

**ORIGINAL RESEARCH ARTICLE****HAND HYGIENE IN THE INTENSIVE CARE UNIT****G Gurung<sup>1\*</sup>, K Pratibha<sup>2</sup>**<sup>1</sup>Department of Nursing, College of Nursing, Chitwan Medical College, Bharatpur-13, Chitwan, Nepal.<sup>2</sup>Department of NICU, Chitwan Medical College, Bharatpur-13, Chitwan, Nepal.*\*Correspondence to:* Prof. Ganga Gurung, Chitwan Medical College, Bharatpur-13, Chitwan, Nepal. *Email:* [gangagurung@gmail.com](mailto:gangagurung@gmail.com)**ABSTRACT**

Adherence to hand hygiene recommendations in the intensive care unit (ICU) is variable and moderate, at the best. This observational study aimed to measure adherence to hand hygiene recommendations among ICU clinicians in 4 multidisciplinary ICUs at Chitwan Medical College Teaching Hospital, Chitwan. Researchers observed 100 clinicians (79 nurses, 13 medical officers and 8 physicians and pediatricians) during patient encounter. Clinicians were unaware that they were under observation. We documented use of gloves, soap and alcohol solution before and after patient encounters for purposes of physical examination or patient care. 80% of clinicians used some form of hand hygiene without fully adhering to recommendations, whereas 20% did not appear to attend to hand hygiene at all during observation. Among 80 clinicians who used some form of hand hygiene, 30% of clinicians adhering to recommendations used gloves followed by washing with soap or alcohol solution. Hence, Multidisciplinary approaches to improving hand hygiene is necessary to improve the modest adherence to hand hygiene that researchers observed.

**Key words:** *Critical care, Hand washing, Hand hygiene*

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**INTRODUCTION**

Hand hygiene is considered to be the cornerstone of infection control.<sup>1</sup> 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 from 12.3% to 1.3% among a cohort of postpartum women.<sup>2</sup> 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.<sup>3</sup>

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.<sup>4</sup> 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.<sup>5-7</sup>

Critically ill patients are particularly vulnerable to nosocomial infection as a result of their immune-compromised state and multiple invasive catheters. Hand hygiene guidelines endorsed by the Society for Healthcare Epidemiology of America, the Association for Professionals in Infection Control, and the

Infectious Diseases Society of America<sup>1</sup>, recommend that clinicians wash hands with soap and water, or disinfectant, for at least 15 seconds before and after patient contact and after any contact with a source of microorganisms; or, alternatively, that clinicians wear gloves on these occasions and wash hands after removing their gloves. Current reports suggest that adherence to hand hygiene recommendations in numerous ICUs has been highly variable and generally poor.<sup>8-11</sup> A number of investigators have studied barriers to hand hygiene among health care providers, particularly in the ICU. In an institution-wide study, Pittet et al. showed that the ICU setting was an independent predictor of poor hand hygiene practice.<sup>10</sup>

Clinicians reporting on important barriers to their own use of proper hand hygiene included hand irritation and dryness, inconvenience, and limited awareness of, or limited agreement with, published recommendations.<sup>12-14</sup> Meanwhile, infection control experts have identified hand hygiene as of paramount importance in the ICU, and have called for behavioral change to improve this practice. In the context of a quality improvement research initiative, Researchers sought to measure adherence to hand hygiene guidelines among ICU clinicians in Chitwan Medical College Teaching Hospital (CMCTH), Chitwan, Nepal.

## METHODS AND MATERIALS

A prospective, anonymous observational study of hand hygiene practices (including hand washing and glove use) among 100 clinicians within 4 multidisciplinary Intensive Care Units (ICU, CCU, NICU and Post-operative ward) was done at Chitwan Medical College Teaching Hospital, Chitwan, Nepal. To avoid the possibility that knowledge of being observed would change hand washing behavior, the subjects were blinded to the study objective and study period. Ethical clearance was taken from Chitwan Medical College Institutional Review Committee (CMC-IRC). The study data form was prepared as a checklist, stored on a handheld computing device, allowed for 2 observers (Professor of department of nursing and a NICU senior staff nurse) to record data related to hand hygiene opportunities observed during ICU rounds or during clinical care.

