

not guilty until proven the opposite beyond statistical significance, it is very dangerous to release on probation suspects of serial killing.

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The author replies.

I agree with Macías that my editorial is just a piece in the complex puzzle of understanding the contribution of nosocomial infections (NIs) to outcome. The impact of NIs on outcome has been classically overemphasized by inappropriate estimations of attributable mortality, basically due to a failure to adjust for severity of illness, and this has contributed to the fact that this myth has flown too high. My current belief is that survival in patients with NIs depends above all on the degree of severity at the moment of the diagnosis.^{1,2} In our experience,³ most device-related infections are usually caused by pathogens involved in endogenous episodes, and this is a benign process with no significant excess of mortality, if appropriate antibiotic treatment is provided early.

In spite of this, I agree that pathogens acquired exogenously appear to have a poorer prognosis.

This trend was well documented in a study⁴ reporting that mortality directly related to pneumonia caused by *Staphylococcus aureus* was 20 times greater in methicillin-resistant episodes than in cases of pneumonia caused by methicillin-sensitive strains. What we have learned, and what this author's own experience^{5,6} confirms, is that the epidemiological pattern of exogenous organisms may vary from hospital to hospital, and control measures or therapeutic approaches should be customized to each institution.

In the field of ventilator-associated pneumonia, our group has demonstrated that effective drainage of subglottic secretions⁷ and periodic monitoring of the intracuff pressure⁸ are inexpensive and effective measures in preventing primary endogenous pneumonia. As expected, these measures reduced the period of intubation, but did not modify the ICU survival rate.⁷ In contrast, presence of secondary endogenous or exogenous pathogens will be associated with significant excess mortality,^{2,9} and I anticipate that these measures will become ineffective.

All of these pieces of the puzzle are partially recognized but are extremely important in addressing key messages regarding therapy and prevention. Careful handling of the artificial devices (intravenous catheters, intratracheal tubes) is extremely important in preventing NI. The current evidence, however, suggests that these measures should be customized to each institution, as is the case for empirical therapy for nosocomial infections.⁶ In the presence of appropriate infection control measures, mortality is not significantly increased, but the reduction in the rate of endogenous infections by specific interventions will contribute to reducing the economic burden associated with these infections. In contrast, in the presence of exogenous pathogens, the approach should be different and should be targeted to antimicrobial-control programs and increasing handwashing compliance.

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Reasons That Healthcare Workers Decline Influenza Vaccination in a New Zealand Hospital Environment

To the Editor:

The Centers for Disease Control and Prevention currently recommends that healthcare workers (HCWs) be vaccinated against influenza each year.¹ This policy seems to be focused on keeping hospitals operational in the event of a severe influenza epidemic and on preventing transmission to at-risk patients, rather than as a protective mechanism for HCWs (who neither fit into the usual high-risk groups nor show evidence of a greater risk of complications).

Auckland Healthcare has operated influenza vaccination programs for some years. Uptake generally has been poor despite extensive advertising, visiting immunization nurses, drop-in immunization clinics, and a no-charge program.

The occupational groupings of those vaccinated were identified, and nonvaccinated HCWs were identified from payroll lists. Of staff who

TABLE
REASONS FOR NOT ACCEPTING VACCINATION OFFERED BY STAFF

Group	Reasons for Not Accepting Vaccination						
	Un-aware of Campaign	Times Not Con-venient	Do Not Believe in Vaccina-tions	Had Else-where	Believed Not in Recom-mended Groups	Un-well 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 al⁵ 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 $\leq 1,000$ 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