Impact of Compliance with Hand Hygiene Guidelines on Device-Associated Infections in Intensive Care Units in Cairo University Hospitals

Thesis

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Abstract

INTRODUCTION: Hand hygiene is a fundamental measure for the control of nosocomial infection. However, sustained compliance with hand hygiene in health care workers is poor.We attempted to enhance compliance with hand hygiene by implementing education,training, and performance feedback. We measured nosocomial infections in parallel.

OBJECTIVES: to investigate the impact of increase of hand hygiene compliance on device- associated infections rates in Intensive Care Units in Cairo University Hospitals.

PATIENTS AND METHODS: We monitored the overall compliance with hand hygiene in 4 ICUs (Medical ICU, ER ICU, PICU & NICU) from January to July 2011**.** We divided the program into 3 phases: phase 1**(**or Pre intervention phase), from January to March 2011 (3 months); and phase 2 (or intervention period), April 2011 and phase3 **(**post- intervention phase), from May to July.During the study 1647 opportunities were observed in all ICUs for pre and post intervention.

Results: Over all compliance for hand hygiene in all ICUs improved from 24.2 to 49.4 (P<.0001).Nurses showed a higher compliance to HH guidelines than doctors pre and post intervention.Over all Device- associated infections rates in all ICUs showed a significant decline and total infection rate decreased from 8.0 \1000 bed days to 3.3. /1000 bed days.

Conclusion: A program consisting of focused education and frequent performance feedback produced a sustained improvement in compliance with hand hygiene, coinciding with a reduction in nosocomial infection rates in the ICUs.

Key words :

Hand Hygiene

Device- Associated Infections

Nosocomial infections

central line-associated bloodstream infection (**CLABSI**)

ventilator-associated pneumonia (**VAP)**

Catheter-associated urinary tract infection (**CAUTI**)

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Contents

Abstract

Introduction …… 1

Aim of the Work …… 2

Review of Literature …… 3

Chapter(1): Nosocomial Infections…….…..3

Chapter(2): Device Associated Infections…….…..18

Chapter(3): Hand Hygiene……..…...48

Subjects and Methods ……68

Results ……77

Discussion ……99

Summary, Conclusion and Recommendations…… 107

References…… 108

Appendices…… 147

Arabic Summary.....

List of Tables

Table number	Table title	Page
Table (1):	Risk factors associated with common nosocomial pathogens	8
Table (2):	Sources and transmission of hospital-acquired organisms	12
Table (3):	Pathogens causing CRIs and their percentage	22
Table (4):	Antimicrobial activity and summary of properties of antiseptics used in hand hygiene	54
Table (5):	Hand hygiene adherence by health-care workers	56
Table (6):	studies of compliance with hand hygiene	58
Table (7):	Factors influencing adherence to hand hygiene practices	59
Table (8):	My five moments for hand hygiene	62
Table (9):	Association between NI rates and HH rates	64
Table (10):	Summary of most recent major global researches on hand hygiene compliance	65
Table (11):	total number of beds ,sinks and alcohol HR dispensers in every ICU	70
Table (12):	total number of patients and opportunities in all ICUs before intervention	77
Table (13):	compliance in percent in all ICUs before intervention	78
Table (14):	total number of patients and opportunities in all ICUs after intervention	81
Table (15):	Over all compliance in percent in all ICUs after intervention	81
Table (16):	Comparison between hand hygiene behavior of HCWs pre and post intervention in different sites	82
Table (17):	Comparison between hand hygiene behavior of HCWs pre and post intervention for the whole studied groups	84
Table (18):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 1 (Before touching a patient)in different sites	85
Table (19):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 2 (Before clean/aseptic procedure) in different sites	86
Table (20):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 3 (After body fluid exposure risk in different sites:	87
Table (21):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 4 (After touching a patient) in different sites	88
Table (22):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 5 (after touching patient surroundings) in different sites	89

Table (23): Comparison between hand hygiene behavior of Doctors pre and post intervention in different sites 90
Table (24): Observations for adherence of HCWs to hand hygiene guidelines in the intensive care units pre and post intervention..... 92
Table (25): Comparison between infection rates with CLABSI pre and post intervention in different sites 93
Table (26): Comparison between infection rates with CAUTI pre and post intervention in different sites 94
Table (27): Comparison between infection rates with VAP pre and post intervention in different sites 95
Table (28): Description rates of device- associated infections in the intensive care units pre and post intervention..... 96