Researchers defined a hand hygiene opportunity as any direct patient contact associated with a risk of in-

fection transmission. These included contact for the purpose of physical examination or patient care (including patient repositioning, peripheral intravenous line insertion, nasogastric tube insertion, suctioning, manual ventilation, ventilator circuit changes, urinary catheter care, or linen changes). Researchers did not include invasive procedures such as endotracheal intubation, central venous catheter or chest tube insertions. Observers recorded clinician designation (registered nurse, medical officer, intensive care physician and pediatrician); type of patient encounter (physical examination, patient care); the use of gloves, antiseptic solution (before and after patient contact), or soap (before and after patient contact); and whether hand hygiene preceded or followed the patient encounter. Researchers did not measure the duration of hand washing.

Before commencing the study, the 2 observers tested and refined the data collection and recording procedures. An inter-observer reliability study was also undertaken to record concordance on 5 aspects (clinician type, patient encounter type, gloving, use of soap, and use of solution) of 10 hand hygiene opportunities. Each clinician was observed during a single patient encounter, only, and clinicians were unaware that they were under observation at the time. In quantifying our findings, our primary goal was to measure the proportion of opportunities in which clinicians hand hygiene practice was consistent with guidelines published by the Healthcare Infection Control Practices Advisory Committee.<sup>1</sup> According to these guidelines, clinicians should wash their hands with soap and water, or disinfectant, for at least 15 seconds before and after patient contact, after any contact with a source of microorganisms, and after removing gloves.

## RESULTS

In the pilot study, inter-observer reliability for all data items was very good. Researchers observed 100 clinicians, including 79 nurses, 13 medical officers, 8 physicians and pediatricians. In total, 80% of clinicians used some form of hand hygiene in the setting of the patient encounters researchers observed and 20% did not attend to hand hygiene at all.

Among 80 clinicians, 30% of observations were con-

sistent with published guidelines (Table 1). On each of these occasions, clinicians wore gloves and washed with soap or alcohol before wearing and after removing gloves.

Comparing hand hygiene among clinician groups, researchers found that 69 nurses, 5 medical officers, and 6 physicians and pediatricians used any form of hand hygiene (Table 2).

**Table 1: Observation of hand hygiene among 100 intensive care unit clinicians according to WHO guideline**

Hand hygiene behavior	Frequency	Percent
Hand hygiene “Adherence to recommendations”	24	30
Hand hygiene without fully “Adherence to recommendations”	56	70
Not attend to hand hygiene at all	20	20

**Table 2: Variation in hand hygiene practice among intensive care unit clinicians**

Clinician groups	Frequency	Total number	Percent
Physicians and Pediatricians	6	8	75
Medical officers	5	13	38.46
Registered nurses	69	79	87.34

## DISCUSSION

This prospective Intensive Care Unit observational study of hand hygiene shows practices that fall short of recommendations by the Healthcare Infection Control Practices Advisory Committee.<sup>1</sup> While the use of any form of hand hygiene related to patient encounters in the ICU was much higher, at 80%. We also found differences among clinician groups, most notably between nurses and medical officers. It is conceivable that the poor rates of hand hygiene among medical officer indicate poor role modeling for trainees by ICU consultants.

Researchers collected data on unobtrusive hand held devices used commonly on rounds, and clinician observations were anonymous to avoid the Hawthorne effect biasing our results. Our study has some notable limitations. For instance, researchers may have underestimated hand washing that preceded patient encounters in the instances where clinicians had washed moments earlier at another bedside. Researchers do not believe that this phenomena occurred to an important degree. Another shortcoming is that the

blinded design did not allow a more comprehensive analysis of predictors of poor hand hygiene, including demographics of the ICU team members including their years of experience and knowledge of this topic, or ICU workload on the day observation.

