

Handrub with alcohol-based preparation as a cornerstone in the prevention of nosocomial infection

Implementation, monitoring the compliance and recommendation for improvement

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By

Rahma Hussien Al Turkey

M.B.B.CH

Faculty of Medicine

Ain shams university

Under supervision of

Prof Dr. Mohamed Samy El Shemy

Professor of Pediatrics

Faculty of Medicine

Ain shams university

Dr. Mervat Gamal El Din Mansour

Lecturer of Pediatrics

Faculty of Medicine

Ain shams university

Faculty of Medicine- Ain shams university

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كلية الطب - جامعة عين شمس

تحت إشراف

أ.د. محمد سامي الشيمي

أستاذ طب الأطفال

كلية الطب - جامعة عين شمس

د. مرفت جمال الدين منصور

مدرس طب الأطفال

كلية الطب - جامعة عين شمس

كلية الطب - جامعة عين شمس

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*This work is dedicated to
My inspiring father
My brave mother
My supporting husband
My attentive sisters and brother
And my strong baby*

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List of abbreviations

PICU	Pediatric intensive care unit.
VAP	Ventilator acquired pneumonia.
HCW`s	Health care workers.
MRSA	Methicillin-resistant Staphylococcus aureus.
NICU	Neonatal intensive care unit.
CDC	Center of disease control and prevention
HAI	Hospital-acquired-infection
CVL	Central venous line
MDRSA	Multidrug-resistant bacteria
MRSA	Methicillin-resistant Staphylococcus aureus
VRE	Vancomycin-resistant enterococci
RSV	Respiratory syncytial virus
HAP	Hospital-acquired pneumonia
VZV	Varicella-zoster virus

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Introduction

Nosocomial infections are infections result during hospital admission. Infections are considered nosocomial if they first appear 48 hours or more after hospital admission or within 30 days after discharge. Nosocomial infections have been estimated that as many as one hospital patient in ten acquires a nosocomial infection, or 2 million patients a year in the U.S. Estimates of the annual cost ranges from \$4.5 billion to \$11 billion. Nosocomial infections contributed to 88,000 deaths in the U.S. in 1995 (**Ricks and Delthia, 2007**).

Ventilator acquired pneumonia (VAP) -as one of the nosocomial infections- in Ain Shams University's Pediatric intensive care unit (PICU) has an incidence rate of 60.8% among the ventilated patients, the mortality rate was 80% in the infected group (**El-Saify et al., 2007**). VAP in Cairo University's PICU has an incidence rate of 42.2% among the ventilated patients; the mortality rate was 63.36% in the infected group (**El-Beleidy et al., 2007**).

One third of nosocomial infections are considered preventable and 92% of deaths from hospital infections could be prevented (**Ricks and Delthia, 2007**).

Hand wash or use of alcohol rubs by all medical personnel before each patient contact is one of the most effective ways to combat nosocomial infections (**McBryde et al., 2004**).

Handrub (applying an antiseptic handrub to reduce or inhibit the growth of microorganisms without the need for an exogenous source of water and requiring no rinsing or drying with towels or other devices) with alcohol-based preparation is now considered the standard of care. Several studies show a significant increase in hand hygiene compliance after the introduction of handrub solutions (**WHO, 2009**).

Monitoring hand hygiene practices is an activity of crucial importance to assess baseline compliance by Health care workers (HCWs), to evaluate the impact of promotion interventions and to provide feedback to HCWs. Monitoring can also be helpful in investigating infection outbreaks, in assessing the potential role of ongoing hand hygiene practices, and also in determining the extent to which infection can be decreased depending on the different rates of compliance (**Boyce and Pittet, 2002**).

It had been reported that the use of an alcohol-based hand gel combined with education sessions and performance feedback to HCWs reduced the incidence of Methicillin-resistant Staphylococcus aureus (MRSA) infections (*MacDonald et al., 2004*). Performance feedback on hand hygiene behavior is critical to improve compliance with hand hygiene among HCWs (*Won et al., 2004*).

Direct observational survey is currently the “gold standard” and the most reliable method for assessing adherence rates (*WHO, 2009*).

The aim of this work:

The aim of this work is to:

1. Evaluate the current knowledge and application of hand rub among HCWs in Ain Shams University's PICU and NICU.
2. Implement the protocol of hand hygiene approved by WHO 2009 in Ain shams University's PICU and NICU.
3. Estimate the compliance of HCWs to the implemented protocol by measuring the adherence rate to hand hygiene protocol.
4. Re-customize recommendations for the improvement of the compliance.

Literature review

- Definitions of Nosocomial infections
- Epidemiology of Nosocomial infections
- Prevention of Nosocomial infection in intensive care unit
- Prevention of Nosocomial infections between the staff of intensive care unit
- Hand hygiene and rub

Definitions of Nosocomial infections:

Nosocomial comes from the Greek word nosokomeion (νοσοκομείον) meaning hospital (nosos = disease, komeo = to take care of) (*McBryde, 2004*).

Nosocomial infections, also called “hospital-acquired infections” (HAI) are defined as infections not present and without evidence of incubation at the time of admission to a healthcare setting. As a better reflection of the diverse healthcare settings currently available to patients, the term healthcare-associated infections replaced old ones such as nosocomial, hospital-acquired or hospital-onset infections. Within hours after admission, a patient's flora begins to acquire characteristics of the surrounding bacterial pool. Most infections that become clinically evident after 48 hours of hospitalization are considered hospital-acquired. Infections that occur after the patient is discharged from the hospital can be considered healthcare-associated if the organisms were acquired during the hospital stay (*Coffin and Zaoutis, 2008*), or within 30 days after discharge (*McBryde, 2004*).



Epidemiology of Nosocomial infections:

Burden of Nosocomial infections

Worldwide, at least 1 in 4 patients in adult intensive care will acquire an infection during their stay in hospital. In developing countries, this estimate may be doubled (**WHO, 2009**). Among pediatric patients, children younger than 1 year, babies with extremely low birth weight (less than 1000 g) and children in either the PICU or NICU have higher rates of healthcare-associated infections (**Coffin and Zaoutis, 2008**).

International comparisons of nosocomial infection rates had been done to estimate the numbers of case/year, death/year and cost/year (**McGeer, 2007**). See table 1

Table 1 Health care associated infection: scale and world worldwide (**McGeer, 2007**)

Country	No. of cases/year	No. of deaths/year	Costs/year
UK	100,000	5,000	UK£ 1 billion
USA	2 million	90,000	US\$ 4.5 billion
MEXICO	450,000	32/100,000 inhabitants	US\$ 1.5 billion
CANADA	220,000	8,000/year (approximately the same as the number of deaths from breast cancer /year)	Data not available