

# Behaviours monitoring and infection control in neonatal intensive care unit: how to improve ourselves?

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## Keywords

Hand hygiene • Healthcare-associated infections • Infection control • Neonatal intensive care unit

## Summary

**Introduction.** Healthcare-associated infections are important events in neonatal intensive care unit.

Hand hygiene is considered one of the most important procedures to control these complications.

**Methods.** Healthcare workers procedures for patient's approaching were directly monitored from February to April 2018 in the Neonatal Intensive Care Unit of Istituto Giannina Gaslini, Genoa, Italy.

Number and type of total contacts with patients or "patient unit" (e.g.: ventilator, monitor, isolette) were recorded as well as errors

related to lack of hand hygiene after and before performing procedures.

**Results.** A total of 1,040 actions were observed on patient or patient unit: 560 actions by nursing staff, 240 by residents and 240 by consultants. The most common misbehaviour was the "double touch" in nursing staff (30%), "glasses, hair or nose" in residents (35%), and "double touch" and "glasses hair or nose" in consultants (25% and 23% respectively).

**Conclusions.** Extemporaneous contact is the more frequent potential "high risk" moment for transmission of healthcare associated infections in NICU.

## Introduction

Hospital-acquired infections in neonatal intensive care unit (NICU) have a relevant role in morbidity and mortality as well as prolonged in hospital stay [1, 2]. Considering some patients as reservoir of potentially dangerous microorganisms, spreading vectors of nosocomial infections were recognised in healthcare workers hands [3]. Since 2005 WHO started the "Clean Care is Safer Care" program to promote hand hygiene in order to improve infections control and direct monitoring was considered probably the best tool to evaluate adherence to hand hygiene recommendations [4]. Despite protocols and recommendations, in-hospital diffusion of drug-resistant pathogens is a current problem. Aim of this study was to identify by direct observation potentially harmful behaviours that could increase patients' infection risk in a NICU of a tertiary care paediatric hospital.

## Methods

Istituto Giannina Gaslini, Genova, Italy, is a tertiary care children's hospital in northern Italy serving as a local pediatric hospital for the Genova area, but representing a tertiary care referral hospital for the whole Italy and many foreign countries.

Neonatal Intensive Care Unit (NICU) is a 21 beds ward (7 isolettes of highly intensive care) that admit about 90-100 very low birth weight (< 1,000 g body weight)

neonates per year. Healthcare workers procedures for patient's approaching in NICU were directly monitored from February to April 2018 by a team of observers composed by a component of nursing, resident and consultant staff [5]. Standard hand hygiene procedures consisted of standard antiseptic hand washing or hand decontamination with isopropyl alcohol gel before and after any patients' approaching, according with specific needs (e.g. sterile or-non sterile procedure) [6].

Number and type of total contacts with patients or "patient unit" (e.g.: ventilator, monitor, incubator) were recorded as well as errors related to lack of hand hygiene before and after performing procedures [5, 7-11].

"Incorrect behaviours" were observed and summarized as follows:

- absence of hand hygiene before/after patient touching. This action was further divided in two sub-groups: no hand hygiene after complete assistance or examination (e.g. catheter positioning or medication) and lack of hand hygiene after extemporaneous contact (e.g.: abdomen palpation or stimulation);
- touching patient unit, taking off a hand (or both) from the isolette to adjust monitor or other devices and reintroduce the hand into isolette without hand hygiene (double touch misbehaviour);
- closing neonatal isolette doors (still considered patient unit) with bare hands without hygiene procedure;
- using mobile phone or computer keyboard without hand hygiene before touching patient unit;

- touching operator's "dirty zones" (e.g. glasses, hair, nose) without hand hygiene before performing a procedure on patient unit.

## Results

A total of 1,040 actions were observed on patient or patient unit: 560 actions by nursing staff, 240 by residents and 240 by consultants.

Different proportions of incorrect behaviours were observed according to the type of patient's care. Table I summarizes the proportion of incorrect behaviours that was 16% in case of complete patient assistance versus 27% in case of extemporaneous contact, with similar distribution among professional roles.

