walls
- (4) Inappropriate use of Personal Protective Equipment (PPE) in ICU, NICU and operating theatre
- (5) Use of overshoes, dust attracting mats in the operating theatre, intensive care and neonatal unit
- (6) Unnecessary IM/IV injections
- (7) Unnecessary insertion of indwelling devices, e.g. IV lines, urinary catheters, nasogastric tubes, etc.
- (8) Inappropriate use of antibiotics for prophylaxis and treatment
- (9) Improper segregation and disposal of clinical waste

Damani N. *J Hosp Infect* 2007; 65(S1): 151-154



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Topic 9
Infection prevention and control

<http://www.who.int/patientsafety/en/>

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Knowledge requirements

- The extent of the problem
- The main causes and types of HCAI
- The modes of infection transmission in health-care settings
- The main principles and methods for HCAI prevention and control

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Performance requirements (1)

- Apply standard precautions
- Adhere to other infection prevention and control measures as required
- Apply principles of asepsis
- Be immunized against hepatitis B
- Use and dispose of protective clothing and equipment appropriately
- Know what to do if exposed to blood or other bodily fluids
- Use and dispose of sharps properly
- Act as a role model for other health-care staff



Performance requirements (2)

- Educate community members as to how they can help to prevent infections
- Encourage others to use standard precautions to prevent and control HCAI
- Understand the potential social, economic and emotional burden of HCAI on patients, and act accordingly
- Be able to discuss HCAI with patients and relatives with sensitivity and clarity



Articles

Status of endemic health care-associated infection in developing countries: systematic review and meta-analysis

Report on the Burden of Endemic Health Care-Associated Infection Worldwide

Clean Care is Safer Care

Allegranzi B et al. Lancet 2011; 377:228-41. Epub 2010 Dec 9.

Issued on 5 May 2011
<http://www.who.int/gpsc/en/>

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Conclusions – situation in developing countries

- The HAI burden is high and much greater than in developed countries
- Scattered picture; many countries have no data
- Intra- and inter-continental imbalance (Europe>Americas>South East Asia)
- Most frequent types of studies: hospital-wide prevalence and SSI studies
- SSI is the most frequent infection site hospital-wide and SSI rates are 3-20 fold higher than in high-income countries
- HAI rates in ICU, particularly device-associated infections, are 3-13 times higher than in the USA
- Neonatal infection rates are 3-20 times higher than in high-income countries
- Low number of high quality papers (48.2%)
- Lack of information on sample size, proportion of infection diagnosed with microbiological criteria
- Limited information on etiology, AMR, risk factors and impact

Potential determinants of high burden

- inadequate environmental hygienic conditions
- poor infrastructure
- insufficient equipment
- understaffing
- overcrowding
- paucity of knowledge and application of basic infection-control measures
- prolonged and inappropriate use of invasive devices and antibiotics
- scarcity of local and national guidelines and policies

WHO Report on the Burden of Endemic Health Care-associated Infection Worldwide



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Potential determinants of high burden: which ones can be improved by education?

- inadequate environmental hygienic conditions
- poor infrastructure
- insufficient equipment
- understaffing
- overcrowding
- paucity of knowledge and application of basic infection control measures
- prolonged and inappropriate use of invasive devices and antibiotics
- scarcity of local and national guidelines and policies



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Education methods

- Top-down approach to training-train the trainers
- Oral presentation
- Practical demonstration
- Interactive learning
- E-learning
- Problem-solving approach
- Experiential learning
- Flip charts
- Discussion groups
- Buddy system
- Importance of written supports (leaflets, manuals, etc)



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Cultural aspects matter!



Allegranzi B. AJIC 2009
Ahmed QA et al. Lancet 2006

Key questions

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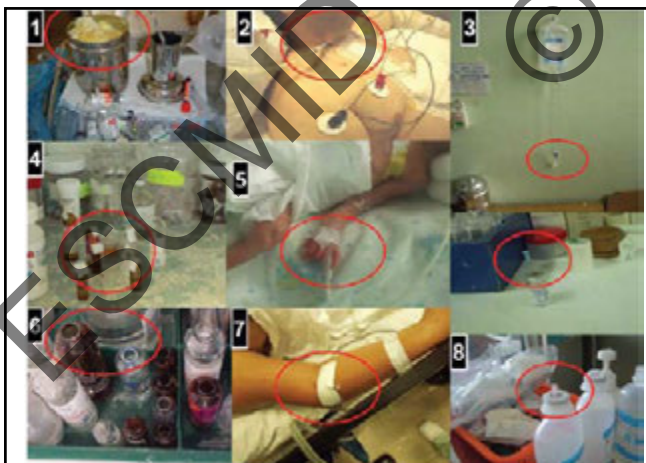
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- More than 600 researchers participate actively
- from over 140 healthcare centers
- in 108 cities
- from 36 countries of 4 continents



