Bacterial contamination of the hands of intensive care unit staff during respiratory tract care: should a specific sequence of care be recommended?

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Background
Optimal care of the respiratory tract (RT) is critical to prevent ventilator-associated pneumonia in intensive care unit (ICU). Our objectives were to study the level of health care workers (HCWs)’ hand contamination during RT care and to evaluate risk factors for contamination.

Material and methods
A prospective observational study was conducted in a 34-bed adult ICU in Switzerland. Six types of RT care were considered:
- oral care with water,
- oral care with chlorhexidine,
- nasal care without fixing of the nasogastric tube (NGT),
- nasal care with fixing of the NGT,
- fixing of respiratory tube,
- endo-tracheal aspiration.

Structured observations of RT care sequences were performed by trained external observers. At the beginning and the end of each RT care, imprints of the 5 fingertips of HCWs’ dominant hand were taken on blood agar plates.

Bacterial colony-forming units (CFUs) were quantified after 18 hours of incubation (35°C).

Primary outcome = number of CFU/plate at end of the care sequence. Independent variables were the type of care and some patient characteristics. Generalized estimating equation was used to take clustered data at the level of the care sequence (HCW and patient).

Results
207 samples were collected during 99 observations sessions; 69 HCWs were observed and performed RT care on 49 intubated patients. Hand hygiene compliance before aseptic care was 70%. 24% of care sequences have a glove contamination level >10 CFUs before care.

Fixing of respiratory tube was providing the highest bacterial contamination level (median 148; IQR: 20-269) followed by oral care with water (126; 43-300), nasal care with fixing of the NGT (87; 34-257), oral care with chlorhexidine (67; 18-179), nasal care without fixing of the NGT (36.5; 6-86) and endo-tracheal aspiration (5.5; 1-24.5) (Figure I).

We found the same distribution of bacteria species by type of RT care. Multivariable analysis showed that bacterial contamination increased gradually by the type of RT care, after adjustment for initial bacterial contamination and other important confounders. Bacterial contamination increased significantly with duration of care (P=0.05), a SAPS II score at 35-50 compared to <35 (P=0.003) and 2-7 days of ventilation compared to <2 days (P=0.01).

However, bacterial contamination significantly decreased when nursing workload increased (P=0.035).

Conclusions
In the light of these results, we recommend to perform nasal care, oral care followed by fixation of the NGT and respiratory tube in the same sequence of care and to consider endo-tracheal aspiration for intubated patients as a separate sequence of care to reduce the risk of bacterial contamination. Further research is needed to establish the clinical relevance of our results.