

TABLE
RISK FACTORS ASSOCIATED WITH NOSOCOMIAL INFECTION IN INFANTS IN A HIGH-RISK NURSERY

Risk Factor	OR	CI ₉₅	Correlation Coefficient	P
Umbilical or central line >7 d	41.9	5.5-320	0.5	<.0001
Parenteral nutrition >7 d	21.0	5.5-77.2	0.53	<.0001
Endotracheal intubation >7 d	17.2	7.4-40.1	0.61	<.0001
Birthweight ≤1,000 g	4.1	2.2-7.5	0.33	<.0001
Gestational age <30 wk	3.0	1.5-6.1	0.23	<.0001
Apgar score at 1 min <7	2.4	1.2-5.2	0.2	<.0001
Apgar score at 5 min <7	3.6	1.8-7.1	0.3	<.0001
Prolonged hospital stay	4.1	2.2-7.5	0.4	<.0001

Abbreviations: CI₉₅, 95% confidence interval; OR, odds ratio.

Escherichia coli (4%). There were three cases of nosocomial infection due to group B streptococcus (3%): ventilator-associated pneumonia at the age of 30 days and BSIs at the ages of 15 and 25 days.

Risk factors associated with nosocomial infection were birth weight ≤1,000 g (ELBW), gestational age <30 weeks, prolonged hospital stay, use of umbilical or central line (UCL), administration of parenteral nutrition, and endotracheal intubation. Parenteral nutrition and use of UCL were independently associated with a higher risk of BSI. Prolonged endotracheal intubation was the only independent risk factor for ventilator-associated pneumonia (VAP). The Table shows the risk factors associated with nosocomial infection. UCL-associated BSI occurred only in ELBW infants. The UCL-associated BSI rate was 16.0 per 1,000 UCL-days, with a UCL utilization ratio of 0.06. Although ventilator use was more common and of longer duration among ELBW infants compared to VLBW infants, the VAP rate in both groups was similar: 9.0 and 8.7 per 1,000 ventilator days in ELBW and VLBW infants, respectively. The ventilator utilization rate was 0.28 (0.37 in ELBWs and 0.1 in VLBWs; $P < .01$). Mortality occurred in 16 (27%) of infected infants compared to 8 (8%) of noninfected infants.

This study shows that nosocomial infection remains a cause of morbidity and mortality in infants weighing <1,500 g admitted to our HRN. The device-associated infection rates in our HRN were higher than the 50th percentile reported by NNIS, whereas the device-utilization ratios were

lower.⁵ The UCL-associated BSI infection rate of 16.0 and VAP rate of 9.0 in ELBW infants in this study were ≥75th percentile of the NNIS data, whereas the non-occurrence of UCL-associated infection in VLBW infants fell at the 10th percentile.⁵ These observations suggest that the high infection rates may have been related more to infection control measures than device utilization. It is necessary to educate medical personnel on infection control and prevention. Infection control should be made part of the hospital orientation program for new residents, nurses, and other hospital employees. Infection control measures should continue to be monitored and discussed periodically with staff. There should also be an infection control nurse or officer who directly oversees the NICU. Isolation procedures also need to be followed strictly.

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Once MRSA, Always MRSA? Setting up a Hospital Preadmission Questionnaire

To the Editor:

A gynecological carcinoma patient who previously had been vaginally colonized with a methicillin-resistant *Staphylococcus aureus* (MRSA) in another hospital was subsequently declared free of MRSA carriage. She later came to our hospital and had to be admitted to the intensive care unit (ICU) due to a respiratory infection, where MRSA of the original phage type reappeared at the same site. Worse still, an outbreak on the ICU followed, involving 14 patients.

A previous history of MRSA has to be considered as a risk factor for unexpected hidden carriage as long as the original disease has not been cured; hence, the adage "Once MRSA, always MRSA?" To prevent a repetition of this episode, a questionnaire was introduced for all newly admitted patients to detect past or present MRSA carriage or possible risk factors, such as an earlier stay in a foreign hospital. Three questions and one suggestion are put to the patient by the attending physician via a flow-sheet (Figure).

