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Changes in hand hygiene compliance after a multimodal intervention among health-care workers from intensive care units in Southwestern Saudi Arabia

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Abstract The aim of this study is to measure the degree of compliance with hand hygiene practices among health-care workers (HCWs) in intensive care facilities in Aseer Central Hospital, Abha, Saudi Arabia, before and after a multimodal intervention program based on WHO strategies. Data were collected by direct observation of HCWs while delivering routine care using standardized WHO method: ''Five moments for hand hygiene approach''. Observations were conducted before (February–April 2011) and after (February–April 2013) the intervention by well-trained, infection-control practitioners during their routine visits.

The study included 1182 opportunities (observations) collected before and 2212 opportunities collected after the intervention. The overall, hand hygiene compliance increased significantly from 60.8% (95% CI: 57.9–63.6%) before the intervention to reach 86.4% (95% CI: 84.9–97.8%) post-intervention ($P = 0.001$). The same trend was observed in different intensive care facilities. In logistic regression analyses, HCWs were significantly more compliant (aOR = 3.2, 95% CI: 2.6–3.8) after the intervention. Similarly, being a nurse and events after patient contact were significant determinants of compliance.

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It is important to provide sustained intensified training programs to help embed efficient and effective hand hygiene into all elements of care delivery. New approaches like accountability, motivation and sanctions are needed.

1. Introduction

Numerous studies document the pivotal role of health-care workers' (HCWs) hands in the propagation of micro-organisms within the health-care environment and ultimately to patients [1]. Hand hygiene (HH) has been known to reduce health care-associated infections (HAIs) since Ingaz Semmelweis demonstrated dramatic reductions in puerperal sepsis after instituting a hand washing regimen in the Vienna Lying-in Hospital in 1847 [2].

Hospitalization in an intensive care unit (ICU) further increases the risk of HAIs. Noncompliance with HH protocols in hospitals, particularly in ICUs, is widely recognized as one of the most important contributing and preventable causes of HAIs. Most ICU-endemic infections result from the carriage of micro-organisms on HCWs' hands, and outbreaks of infections due to cross-transmission are frequent [3,4]. Contributing factors are the high intensity of patient care in ICUs, the frequent contacts between HCWs and ICU patients, and the performance of procedures with a high risk of cross-transmission [5]. Unfortunately, in health-care, compliance with HH practices has been below an acceptable level of at least 60% [6–8]. HCWs must understand that hands are often the vessel by which pathogens are passed from patient to patient. It has been found that an aggressive education program that is continuous can help to improve HH compliance [5]. The WHO noted that successful and sustained HH improvement is achieved by implementing multiple actions to tackle different obstacles and behavioral barriers [9]. Based on the evidence and recommendations from the WHO Guidelines on Hand Hygiene in Health Care [9], the following components make up an effective multimodal strategy for HH: (i) System change; (ii) Training/Education; (iii) Evaluation and feedback; (iv) Reminders in the workplace; and (v) Institutional safety climate.

The Aseer region is located in southwest Saudi Arabia covering an area of more than 80,000 km^2. The region extends from the high mountains of Sarawat (with an altitude of 3200 m above sea level) to the Red Sea, and lies a few kilometers from the northern border of neighboring Yemen. The population of Aseer is 1,688,368. Health service delivery in the southern region is provided by a network of 244 primary health-care centers, 16 referral hospitals and 1 tertiary hospital—Aseer Central Hospital (ACH), which has 500 beds [10] and is run by the Ministry of Health and the College of Medicine of King Khalid University (KKU), Abha.

The purpose of the current study is to measure the compliance with HH practices among HCWs in intensive care facilities at ACH before and after a multimodal intervention program for HH based on WHO strategies.

2. Materials and methods

Observations of HH compliance were conducted in the different ICUs of Aseer Central Hospital, Abha, Saudi Arabia, before (February–April 2011) and after (February–April 2013) the multimodal interventions.

2.1. Sample size

Using the WHO manual for ''Sample Size Determination in Health Studies'' [11], the minimal sample size required for each group was calculated to be 969 observations to be selected from each of two groups to estimate a risk difference to within 5% points of the true difference with 95% confidence and with an anticipated population estimate of 60% (the compliance figure in a similar study in Saudi Arabia) [6] and 80% (expected compliance after the intervention). To avoid possible non-response, a total of 1100 cases were initially planned for the study. After reaching the minimal sample size, researchers decided to continue collecting observations during the assigned study periods.

2.2. Hospital setting

The Intensive Care Unit (ICU) has 12 beds; the Intermediate Care Unit (IMCU), 32 beds; the Cardiac Care Unit (CCU), 15 beds; the Pediatric Care Unit (PICU), 7 beds; and the Neonatal Intensive Care Unit (NICU), 10 beds. All of the ICUs follow the same infection control policies and procedures and provide the same staff orientation. Each unit