List of Figures

Figure number	Figure title	Page
Fig. (1):	The epidemiology of nosocomial infection	5
Fig. (2):	a) Subclavian and (b) jugular central venous catheters.	20
Fig. (3):	Sources of CRIs	23
Fig. (4):	Routes of entry of uropathogens to catheterized urinary tract	31
Fig. (5):	Neonatal ventilator	36
Fig. (6):	Adult ventilator	36
Fig. (7):	Pathogenesis of HAP and VAP	38
Fig. (8):	The CombiCath™, non-bronchoscopic catheter used for BAL	42
Fig. (9):	hang hygiene technique with alcohol based formulation	63
Fig. (10):	observation form recommended by *WHO*.	69
Fig. (11):	Comparison between hand hygiene behavior of HCWs in different sites before intervention	78
Fig. (12):	alcohol based handrub dispenser.	79
Fig. (13):	Educational class for HCWs	80
Fig. (14):	Training and education campaign of HW	80
Fig. (15):	How to" and “5 Moments” posters are displayed in all test units	80
Fig. (16):	Comparison between hand hygiene behavior of HCWs in different sites after intervention	82
Fig. (17):	Comparison between hand hygiene behavior of HCWs pre and post intervention in different sites	83
Fig. (18):	Hand hygiene behavior of HCWs pre and post intervention for the whole studied groups	84
Fig. (19):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 1 in different sites	85
Fig. (20):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 2 in different sites	86
Fig. (21):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 3 in different sites	87
Fig. (22):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 4 in different sites	88
Fig. (23):	Comparison hand hygiene behavior of HCWs pre and post intervention for indication 5 in different sites	89
Fig. (24):	Comparison between hand hygiene behavior of Nurses pre and post intervention in different sites	91

Fig. (25): Comparison between hand hygiene behavior of Doctors pre and post intervention in different site 91

Fig. (26): Comparison between infection rates with CLABSI pre and post intervention in different sites 93

Fig. (27): Comparison between infection rates with CAUTI pre and post intervention in different sites 94

Fig. (28):): Comparison between infection rates with VAP pre and post intervention in different sites 95

Fig. (29): Incidence of CLABSI, CAUTI, VAP along months of observations pre and post intervention in ER 97

Fig. (30): Incidence of CLABSI, CAUTI, VAP along 3 months of observations pre and post intervention in ICU 97

Fig. (31): Incidence of CLABSI, CAUTI, VAP along 3 months of observations pre and post intervention in NICU 98

Fig. (32): Incidence of CLABSI, CAUTI, VAP along 3 months of observations pre and post intervention in PICU 98

List of Abbreviations

ABHR	alcohol-based handrub
Aft-b.f	*After body fluid exposure risk*
Aft-pat	*After touching patient surroundings*
BAL	Broncho-alveolar Lavage
Bef-asept	*Before clean/aseptic procedure*
Bef-pat	*Before touching a patient*
BSI	Blood stream infection
CAUTI	Catheter-associated urinary tract infection
CDC	Centers for Disease Control and Prevention
CFU	Colony forming unit
CLABSI	central line-associated bloodstream infection
CoNS	*Coagulas-negative staphylococci*
CRBSI	catheter-related bloodstream infections
CRIs	catheter - related infections
CRP	C-reactive protein
CTICU	cardiothoracic ICU
CVC	central venous catheter
CVC-BSI	central venous catheter-associated blood stream infection
DAIs	Device associated infections
DTP	differential time to positivity
EF	Elastin Fiber
ER	Emergency room
ESβLs	extended-spectrum β-lactamases
ETA	Endotracheal aspirates
HAI	Healthcare-associated infections
HCAIs	*Health care associated infections*
HCWs	Health-care workers
HH	Hand hygiene
HHO	hand hygiene opportunity
HICPAC	Healthcare Infection Control Practices Advisory Committee
HR	handrubbing
HW	Hand-washing
IC	Infection control