Our study highlights that hand hygiene is an important concern in the delivery of intensive care. A study by Bischoff et al. measured hand hygiene before and after patient contact and found that hand hygiene was 6–10% before patient contact and 13–22% after patient contact. With education and feedback, this rate improved to 23% before and 48% after patient contact.<sup>9</sup> Pittet et al. found that the average level of hand washing among ICU clinicians was 48%. Consistent with our findings, compliance was higher among nurses than among physicians and pediatricians.<sup>10</sup> However, they also found that female clinicians were more apparent than male clinicians to attend to hand hygiene. The consistency of many of these findings with our results speaks to the pervasiveness of the problem.

A number of potential solutions to this problem exist which address barriers to optimal should hand hygiene. Several factors are likely to contribute to poor

hand hygiene practices, including inadequate awareness of the issue, personal concerns such as skin irritation and dryness from frequent washing, or time constraints. Regular audit and feedback may be useful in improving hand washing practice. A complementary strategy might include the use of newsletters to inform ICU clinicians about the incidence of nosocomial infection within their institution. Quick and easy access to sinks, hand washing solutions and skin care lotion may improve hand hygiene compliance.

## CONCLUSION

In summary, limited attention to hand hygiene is an important concern in our ICUs. Improvement will require concerted multidisciplinary multi method efforts using effective behavior change strategies, led by administrators, ICU supervisors, and bedside clinicians, alike.

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## REFERENCES

1. Boyce JM, Pittet D, and the Healthcare Infection Control Practices Advisory Committee of the Society for Healthcare Epidemiology of America, the Association for Professionals in Infection Control, and the Infectious Diseases Society of America. Guidelines for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Infect Control Hosp Epidemiol.* 2002;23:S3-S40.
2. Semmelweis I. The aethiology, Buck C, Llopis A, Najera E, Terris M, eds. The challenge of epidemiology-Issues and selected readings. Washington, DC: PAHO Scientific Publication. 1988:46-59.
3. Bryan JL, Cohran J, Larson EL. Handwashing: a ritual revisited. *Crit Care Nurs Clin North Am* 1995;7:617-625.
4. Pittet D, Hugonnet S, Harbarth S, et al. Effectiveness of a hospital wide program to improve compliance with hand hygiene. *Lancet* 2000; 356:1307-1312.
5. Casewell M, Phillips I. Hand as route of transmission for Klebsiella species. *BMJ.* 1977;2:1315-1317.
6. Gold H. Vancomycin resistant enterococci: mechanism and clinical observation. *Clin Infect Dis* 2001;33:210-219.
7. Albert RK, Condie F. Hand washing patterns in medical intensive care units. *N Engl J Med* 1981;24:1465-1466.
8. Pittet D. Improving adherence to hand hygiene practice: a multidisciplinary approach. *Emerging Infectious Dis* 2001;7:234-240.
9. Bischoff W, Reynolds T, Sessler C, et al. Hand washing compliance by health care workers. *Arch Intern Med* 2000;160:1017-1021.
10. Pittet D, Mourouga P, Perneger TV. Compliance with hand washing in a teaching hospital. *Ann Intern Med* 1999;130:126-130.
11. Karabey S, Ay P, Derbentli S, et al. Hand-washing frequencies in an intensive care unit. *J Hosp Infect* 2002;50:36-41.
12. Pittet D. Compliance with hand disinfection

- tion and its impact on hospital acquired infection. *Journal of Hospital Infection* 2001;48:S40–S46.
13. Larson E, Kretzer EK. Compliance with handwashing and barrier precautions. *J Hosp Infect* 1995;30:88–106.
  14. Larson E, Killien M. Factors influencing handwashing behavior of patients care personnel. *Am J Infect Control* 1982;10:93–99.
  15. Zimakoff J, Kjelberg AB, Larson SO, Holstein B. A multicenter questionnaire investigation of attitude towards hand hygiene. *Am J Infect Control* 1992;20:58–64.
  16. Dubbert PM, Dolce J, Richter W, et al. Increasing ICU staff handwashing: effects of education and group feedback. *Infect Control Hosp Epidemiol* 1990;11:191–193.