

## Video Surveillance Audit of Hand-washing Practices in a Neonatal Intensive Care Unit

RUTVI SHAH, DIPEN V PATEL, KUSHAL SHAH, #AJAY PHATAK AND SOMASHEKHAR NIMBALKAR

From Department of Pediatrics, Pramukhswami Medical College; and #Central Research Services, Charutar Arogya Mandal; Karamsad, Anand, Gujarat, India.

Correspondence to: Prof Somashekhar Nimbalkar, Department of Pediatrics, Pramukhswami Medical College, Karamsad, Anand, Gujarat 388 325, India. [somu\\_somu@yahoo.com](mailto:somu_somu@yahoo.com)

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**Objective:** To audit hand-washing practices by video-surveillance. **Methods:** Six main steps (step 2 to step 7) of World Health Organization's hand hygiene technique with soap and water were used for evaluation. Handwashing was categorized as excellent, acceptable and unacceptable. **Results:** Of 1081 recordings, 403 (37.3%) were excellent, 521 (48.2%) were acceptable and 157 (14.5%) were unacceptable handwash. Unacceptable handwashing was more prevalent in the night in comparison to daytime (17.5% vs 12.5%). Thirteen people washed their face after washing their hands. **Conclusion:** Innovative interventions are required to improve handwashing during night shifts.

**Keywords:** Asepsis, Hand washing, Neonatal Intensive care Unit, Surveillance.

Healthcare associated infections not only increase neonatal morbidity, mortality, cost of health care and emotional burden, but also prolong hospital stay and lead to resistance to antimicrobials [1]. Infections significantly contribute to high neonatal mortality in developing countries [2], and health care associated infections also contribute significantly to this burden [3]. Newborns in the neonatal intensive care unit (NICU) are more susceptible to such infections because of their immature immune systems, fragile integumentary system, need for frequent invasive procedures, and frequent contact with the staff [4].

Health care associated infections can be reduced significantly by strict compliance to hand hygiene guidelines [5]. Lack of good hand hygiene practices is a single most modifiable cause of these infections [6]. Adherence to hand hygiene is poor worldwide [1]. We planned to assess the completeness and accuracy of hand-washing practices in NICU by analyzing video recordings.

### METHODS

The study NICU is a level 3 unit of a teaching hospital in Gujarat, India, with 26 beds. It is managed by 7 nurses each in 3 shifts (2 day shifts and 1 night shift). Six doctors are available in the day shifts whereas 3 doctors are available in the night shift. The hand hygiene policy of the unit is as follows: hand-wash with soap and water before entering the NICU wards, alcohol-based hand rub between patients, and hand-wash with soap and water

between high-risk neonates (extreme prematurity, sepsis etc). The inborn NICU ward has one sink while the out born NICU ward has two sinks. Tap water is not temperature-controlled and study was conducted in the winter months. The taps can be operated by forearm/elbow.

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Motion-activated video camera (Crystal IR) was installed above the washing area of the out born NICU. Videos recorded over a week (November 22-28, 2013) were extracted and analyzed by single investigator with a pre-decided protocol, and information was entered on the study proforma. Quality-check on video analysis was performed by two senior investigators by random check. Hand-washing practice was evaluated on the basis of Hand Hygiene Technique with Soap and Water protocol of World Health Organization [1]. This protocol involves steps given in **Table I**. Six main steps (step 2 to 7) were used for classifying the appropriateness of behavior.

Hand-wash for <20 s was considered as poor hand-washing practice (unacceptable). If three or more important steps (step 2 to 7) were missed, it was also considered as unacceptable. Hand-washing was categorized as excellent if it exceeded 20 seconds, and all the six important steps were followed. The procedure was considered acceptable if duration exceeded 20 seconds but only 4 or 5 steps were followed.

Study was approved by the Institutional ethics committee with waiver of informed consent. It was

**TABLE I** COMPLIANCE TO HAND-WASHING GUIDELINES

Step	Particulars	Correctly Done N (%)
1.	Wet hands with water	1081 (100%)
2.	Apply enough soap to cover all hand surfaces	1081 (100%)
3.	Rub hands palm to palm	1081 (100%)
4.	Right palm over left dorsum with interlaced fingers and vice versa	489 (45.2%)
5.	Palm to palm with fingers interlaced	1016 (94.0%)
6.	Back of fingers to opposing palms with fingers interlocked	874 (80.9%)
7.	Rotational rubbing of left thumb clasped in right palm and vice versa	437 (40.4%)
8.	Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa	1081(100%)
9.	Rinse hands with water	1081 (100%)
10.	Dry hands thoroughly with a single towel use	Not assessed

mandated that visible information regarding video surveillance be placed. Descriptive statistics [mean (SD), frequency (%)] and Chi-square test were used for analysis.

**RESULTS**

A total of 1081 procedures were recorded over a week. The quality of recording was good and all videos could be analyzed. Of these 1081 recordings, 775 (71.7%) were from nurses 204 (18.9%) were from parents, and 102 (9.4%) were from doctors. Most hand-wash episodes 665 (61.5%) occurred during day time (8 AM to 8 PM). Not a single person entered/exited the out born NICU ward without hand-wash.

Step number 10 was not applicable to our setup. Step number 1, 2, 3, 8 and 9 had 100% compliance. Step number 4 (45.2%) and step number 7 (40.4%) had very poor compliance (**Table I**). Some videos revealed atypical behavior. Thirteen persons (11 nurses and 2 parents; 12 during night time) washed their face after washing their hands. All these were classified as poor hand-washing. Out of 1081 hand-washing episodes, 37.3% were excellent, 48.2% were acceptable, and 14.5% were unacceptable. Only 4.9% procedures performed by doctors were unacceptable in comparison to 10.6% by the nurses and 34.3% by relatives ( $P<0.001$ ) (**Table II**).

**DISCUSSION**

In this study evaluating hand-washing practices in NICU, we observed that 15% of procedures were unacceptable. Unacceptable procedures were more common in night, and among parents of admitted neonates.

The limitations of study were: short duration (one

week), and awareness of the personnel about them being monitored. Also the study did not observe health care worker behavior after the initial hand-wash. The study also did not analyze healthcare-associated infections during the observation period.

Contrary to a study by Pittet, *et al.* [5] that reported highest non-compliance among physicians, we found highest compliance among doctors. The completeness and accuracy of hand-washing was better in our study as compared to other studies in Indian setting [1,7]. The high compliance in our study may be ascribed to team building, empowerment of nurses, protocol-driven care and constructive feedback to violators, all of which have been followed in this unit over a decade. Multimodal interventions with ongoing surveillance have been shown to be effective in an NICU setting [8].

**TABLE II** QUALITY OF HAND-WASHING IN DIFFERENT SUB-GROUPS

Groups	Quality of hand-washing			P value
	Excellent	Acceptable	Unacceptable	
<i>Status</i>				
Doctors	73	24	5	<0.001
Nurses	325	368	82	
Relatives	5	129	70	
<i>Gender</i>				
Male	69	27	9	<0.001
Female	334	494	148	
<i>Shift</i>				
Day	283	298	84	<0.001
Night	120	223	73	

**WHAT THIS STUDY ADDS?**

- Unacceptable hand-washing procedures were more common during night, and among parents.

The study shows good compliance to hand-washing guidelines but also indicates scope for improvement with emphasis on night shifts and parents. Innovative interventions may be required to improve hand-washing behaviors during night shift, and among parents.

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