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Rosenthal V et al. *Clin Infect Dis* 2009;49:1899-907

Impact of International Nosocomial Infection Control Consortium (INICC) Strategy on Central Line-Associated Bloodstream Infection Rates in the Intensive Care Units of 15 Developing Countries Infect Control Hosp Epidemiol Dec 2010

Victor D. Rosenthal, MD, MSc, CIC; Dennis G. Maki, MD; Cecilia Rodriguez, MD; Carlos Alvarez-Monera, MD, MSc, FIDM&H; Eileen Lubbichinghe, MD; Marlene Suberria-Congreso, MD, PhD; Regina Barrios, MD; Samuel Ibrahim, MD; Roberto A. Sotomayor, MD, PhD; Kenji K. Yoshida, MD; Zora Hlebec, MD; EDPin; Lourdes Ojeda, MD; Rosalinda Coronado-Carrillo, MD; Toshiro Hase, BS; Susuki S. Kato, MD, UIC; TIDNA; Emilia Fernandez-Rodríguez, RN, MSc; International Nosocomial Infection Control Consortium Investigators

- 86 ICUs in 15 countries participating in INICC for at least 6 months in the 2002–2009 period
- Pooled CLA-BSI rates during the first 3 months (baseline) compared with rates at 6-month intervals during the first 24 months
- **Intervention:**
 - CLA-BSI and practices surveillance
 - Staff education on CLA-BSI prevention
 - Regular feedback of performance and outcome indicators



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- Over the first 24 months, cumulative reduction from baseline of 54% (from 16.0 to 7.4 CLABSIs/1000 CL-days; $P < .001$)
- The number of deaths in patients with CLABSI decreased by 58%
- Hand hygiene adherence improved from 50% to 60% ($P < .001$);
- The duration of CL placement decreased from 4.1 to 3.5 days ($P < .001$).
- The percentage of intensive care units that:
 - used maximal sterile barriers at insertion increased from 45% to 85% ($P < .001$)
 - adopted chlorhexidine for antisepsis increased from 7% to 27% ($P = .018$)
 - sought to remove unneeded catheters increased from 37% to 83% ($P = .004$)



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Reducing ventilator-associated pneumonia rates through a staff education programme

N. Salahuddin^a*, A. Zafar^b, L. Sukhyani^c, S. Rahim^d, M.F. Moor^e, K. Hussain^f, S. Siddiqui^g, M. Islam^h, S.J. Husainⁱ

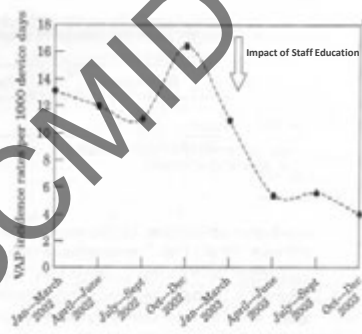
Journal of Hospital Infection (2004) 57, 223-227

- Adult ICU, Aga Khan University Hospital, Karachi, Pakistan
- An evidence-based guideline for preventive practices at the bedside developed locally
- Multidisciplinary educational programme
- Weekly lectures, departmental presentations, reinforcement, at the bedside and visual aids posted in the ICU



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VAP reduction by 51%, from $13.2 \pm 1.2/1000$ ventilator-days in the pre-intervention period to $6.5 \pm 1.5/1000$ in the post-intervention period (mean difference 6.7; 95% CI: 2.9–10.4, $P = 0.02$)



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Implementation tools for Training / Education

- Slides for the Hand Hygiene Co-ordinator
- Slides for Education Sessions for Trainers, Observers and

2

Training and education

Providing regular training to all health-care workers

- Sustaining Improvement – Additional Activities for Consideration by Health-Care Facilities



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Mali - Healthcare workers' knowledge survey (1)

| Question category, question number, type of answer | Study period, number of respondents (%) | |
|---|---|--------------------------------|
| | Baseline (152 respondents) | Follow-up (157 respondents) |
| Knowledge (correct answers) | | |
| 16. HCWs' unclean hands are the principal route of cross-transmission | 105/132 (79.5) | 99/119 (83.2) |
| 22.a Handrubbing is more rapid than handwashing | 115/128 (89.8) | 144/145 (99.3) |
| 22.b Handrubbing does not dry the skin more than handwashing | 32/127 (25.2) | 68/143 (47.6) |
| 22.c Handrubbing is more effective than handwashing | 79/127 (62.2) | 121/141 (85.8) |



