of time exposed to risk. This type of rate can also be used for calculating procedure/device specific rates. An example would be the number of patients with central line bacteremias *as* the numerator and the number of days of central lines in place in the population during the same time period as the denominator. However, this rate still does not account for the additive effect on infection of underlying disease.

The use of hospital-wide infection rates are of little use in describing problem areas or in assessing preventive measures. Gathering site or procedure specific data, including risk factors, will provide much more useful information for utilization in individual health care institutions. In the past, we used incidence rates to describe a problem in our institutions without comparing patients who were infected to those who were not infected. Without this important comparison, disease causation truly cannot be evaluated. By using procedure specific information and comparing the pertinent risk factors of infected and noninfected, we can more carefully evaluate the causes of nosocomial events.

As the science of hospital epidemiology continues to mature, we expect to see our rates become even more specific as we begin adjusting for severity of illness. This will become possible because of the fact that hospitals will have data bases with severity of illness indexes to enable them to provide more accurate outcome measurement statistics to outside agencies. By having these data available, we will be able to further refine our statistics and have data that can be used for comparisons between hospitals following statistical adjustment for severity of illness. Without such adjustment, the inter-hospital comparisons may not be valid.

The majority of infection control epidemiologists agree that we need a standardized system for measuring infection risk and prevention activities, but the standard only now is being developed. Research activities are ongoing to determine appropriate severity of illness indexes to use in the adjustment of rates. No matter what method is used for calculation of rates, comparisons between hospitals will not be possible unless there is standard application of surveillance definitions when determining infection. A study is also underway to evaluate the reliability and validity of infection surveillance data in a random sample of infection control practitioners.

As a more direct answer to vour questions, no there is not a universal way to calculate infection rates. Yes, one is needed to enable valid comparisons between health care institutions. And finally, at the current time the best formula for calculating infection rates in both acute and long term facilities would be the use of number of patient days × 1000 in the denominator. To provide more detailed information on which to base and evaluate preventive measures, use procedure/device specific rates with the denominator reflecting which patients truly are at risk for that infection and then compare those who got infected with those who did not. If possible, adjust your data for severity of underlying disease in your patients.

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Blood Culture Collection and Needle Punctures in Healthcare Workers

To the Editor:

In the past, a common practice in collecting blood cultures has been removing the needle from the syringe after performing the venipuncture and/or after inoculating the first of two culture bottles with blood, in order to decrease the likelihood of contaminating the culture with skin or environmental bacterial flora. Recently, a physician in our hospital sustained a puncture wound on the hand from a needle used to collect a blood specimen for culture from a patient with acquired immunodeficiency syndrome (AIDS). She was attempting to remove the unsheathed needle from the syringe in order to replace it with a new needle to inoculate the culture bottle. In our hospital, the Infection Control Office has no specific recommendations on the technique for collecting blood cultures, other than the general recommendation to avoid recapping needles. The Department of Clinical Pathology does set forth guidelines for specimen collection in their procedure manual. However, their guidelines address the issue of aseptic technique in specimen collection, but not avoidance of needle puncture injuries. When questioned, a number of our houseofficers expressed the belief that they were expected to change needles when drawing blood cultures, despite their awareness of the recommendation to avoid recapping or otherwise manipulating needles.

To determine whether this problem existed only in our hospital or was more widespread, we contacted the chief infection control nurse at each of four east coast university hospitals and one large local community hospital with residency training programs in several specialties. The nurses at all four of the university hospitals surveyed stated that persons drawing blood cultures in their respective institutions changed needles after performing the venipuncture and before inoculating the culture bottle. One stated that it was recommended to remove the unsheathed needle from the syringe with a hemostat. Two others stated that it was recommended to recap the needle by resting the cap on a firm Hat surface with one hand and gently guiding the needle into the cap with the other. The nurse at the community hospital was not aware of any healthcare workers changing needles during blood culture collection in her institution. The infection control nurses also were asked if there was a specific policy regarding the technique for the collection of blood cultures in their institution. In no instance was there a policy or procedure guide-

line from the Infection Control Office, although most institutions had a Clinical Pathology procedure manual that stressed aseptic technique in specimen collection. One university hospital emergency department had a departmental procedure manual that required changing needles when drawing blood cultures.

Manipulation of the needle on a syringe (attempting to re-sheath the needle or to remove the unsheathed needle) is among the most common causes of needle puncture injuries in healthcare workers.[1,2] Authorities from the Centers for Disease Control (CDC) have recommended that healthcare workers avoid this practice." Yet our experience in our own hospital and our small survey of other teaching hospitals suggests that this practice is not uncommon in the collection of blood cultures. Also, it is desirable to collect blood cultures in a manner that will minimize contamination and avoid false-positive test results.

We have recently recommended the following guidelines to persons who draw blood cultures in our hospital:

- A site for venipuncture should be selected, and the skin should be scrubbed with an antiseptic. Effective antiseptics for skin disinfection include 70% ethyl or isopropyl alcohol, 2% tincture of iodine, povidone-iodine (e.g., Betadine), and 0.5% chlorhexidine in alcohol (e.g., Hibitane tincture and others).[4-7] One commonly suggested regimen involves the application of alcohol followed by povidone-iodine.[8-11] Since disinfection requires adequate contact time, it is preferable to wait about one minute before drawing the blood.
- The rubber stoppers on the blood culture bottles are not sterile and should also be disinfected with 70% alcohol.
- Sterile gloves should be worn to avoid possible contact with blood, as well as to prevent contamination of the site while palpating the vein.
- After drawing blood with a needle and syringe, the same needle should be used to inoculate one aerobic and one anaerobic culture bottle.
- After inoculating both bottles, the needle and syringe should be placed in the appropriate waste disposal container as a unit, without attempting to remove the needle from the syringe. The needle should never be left at the patient's bedside. Blood on the outside of the bottle should be wiped off with alcohol before sending the bottle to the microbiology laboratory. Gloves should be discarded into an appropriate waste container in the patient's room.

We hope that adherence to these guidelines will reduce the frequency of needle puncture injuries to healthcare workers in our hospital.

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Letters to the Editor should be addressed to INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY Editorial Offices, C41 General Hospital, University of Iowa Hospitals and Clinics, Iowa City, IA 52242. All letters must be typed, double spaced and may not exceed four pages nor include more than one figure or table. The editors reserve the right to edit for purposes of clarity or brevity.

Correction

In the article "Indications for Alcohol or Bland Soap in Removal of Aerobic Gram-Negative Skin Bacteria: Assessment by a Novel Method" (July, 1989; pp. 306-310), Table 1 should have appeared as it does here instead of how it appeared on page 309. The editors regret the error.

Table 1
Amount of Health Care Worker (HCW) Hand Pickup of Aerobic Gram-Negative Bacilli (AGNB) After Contact With Source Carrier, By Level of Carriage

Carriage Source Lever H C W Pickup†	≤3	≥4
0	13	1‡
≤2	9	7
≥3 to <4	2	a
≥4	0	8**
	24	24

* Log_{10} AGNB number per ml of stripping fluid
† Log,, AGNB number per ml of glove juice fluid
‡ Comparison of proportion of tests showing HCW pickup at different carrier source levels: p<0.001, Fisher's exact test
** Comparison of proportion of tests showing HCW pickup at different carrier source levels: p=0.007, fisher's exact test