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Original Research Article

Nosocomial Infections in Intensive Care Units: Knowledge and Practices of Healthcare Workers in the Three University Hospitals of Abidjan

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Abstract: ***Introduction***: Nosocomial infections (NI) are common conditions among hospitalized patients. This study aimed to evaluate healthcare workers' knowledge and practices regarding infection prevention measures in intensive care units. ***Method*:** This was a descriptive, cross-sectional study conducted from April 13to June 10, 2022, among 45 healthcare workers in three university teaching hospitals of Abidjan. The parameters studied were: the theoretical and practical knowledge of healthcare workers regarding the prevention of nosocomial infections. ***Results*:** 45 healthcare workers participated. 74.7% knew the definition of a nosocomial infection and 43% identified the main risk factors for its occurrence. Sixty-five percent identified staff hands as the main mode of cross-transmission of germs between patients. Sixty-four percent of staff reported using non-sterile gloves during urinary catheter insertion. Compliance with hand hygiene before patient contact was low (31.8%) while gloves changes between patients were observed in 87.2% of cases. Deficiencies were noted in adherence to aseptic techniques before performing invasive procedures. Non-compliance was mainly attributed to shortages of supplies and personnel, and insufficient knowledge of preventive measures. ***Conclusion***: healthcare workers' knowledge and adherence to hygiene practices in intensive care units were insufficient.

Keywords: Resuscitation, Nosocomial Infections, Healthcare Personnel.

INTRODUCTION

A nosocomial infection is defined as an infection acquired in a healthcare facility by a patient admitted for a reason other than infection [1]. The occurrence of nosocomial infections in developing countries prolongs hospital stays, increases treatment costs, and contributes to increased mortality [2]. Many healthcare-associated infections are preventable, as adherence to guidelines has been shown to significantly reduce both their rate and frequency [3]. The main determinants of healthcare-associated infection risks in developing countries include inadequate infrastructure and equipment, poor hygiene conditions, non-compliance with established protocols, inappropriate use of antibiotics, failure to comply with hygiene rules, and insufficient knowledge among healthcare professionals, often linked to limited initial and continuing training [4]. In Africa, the prevalence of nosocomial infections varies between 10 and 60% representing the third leading cause of maternal mortality, the second cause of early neonatal mortality, and the leading cause of postoperative morbidity [5]. Previous studies, such as that by Moussa *et al*., have also shown insufficient knowledge of standard precautions among healthcare workers at the Hassan II university hospital [6]. In our context, given the high burden of nosocomial infections in our hospitals, this study aimed to evaluate healthcare workers' knowledge and practices regarding infection prevention and hygiene measures during patient care in intensive care units.

PATIENTS AND METHODS

This was a descriptive cross-sectional study conducted from April 13to June 10, 2022, in the three university hospitals of Abidjan (Cocody, Treichville, and Angré). Registered nurses and auxiliary nurses working in the intensive care units were included. Trainees were excluded. A non-probability exhaustive sampling

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method was used, including all eligible healthcare workers who consented to participate. Two data collection techniques were employed: a questionnaire survey and direct observation. Each participant completed a structured questionnaire designed to collect sociodemographic characteristics and assess general knowledge, attitudes, and practices regarding nosocomial infection prevention. In addition, a single trained investigator conducted direct observations while wearing standard attire and attending care sessions discreetly for two weeks at each hospital. He checked, in real time, activities related to infection prevention practices. Each staff member was observed on several occasions, with the number of observed acts determined by patient flow in each facility.Collected data were analyzed using Microsoft word 2016 and Excel 2016. Authorization to conduct the study was obtained from the medical and scientific directors of the three university hospitals. Data collection forms were anonymous to ensure participant confidentiality. The study aimed to contribute to improving the quality of care and reducing the occurrence of nosocomial infections in intensive care units.

RESULTS

A total of 45 healthcare workers were included in our study. Of these, 72.2% correctly defined nosocomial infection. The most frequently identified risk factors were invasive procedures (69%), severe clinical conditions (58.6%), and prolonged hospital stays (49.62%). Lack of hygiene during care was identified as a cause of cross-transmission of germs in 65.9% of cases **(Table I).**

Table I: Staff attitudes toward compliance with WHO hand washing procedures

Handwashing steps (n=190)	Correctly performed steps	Compliance rate
Wet hands with water	190	100%
Apply enough soap to cover all hand surfaces	172	90,52 %
Rub hands palm to palm	164	86,31 %
Right palm over left dorsum with interlaced fingers and vice versa	120	63,15 %
Palm to palm with fingers interlaced	118	62,10 %
Backs of fingers to opposing palms with fingers interlocked	99	52,10 %
Rotational rubbing of left thumb clasped in right palm and vice versa	52	27,36 %
Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa	68	35,78 %
Rinse hands with water	190	100 %
Dry hands thoroughly with a single use towel	0	0 %
Use towel to turn off faucet	0	0 %
Time taken to perform correctly (30 to 60 seconds)	190	100 %

Regarding hand hygiene, 54.33% gave correct answers for simple hand washing, 50.3% for hygienic hand washing and 80% for surgical hand washing. Correct knowledge of hydro alcoholic hand rubbing was reported by 67.3% of respondents. Most healthcare workers (83.1%) knew hygienic and antiseptic hand washing requires antiseptic soap and water. Overall, similar trends were observed across all three hospitals.