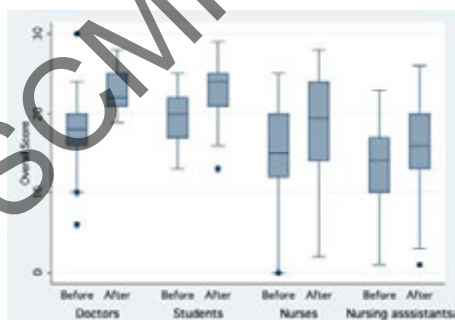
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Mali - Healthcare workers' knowledge survey (2)

| Question category, question number, type of answer | Study period, number of respondents (%) | |
|---|---|--------------------------------|
| | Baseline (152 respondents) | Follow-up (157 respondents) |
| Knowledge (correct answers) | | |
| 21.b Indication for handrubbing before patient contact | 61/125 (48.8) | 83/136 (90.4) |
| 21.d Indication for handrubbing before giving an injection | 54/121 (44.6) | 113/136 (83.1) |
| 21.g Indication for handrubbing after giving an injection | 50/122 (41.0) | 94/130 (72.3) |
| 21.i Indication for handrubbing after removing gloves | 40/118 (33.9) | 80/129 (62.0) |
| 21.j Indication for handrubbing after patient contact while leaving | 52/114 (45.5) | 113/133 (85.0) |
| 21.k Indication for handrubbing after making a patient bed | 35/112 (31.3) | 103/132 (78.0) |

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



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Education

Is it feasible at the national level in a country with limited resources?

Country example: Senegal



Since 2004, **Programme National de Lutte Contre les Infections Nosocomiales (PRONALIN)**

Objectives:

- 10% reduction of HAI rates by 2010 – 15% reduction by 2015
- 50% reduction of professional exposure to accidents with blood and body fluids
- National waste management system in place by 2010
- Reduction of nosocomial transmission of MDR pathogens

Key factors to success:

- Political support
- International fund raising actions
- Strong (but small) group of IC professionals

Senegal, Africa: national infection control programme in a country with limited resources (1)

- **National action plan** (started in 2005)
- **Education on IC:** train the trainers, HCW education (>3500 HCWs for a 10-day course)
- **IC committees** (1 IC professional and surveillance system in each hospital) and **hospital action plan**
- **National committee for the rational use of antibiotics**
- **Hand hygiene programme**
- In 2009/2010/2011, participation in the celebration of the **global annual day on hand hygiene on 5 May (SLCYH)** - in **2010 national event with training** and the participation of the Minister of Health and WHO representatives

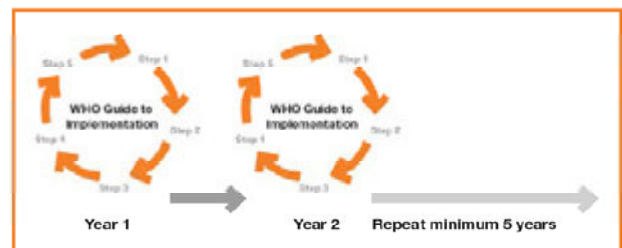


Senegal, Africa: national infection control programme in a country with limited resources (2)

- National HAI prevalence survey in 2007 and 2008
- Development and application of an evaluation grid for IC and PS
- One officer in charge of patient safety in each district
- International forum on patients' and users' participation in patient safety improvement
- New national policies for medical waste management
- New national policies on antibiotic use (launched on 5 May 2010)
- **Participation in APPS**



Maintaining knowledge: education cannot stop!





Hand Hygiene Self-Assessment Framework

Aims of the Framework

1. Provide systematic **situation analysis** of hand hygiene structures, resources, promotion and practices within a health-care facility
2. Facilitate development of an **action plan** for strengthening the facility's hand hygiene improvement programme
3. Document **progress** over time through the repeated use

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Hand Hygiene Self-Assessment Framework 2010

