TABLE
REASONS FOR NOT ACCEPTING VACCINATION OFFERED BY STAFF

	Reasons for Not Accepting Vaccination						
Group	Unaware of Campaign	Times Not Convenient	Do Not Believe in Vaccinations	Had Elsewhere	Believed Not in Recommended Groups	Unwell at Time	Advised Not to by Their Doctor
Doctors (21)	4	4	2	2	8	1	0
Nurses (114)	2	7	63	3	33	1	5
Laboratory or clinical (58)	0	4	24	2	22	2	4
Clerical or managerial (95)	3	3	41	4	36	7	1
Totals	9 (3%)	18 (6%)	130 (45%)	11 (4%)	99 (34%)	11 (4%)	10 (3.5%)

had not had the vaccination, 700 were selected randomly and (anonymously) surveyed in June 1998 as to their reasons for not accepting vaccination.

Of eligible staff, 22% (1,554) received the vaccination. Nurses had the lowest uptake (402, or 15% of nurses), and nonclinical staff the highest (172 or 41%).

From the 700 nonrecipient staff surveyed as to their reasons for not accepting vaccination, 323 replies were received, of which 288 (41% of the nonvaccinated sample) were valid. The reasons for not being vaccinated are shown in the Table.

Good evidence exists as to the efficacy,[2,3] safety, and cost-effectiveness[3,4] of an influenza vaccination program. Heimberger et al[5] identified previous influenza vaccination and knowledge that the vaccination does not cause influenza as a positive predictor of immunization, but noted less success among medical personnel. At Auckland Healthcare, 45% of responding HCWs cited not believing in vaccinations, and 34% cited not belonging to one of the recommended groups as their reason for not accepting influenza vaccination. There appeared to be an inverse relation between the degree of medical education and the acceptance of this vaccination. As a generalization, medical personnel did not lead by example.

Uptake at Auckland Healthcare can probably be further improved by a prolonged staff education program as to the reasons for vaccination and the appropriateness for their work group and by targeting communal areas where clinical HCWs congregate and service units with the high-risk patients. In addition, it may be appropriate to exclude (or make no particular marketing effort toward) nonclinical staff.

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Risk Factors for Nosocomial Infection in a High-Risk Nursery

To the Editor:

The National Nosocomial Infection Surveillance (NNIS) System was established by the Centers for Disease Control and Prevention (CDC) to help create a national database of nosocomial infections, improve surveillance methods in hospitals, and allow inter-hospital comparisons.[1] One of the four NNIS components is the high-risk nursery (HRN) surveillance that focuses on infants in the neonatal intensive care unit (NICU). Most hospitals do not participate in this component, even though infants in the NICU are at greater risk for nosocomial infection due to their compromised immune status and the complex invasive diagnostic and therapeutic regimens to which they often are exposed.[2]

A study was undertaken to determine the pattern of nosocomial infection, associated risk factors, device utilization, and the need for an active NICU surveillance program in our hospital. We reviewed the demographics and the clinical, radiology, and microbiology records of infants weighing less than 1,500 g admitted to the HRN at District of Columbia General Hospital over a 48-month period between January 1994 and December 1997 in order to provide baseline data for comparison with the national database, thereby encouraging active surveillance. The study was approved by the Institutional Review Committee. We employed CDC definitions of nosocomial infection rates and utilization ratios.[2-5] Infants who had clinical evidence of sepsis and a positive culture ≥48 hours after admission served as cases, and their matched infants with no evidence of nosocomial infection served as controls.

Records of 231 infants were reviewed; 73 (32%) were excluded because of incomplete records or not satisfying study criteria. Of remaining infants, 86 (54%) had birth weight ≤1,000 g (extremely low birth weight [ELBW]). The remaining 72 infants (46%) had birth weight of 1,001 to 1,049 g (very low birth weight [VLBW]). There were 99 nosocomial infection episodes in 59 infants (37%). The nosocomial infection rate was 8.5 per 1,000 patient-days. Seventy-two episodes of nosocomial infection (73%) were in ELBW infants and 27 (27%) in VLBW infants ($P<.001$). Fifty-two of the infection episodes (53%) were bloodstream infections (BSI); pneumonia and urinary tract infection accounted for 29 (30%) and 16 (17%) of episodes, respectively. The most common organism causing nosocomial infection was coagulase-negative *Staphylococcus*, accounting for 32 (33%) of the isolates. *Klebsiella pneumoniae* and *Candida* species each accounted for 16 (16%). Other organisms were *Enterobacter* species (9%), *Enterococcus faecalis* (4%), and

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: CI_{95}, 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