In the Dutch opinion, all foreign hospitals are considered suspected for harboring MRSA. In accord with national guidelines, MRSA-colonized patients in Dutch hospitals are always put in strict isolation. Depending on the level of suspicion derived from the MRSA history, more or less strict preventive control measures, including nursing in isolation, are taken at admission.¹ Most answers lead, fortunately, to the result that no special hygienic precautions are required on admission. For all patients, except those admitted via the emergency

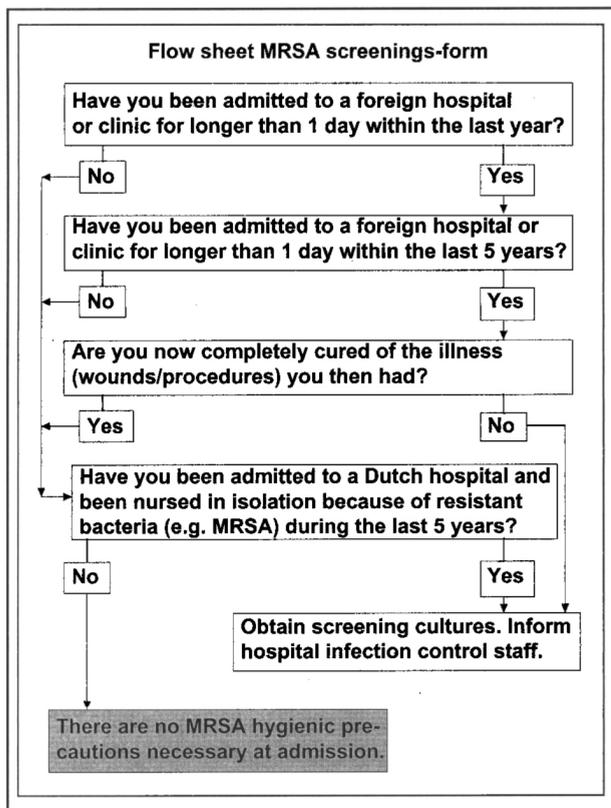


FIGURE. Structure of the MRSA flow sheet, to be processed by the attending physician (with name of physician, specialty, department, and date). Abbreviation: MRSA, methicillin-resistant *Staphylococcus aureus*.

department (nearly 50%), sufficient time is available to obtain screening culture results, which are performed with an additional enrichment broth as previously described.²

As compliance with this formula is not complete for every medical specialty, and the ICU is particularly vulnerable to further spread of MRSA, an extra administrative control by the nursing staff on the content of the questionnaire is performed when the patient is actually admitted and when transfer of a patient from a ward to the ICU is indicated. After a reminder letter, the average compliance rose from 50% to more than 75%, but we are aiming for a higher percentage, as

reached by the emergency department, with nearly 100% of forms correctly processed.

In the past year, 191 of 30,283 admitted patients were recognized as having risk factors, and these patients had cultures for the presence of MRSA. No MRSA was found. Due to emergency admission or absent screening forms, 84 patients were isolated preventively; all were MRSA-negative. In contrast, 2 patients, not subjected to the questionnaire and subsequently admitted on surgical wards, were found colonized with MRSA and became involved in (rapidly contained) MRSA outbreaks. As the additional costs of two outbreaks

in the past were estimated as \$150,000 (US), we think that an investment as described here is certainly cost-effective.

European healthcare insurers tend more and more to allow their patients to seek elective treatment in foreign hospitals. As our large, regional, 800-bed teaching hospital is situated in the border region with Belgium and Germany (~15 km from Aachen) a frontline situation has been created for us in this way.^{3,4} Such questionnaires may become of increasing importance to prevent the unexpected introduction of MRSA into the Dutch hospitals, but still better is the prevention of such an outbreak of MRSA on European scale. Not only local or national solutions¹ will suffice in a united Europe; international guidance should be considered as a task for European Union healthcare policy institutions.⁵

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