2. Training and Education

| Question | Score | WMO implementation tools |
|---|-------|---|
| 2.1 Regarding training of health-care workers in your facility: | | |
| 2.1.1a How frequently do health-care workers receive training regarding hand hygiene? (score 0-5) | 5 | <ul style="list-style-type: none"> Guides for Education Decision for Trainers, Cleaners and Instructors are available |
| 2.1.1b How often do you provide training for medical and nursing staff, or all professional categories (at least annually)? (score 0-5) | 5 | <ul style="list-style-type: none"> Hand Hygiene Training Films Guides accompanying the Training Film Notes for the Hand Hygiene Coordinator Hand Hygiene Technical Reference Manual |
| 2.1.1c Is there a process in place to confirm that all health-care workers complete this training? (score 0-5) | 5 | <ul style="list-style-type: none"> Hand Hygiene Who, How and When Strategy Guides to implementation 8.2 |

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| | | | |
|---|-----|----|---|
| 2.3 Is a professional with adequate skills to serve as a trainer for hand hygiene educational programmes active within the health-care facility? | No | 0 | <ul style="list-style-type: none"> WMO Guidelines on Hand Hygiene in Health Care Hand Hygiene Technical Reference Manual |
| | Yes | 15 | <ul style="list-style-type: none"> Hand Hygiene Training Film Guides accompanying the Training Film |
| 2.4 Is a system in place for training and validation of hand hygiene compliance observers? | No | 0 | <ul style="list-style-type: none"> Guides to implementation 8.2 |
| | Yes | 15 | |
| 2.5 Is there a dedicated budget that allows for hand hygiene training? | No | 0 | <ul style="list-style-type: none"> Template Letter to Advise Hand Hygiene to Managers Template Letter to communicate Hand Hygiene Initiatives to Managers |
| | Yes | 15 | <ul style="list-style-type: none"> Template Action Plan Guides to implementation 8.2 and 8.3 (page 33) |

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Constraints to effective education in low-/middle-income countries

- Lack of expertise/trainers
- Absence of IC from medical, nurse and other categories' curricula
- Limited computer skills computer skills or access to the internet
- Lack of supports (books, internet access, etc...)
- Language barrier (education material mostly available in E)
- Local culture of communication
- Complexity of available educational material
- Creation of expectations on infrastructure improvement
- Staff shortage



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Conclusions

- Education can be improved at low- (but not at no-) cost in settings with limited resources and contributes to significant reduction of HAI
- These improvements cannot be achieved with education only
- Monitoring and feedback are essential for success
- Role models are particularly important in this context
- Accountability should be leveraged to motivate knowledge improvement
- Understanding HCWs' perception can be very helpful to develop locally relevant educational interventions
- Simple messages and continuous education
- Feasibility and adaptation to the local reality are critical
- Cultural/communication issues must be taken into account



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2011 Free WHO Teleclass Series on Infection Control

In order to participate, visit <http://websitestraining.com/schedule1.php>

01/02/11, 1:30 pm (NYT): Quality improvement and infection prevention and control (D. Gokhale, Boston, USA)

06/01/11, 2:30 pm (CET): Hand hygiene education and monitoring: returning to the WHO "My five moments" concept (H. Sax, Geneva, Switzerland)

07/12/11, 1:30 pm (NYT): Current perspectives about disinfection and sterilization (W. Rutala, University of North Carolina, USA)


THE NEW ENGLAND JOURNAL OF MEDICINE

VIDEOS IN CLINICAL MEDICINE

Hand Hygiene

Yves Longtin, M.D., Hugo Sax, M.D., Benedetta Allegranzi, M.D.,
Franck Schneider, and Didier Pittet, M.D.

N Engl J Med 2011;364:e24.

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WHO Hand Hygiene Self-Assessment Framework Global Survey

Use the Framework to identify where your facility stands in terms of hand hygiene resources, practices and promotion!

AND

By submitting your results online, help WHO obtain a global picture of hand hygiene progress and identify areas for further improvement!

To participate in the global survey your health-care facility must be registered for **SAVE LIVES: Clean Your Hands** and will receive an invitation by WHO

Ask clarifications through WHOframework.survey@who.int



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Contact
responsible for Educational Programme

Ennio Scarselli
enriosc@unibo.it

Severino Magagnoli
smagagn@unibo.it

Administrative Secretariat
Giovanna Restuccia
giovanna.restuccia@gmail.com

Giulia De Angelis
giulia.deangelis@unibo.it

Università Cattolica Sacro Cuore
Via P. S. 2
00188 Roma, Italy
Phone: +39 062 025 5490

ESCMIID Workshop
Prevention, Diagnosis and Treatment of Healthcare-associated Infections in „Real“ Life

Rome, Italy
10 Nov - 11 Dec 2011

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Thank you

WHO Clean Care is Safer Care



Find all information at www.who.int/gpsc/5may

Send enquiries to savelives@who.int



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