Observation of hand hygiene practices revealed weaknesses both in the technique and in the duration of application. The rotational washing of the thumb was performed by only 27% of staff, and the use of single use towels for hand drying was never observed. Only 28.6% complied with the WHO recommended duration of 30-60 seconds **(Table II).**

Table II: Staff attitude toward compliance with the five WHO hand hygiene guidelines

Hand hygiene indications	Acts observed	Acts performed correctly	Compliance rate
Before touching a patient	240	67	27, 91%
After touching a patient	240	229	95, 41 %
After touching patient surroundings	192	51	26 %
Before clean/ aseptic procedure	474	213	44, 93 %
After body fluid exposure risk	513	348	67, 83 %
Total	1659	908	54, 73 %

All staff observed wore clean uniforms and service shoes when entering treatment areas. However, compliance with wearing hair caps was 51.6% and only 23.3% removed jewelry before care. When performing invasive procedures, 56.2% of staff did not wash their hands before inserting a peripheral intravenous line, and 19.6% reused non sterile syringes for repeated procedures on the same patient. Similarly, 64.2% of nurses did not wash their hands before urinary catheterization, 76.7% failed to ensure urogenital asepsis, and 29.2% did not use sterile lubricating gel during catheter insertion **(Table III)**

Table III: Implementation of hygiene measures during invasive procedures

Type of invasive procedure	Hygiene measures	Procedures performed correctly	Compliance rate
Bladder catheterization (n= 51)	Hand washing	18	35, 29 %
	Urogenital cleansing	12	23,52 %
	Wearing sterile gloves	33	64,70 %
	Disinfection of the meatus	51	100 %
	Use of lubricant	30	58,82 %
Peripheral venous line (n= 240)	Hand washing	100	41,66 %
	Wearing clean non-sterile gloves	240	100 %
	Pre-disinfection of the site	240	100 %
	Use of sterile syringes before any injection	195	81,25%

DISCUSSION

More than 74.7% of healthcare staff correctly knew nosocomial infection as an infection acquired at least 48 hours after hospital admission. Similar studies have shown lower levels of knowledge: BONI Cisee *et al*., reported 16.5% at Youpougon teaching hospital [7], and Hein et al. found 30.4% in Burkina Faso [8].

Compliance to hand hygiene techniques was low. Only 28.6% of participants adhered to the WHO recommended duration of 30-60 seconds slightly higher than the 18% reported by Amene and Mariem in the ICU of Habib Bourguiba university hospital Sfax [9]. Although this result was better than that reported by Yalgado *et al*., (2012), where no staff practiced hand hygiene before catheterization [10], it remains far from acceptable. In our study, 76.7% did not perform urogenital asepsis before insertion, a higher rate that the 43.2% reported in Burkina Faso [10]. Meatal asepsis, however was systematically performed. Perineal washing and meatal antisepsis are complementary steps. The first reduces microbial load and debris, while the latter minimizes local bacterial contamination.

These poor practices may reflect the lack of continuous education in infection prevention, inadequate architectural design of the ICUs, and insufficient hygiene's facilities. The combination of limited infrastructure and staff shortages may explain these deficiencies and procedural noncompliance. Corrective measures should prioritize infection prevention education from initial professional training, improve facility design and equipment, implementation of standard operating procedures, and continuous in service training for health care workers.

CONCLUSION

Nosocomial infections remain a major global health concern. This study aimed to assess the contribution of intensive care staff to the occurrence of these infections through the evaluation of their hygiene practices. The findings indicate that nosocomial infections in intensive care units are mainly linked to insufficient adherence to infection prevention measures. Among these deficiencies, inadequate hand hygiene remains the most frequent and preventable contributor.

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Distribution of Tasks:

The authors confirm that all authors have made substantial contributions to all of the following:

- ✓ The conception and design of the study, critical reading.
- ✓ Drafting the article or revising it critically for important intellectual content.
- ✓ Data collection and analysis, bibliographic research and writing.
- ✓ Final approval of the version to be submitted.

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