Table II summarizes the type of wrong behaviours by type of professional role. Glasses-hair-nose touch was the most frequent misbehaviour (27%), even if there were differences in the distribution among the different professional roles. The most common misbehaviour was the "double touch" in nursing staff (30%), "glasses, hair or nose" in residents (35%), and "double touch" and "glasses hair or nose" in consultants (25% and 23% respectively).

## Discussion

This observational study identified occasional contact not followed by hand hygiene as the clue moment of potential incorrect behaviours in NICU. We also identified "double touch" to be the commonest misbehaviour in nursing staff, probably due to the very high rate of intervention on patient unit and often the need to adjust monitors or ventilators during patient manipulation in daily practice. On the other hand "glasses-hair-nose touch" was the most frequent misbehaviour among physicians (resident and consultant) and this, together with mobile phone use, is a well known behaviour that increases the risk of pathogen transmission from patient to patient and from the hospital environment to patients [12, 13].

Correct hand hygiene procedures during healthcare reduce the risk of pathogen transmission, but they must be performed during any step of patients' care in a correct "sequence" [4]. In a previous study we estimated the mean number of daily hand hygiene procedures per patient in different units of our hospital and found that in NICU there was a large compliance with this procedure [6]. However, the direct observation of health care workers behaviours reported in this study found the presence of many "wrong" actions by all the components of the team, confirming the role of direct observation to more precisely identify areas of intervention.

The study has also limitations, the major being the short-term, with relatively low number of observations, and the absence of stratifications of risk by staff shift (day or night) and period at risk of understaff (e.g. week-end, holiday periods) [10]. Moreover, it not takes into account also ward overcrowding by concomitant presence of staff, training doctors, parents [11] that can increase the risk of misbehaviours and decrease the possibilities of correct cleaning of environment [14] in some way increasing the risk of health care workers', and indirectly patients', contamination.

## Conclusions

This observational study clearly indicates patient's extemporaneous contact as the more frequent potential "high risk" moment for healthcare associated infection transmission in patient care. Our data supports the need to improve staff education in sporadic patient body contact because of the higher frequency of these short procedures, compared to the more complex ones (e.g. positioning central lines, lumbar punctures).

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Tab. I. Distribution of different behaviours during patient's care stratified by professional roles.

Staff member	"Complete" assistance (total number)	Wrong behaviours in complete assistance	Occasional contact (total number)	Wrong behaviours in occasional contact
Nurse	160	26 (16%; 95% CI 10-22)	400	112 (28%; 95% CI 24-32)
Resident	40	7 (17,5%; 95% CI 6-29)	200	52 (26%; 95% CI 20-32)
Consultant	40	6 (15%; 95% CI 4-26)	200	50 (25%; 95% CI 19-31)
Total	240	39 (16%; 95% CI 11-21)	800	214 (27%; 95% CI 24-30)

95% CI: 95% Confidence Interval.

Tab. II. Distribution of different misbehaviours during patient's care stratified by professional roles.

Staff member	Observations (total number)	Double touch	Mobile phone	Glasses-hair-nose touch	Incubator doors
Nurse	560	169 (30%; 95% CI 26-34)	60 (11%; 95% CI 8-14)	146 (26%; 95% CI 22-30)	25 (4%; 95% CI 2-6)
Resident	240	20 (8%; 95% CI 5-11)	23 (9%; 95% CI 5-13)	85 (35%; 95% CI 29-41)	46 (19%; 95% CI 14-24)
Consultant	240	60 (25%; 95% CI 20-30)	37 (15%; 95% CI 10-20)	56 (23%; 95% CI 18-28)	12 (5%; 95% CI 2-8)
Total	1040	249 (24%; 95% CI 21-27)	120 (11%; 95% CI 9-13)	287 (27%; 95% CI 24-30)	83 (8%; 95% CI 6-10)

95% CI: 95% Confidence Interval.

## Conflict of interest statement

None declared.

## Authors' contributions

FMR performed study design, data analysis and manuscript preparation, DM performed data analysis and manuscript preparation, MM performed data collection and analysis, SS performed data collection and review, AP performed data collection and review, DLM carried out data collection and analysis, EC performed data analysis and manuscript preparation, LAR performed study design and manuscript preparation.

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