

- infections: I. Surveillance in a university hospital. *Am J Epidemiol* 1976;103:251-260.
19. Directigen FLU-A [package insert]. Sparks, MD: Becton Dickinson; 2000.
  20. Rosner B. *Fundamentals of Biostatistics*. Belmont, CA: Duxbury Press; 2000:397.
  21. Mehta CR, Patel NR. Exact logistic regression: theory and examples. *Stat Med* 1995;14:2143-2160.
  22. Centers for Disease Control and Prevention. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2001;50:1-44.
  23. Centers for Disease Control and Prevention. Recommendations for prevention and control of influenza: recommendations of the Immunization Practices Advisory Committee. *Ann Intern Med* 1986;105:399-404.
  24. Garner J, The Hospital Infection Control Practices Advisory Committee (HICPAC). Guidelines for isolation precautions in hospitals. *Infect Control Hosp Epidemiol* 1996;17:53-80.
  25. Williams W, Hickson M, Kane M, Kendal A, Spika J, Hinman A. Immunization policies and vaccine coverage among adults: the risk for missed opportunities. *Ann Intern Med* 1988;108:616-625.
  26. Reese S, Owen P, Bender B, et al. Influenza and pneumococcal vaccination levels among persons aged  $\geq 65$  years: United States, 1999. *MMWR* 2001;50:532-537.
  27. Yassi A, Murdzak C, Cheang, Tran N, Aoki F. Influenza immunization: knowledge, attitude and behaviour of health care workers. *Canadian Journal of Infection Control* 1994;9:103-108.
  28. Christian M. Influenza and hepatitis B vaccine acceptance: a survey of health care workers. *Am J Infect Control* 1991;19:177-184.
  29. Russell D, Cameron D, Lockey R, Behnke R, Sinnott J, Ganguly R. Influenza vaccination acceptance among health care professionals. *Vaccine* 1991;9:691-692.
  30. Heimberger T, Chang H, Shaikh, Crotty L, Morse D, Birkhead G. Knowledge and attitudes of healthcare workers about influenza: why are they not getting vaccinated? *Infect Control Hosp Epidemiol* 1995;16:412-415.
  31. Carman W, Elder A, Wallace L, et al. Effects of influenza vaccination of healthcare workers on mortality of elderly people in long-term care: a randomized controlled trial. *Lancet* 2000;355:93-97.
  32. Walker F, Singleton J, Strikas R, National Immunization Program CAG. Are U.S. health care workers receiving annual influenza vaccinations? Presented at the 39th Interscience Conference on Antimicrobial Agents and Chemotherapy; September 26-29, 1999; San Francisco, CA. Abstract 752.

## Medical News

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### Ventilator-Associated Pneumonia: Caveats for Benchmarking

Eggimann and colleagues conducted a prospective cohort study to determine the influence of using different denominators on risk estimates of ventilator-associated pneumonia (VAP). VAP occurs in approximately 25% of mechanically ventilated patients with a reported incidence rate of 4 to 25 episodes per 1,000 ventilator-days, but methods used for risk assessment vary widely, making benchmarking hazardous. True risk determination requires calculation of infection rates only for the days at risk (ie, those on which patients are free of VAP). All patients admitted to a medical intensive care unit for more than 48 hours during a 2-year period were included. Intensive care unit-acquired infections were recorded using modified Centers for Disease Control and Prevention criteria. Of the 1,068 patients admitted, VAP developed in 106 (23.5%) of those mechanically ventilated. The incidence of infection was 22.8 per 1,000 patient-days (95% confidence interval [CI<sub>95</sub>],

18.7–27.6), 29.6 per 1,000 patient-days at risk (CI<sub>95</sub>, 24.2–35.8), 35.7 per 1,000 ventilator-days (CI<sub>95</sub>, 29.2–43.2), and 44.0 per 1,000 ventilator-days at risk (CI<sub>95</sub>, 36.0–53.2). The authors concluded that the method of reporting VAP rates has a significant impact on the risk estimates. They further emphasize that clinicians and hospital management in charge of patient care policies should be aware of how to read and compare nosocomial infection rates and become familiar with the underlying concepts of infection control and its potential role for prevention. They argue that failure to recognize these issues will lead to biased comparisons and compromise meaningful benchmarking between healthcare institutions.

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