ICU	Intensive care unit
IL-1β	Interleukin-1β
IV	intravenous
JCAHO	Joint Commission on Accreditation of Healthcare Organizations.
LRT	Lower respiratory tract
MICUs	Medical ICUs
MMWR	Morbidity and Mortality Weekly Report
MRSA	*methicillin-resistant S. aureus*
MSICU	medical/surgical ICU
NB-BAL	The non-bronchosopic BAL
NI	nosocomial infection
NICU	neonatal intensive care unit
NNIS	Nosocomial Infection Surveillance System
NS	not stated
OPD	outpatient departm
Opp	*opportunity*
PACU	post-anaesthesia care unit
PCT	Procalcitonin
PICC	Peripherally inserted central catheterizations
PICU	pediatric intensive care unit
PSB	Protected Specimen Brushing
PVCs	*Peripheral venous catheters*
SDD	Selective digestive tract decontamination
SICU	surgical ICU
SPSS	Statistical Package for Scientific Studies
SSI	surgical site infection
sTREM-1	Soluble Triggering Receptor Expressed on Myeloid cells
TNF	Tumor Necrosis Factor
TPN	total parental nutrition
UTI	Urinary tract infection
VAP	ventilator-associated pneumonia

Introduction

And aim of the work

Introduction

Hand hygiene is considered to be the cornerstone of infection control ***(Boyce and Pittet, 2002).*** *Semmelweis* first demonstrated the importance of hand hygiene over 150 years ago when he systematically observed that hand washing reduced the rate of puerperal streptococcal infection from12.3% to 1.3% among a cohort of postpartum women ***(Semmelweiss,1988).*** Since then, innumerable microbiologic and epidemiologic clinical studies have corroborated the importance of hand hygiene in medical care. This evidence has been synthesized in a systematic review ***(Bryan et al., 1995).***

Authors of this review concluded that hand washing is an important infection control strategy in acute care settings, notwithstanding the important challenges to quantifying perceived effects on nosocomial infection rates. Although observational studies show an association between hand hygiene and both nosocomial infection rates and emergence of antimicrobial‐resistant bacteria, there are no randomized trials addressing this question ***(Pitter et al., 2000).***

Hand hygiene is particularly important in the management of critically ill patients within an intensive care unit (ICU). The provision of intensive care includes relatively frequent and close interaction between patients and health‐care workers. Meanwhile, colonization of the ICU staff is common, transmission of microorganisms via the hands of health care workers is universal, and the prevalence of multiresistant organisms in the ICU is high ***(Casewell and Phillip, 1977;Gold,2001; Albert and Condie, 1981).***

Critically ill patients are particularly vulnerable to nosocomial infection as a result of their immune compromised state and multiple invasive catheters.

Nosocomial infections are frequently encountered in intensive care units (ICUs) because of the severity of underlying diseases, the frequency of invasive interventions, and the frequent use of wide-spectrum antibiotics ***(Vincent, 2003*)**.

It has been reported that ICUs account for 25% of nosocomial infections‹ even though they occupy only approximately l0% of the bed capacity of a hospital **(Fridkin et al,1997).**The magnitude and The frequency of such infections particularly in ICUs, and the causative microbial agents and their resistance rates should be identified and monitored in order to better control infection.

Studies examining nosocomial infections for the purpose of assessing the nosocomial infection rate are one of the most important indicators of the quality of health services.

Aim of the Work

The study was conducted to investigate the impact of increase of hand hygiene compliance on device- associated infections rates in Intensive Care Units in Cairo University Hospitals.

Nosocomial Infections

Nosocomial infections or Healthcare-associated infections (HAI) are the infections that were not present -and without evidence of incubation- at the time of admission to a healthcare setting. Currently, the term healthcare-associated infections replaced other ones such as nosocomial, hospital-acquired or hospital-onset infections ***(Coffin et al., 2008).***

Centers for Disease Control and Prevention (CDC) define health care associated infection (HAI) or nosocomial infection (NI) as a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that occurs in a patient in a health care setting (e.g., a hospital or outpatient clinic), was not found to be present or incubating at the time of admission unless the infection was related to a previous admission to the same setting, and if the setting is a hospital, meets the criteria for a specific infection site as defined by CDC ***(McKibben et al., 2005).***

For most bacterial nosocomial infections, this means that the infection usually becomes evident 48 hours (i.e., the typical incubation period) or more after admission. However, because the incubation period varies with the type of pathogen and to some extent with the patient's underlying condition, each infection must be assessed individually for evidence that links it to the hospitalization ***(CDC, 1996).***

The impact of hospital acquired infections is considerable. The patient may need longer hospital treatment, readmission, or even further surgery, increasing days off work and use up of hospital and community resources ***(Spelman, 2002).***