Compliance With Universal Precautions Among Pediatric Residents

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Background: There are few data on the rate of compliance with universal precautions among pediatricians. We hypothesized that compliance in pediatrics would be poor because of the intrinsic difficulties in performing invasive procedures in small subjects.

Design: Prospective, observational study.


Study Participants: A convenience sample of pediatric house staff.

Main Outcome Measures: Pediatric house staff members were observed while performing invasive procedures. Procedure type, number of attempts required, and patient’s age and diagnosis were recorded. Degree of compliance with universal precautions was judged by means of Centers for Disease Control and Prevention guidelines. Comparisons between the compliant and noncompliant groups were analyzed by $\chi^2$ and 2-tailed t test.

Results: A total of 128 procedures performed by 43 house officers, 4 advanced medical students, and 3 chief residents or fellows were observed. Sixty-nine (53.9%) of the 128 procedures were performed correctly according to universal precaution guidelines. Rate of compliance did not appear to be influenced by small patient size, as judged by the lack of association with the age of the patient (mean±SD, 4.8±5.7 years among those in whom universal precautions were properly used vs 4.9±5.4 years among patients in whom precaution guidelines were breached; $P=.96$). Moreover, the number of attempts required in compliant procedures (1.31±0.53) was almost identical to that in noncompliant procedures (1.28±0.49; $P=.73$). Additionally, compliance did not improve with advanced level of training.

Conclusions: Failure of compliance among pediatricians has no apparent association with procedure difficulty, and compliance rates continue to be poor through the course of pediatric training. These findings underline the need for effective education concerning universal precautions throughout pediatric residency, and they suggest that such efforts will not be precluded by obstacles intrinsic to performing invasive procedures on young subjects.


Editor's Note: The aberrant 100% compliance with universal precautions for lumbar puncture is intriguing. Is it caused by (1) concern for the patient rather than “self,” (2) even the oldest faculty member was taught to do it that way (nothing new), or (3) something less obvious? Any thoughts?

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SUBJECTS, MATERIALS, AND METHODS

The study was performed at a tertiary care children's hospital in the American Midwest between December 1, 1995, and March 31, 1996. All pediatric house staff members employed in this hospital are instructed on the proper use of gloves and other aspects of universal precautions during a mandatory in-service at the beginning of internship. The in-service lasts approximately 1 hour and is administered by hospital infection control nurse practitioners. Appropriate use of gloves is discussed in detail; eye protection is recommended for any procedure likely to generate an aerosol. Latex gloves are readily available in all treatment areas.

Procedures were observed by 3 of us (S.M., H.G., and R.G.) on a convenience sample of house officers in the emergency department and on the inpatient wards. Observations were recorded during both the day and evening hours. To avoid introducing bias into resident behavior, subjects were told that they were being observed to study physician-patient interactions during painful procedures. The residents were assured that participation was voluntary, that the observations would be recorded by means of coded numbers instead of physician names, and that the results would not be used punitively. There were no refusals. The study was approved by the Institutional Review Board of University Hospitals of Cleveland, Cleveland, Ohio, which waived the requirement for informed consent.

For each observation, the following data were collected: type of procedure, whether gloves and protective eyewear were appropriately used, blood-skin contact, blood–mucous membrane contact, year of training of the resident, and patient age and diagnosis. Additional variables were recorded by means of definitions established before the beginning of the study. Patients were judged to be at high risk for infection with a blood-borne pathogen if they carried an established or suspected diagnosis of hepatitis or HIV infection or if they had a history of an illness that frequently required multiple blood transfusions, such as hemoglobinopathy, prematurity, or repaired congenital heart disease. The resident was designated as “busy” if, while he or she was in the emergency department, there were 8 or more patients waiting to be seen at the time of the observation (matching the number of examination rooms in that unit), or if, while on the inpatient wards, the resident was observing 10 or more patients.

Subjects were judged compliant with universal precautions according to Centers for Disease Control and Prevention guidelines. Specifically, gloves were required for venipunctures, arterial blood sampling, intravenous catheter (IV) placement, and lumbar punctures, and gloves and protective eyewear were required for irrigating and suturing a laceration. The resident was recorded as compliant only if protection was used throughout the entire procedure. The observation was judged noncompliant if gloves were intentionally torn to aid palpation of landmarks. Compliant and noncompliant groups were compared by χ² for discriminant variables and by 2-tailed t test for continuous variables.

RESULTS

A total of 128 procedures performed by 43 residents (of a total of 67), 4 advanced medical students, and 3 chief residents and fellows were observed. The numbers of procedures observed by year of training were as follows: 5 by advanced medical students, 55 by interns, 41 by second-year residents, 23 by third-year residents, and 4 by chief residents or fellows. The mean number of observations house officer was 2.5, with a median of 2 and a range of 1 to 6. A total of 65 procedures were observed in the emergency department and 63 on the inpatient wards.

Overall, compliance with universal precautions was recorded in 69 (53.9%) of the 128 observations. There was no difference in compliance rates between procedures performed in the emergency department and those completed on the inpatient wards (55.4% vs 52.4%, respectively). Compliance rates differed significantly according to procedure (Table). All suture procedures were judged noncompliant because of the uniform omission of protective eyewear while the wound was irrigated, although gloves were used in all instances. Excluding suture placement, compliance during IV placement was significantly worse than for other procedures (Table). Blood-to-skin contact was noted in 17 procedures. All blood-to-skin contact occurred when universal precautions had been breached. Twelve of these instances of blood-to-skin contact occurred during IV placement. No blood-to-mucous membrane contact was experienced.

There was little evidence that the intrinsic difficulty of performing procedures in small patients was the principal obstacle to complying with universal precautions. Specifically, there was no association between patient age and noncompliance. The age of the patients in whom compliance was observed (mean±SD, 4.8±3.7 years) was nearly identical to that of patients in whom compliance was breached (4.9±5.4; P=.96). Indeed, the rate of compliance during procedures performed in patients younger than 1 year (27/41 observations [65.9%]) exceeded the rate during procedures performed on older patients.
Universal precaution guidelines were developed to prevent the transmission of infections borne in the blood and other body fluids to health care workers. Since their introduction, they have become standard operating procedure in all medical facilities. Recognizing the particularly high risk incurred in the emergency department setting, previous studies examining compliance with universal precautions have concentrated on their practice among emergency medical services staff and emergency department personnel. These studies have documented a wide range of compliance rates. Appropriate use of gloves has been recorded in 44% to 98% of procedures. A national survey of hospital-based workers documented poor compliance with universal precautions among pediatric house staff a decade and a half after the recognition of the threat of HIV transmission through blood contact. There was little evidence that poor compliance rates were associated with the unavoidable difficulty of performing invasive procedures in small patients. Specifically, compliance had no apparent relationship to patient age, as would be expected if the principal barrier to universal precautions were the intrinsic difficulty in performing procedures on small subjects. Moreover, compliance with universal precautions was not influenced by the apparent difficulty of the procedure, as reflected by the number of attempts required for its completion.

This study was conducted in the Midwest, where the prevalence of pediatric HIV infection is low; compliance with universal precautions in areas where HIV infection is more commonplace may be higher than those recorded here. Additionally, this study was limited by the inherent difficulties in defining some of the potential mediators of compliance with universal precautions. For example, while the number of attempts made to complete a procedure was used as a reflection of its difficulty, this variable certainly was influenced by other factors as well, such as the skill of the operator and the abilities of the assistant. Similarly, the definitions of “busyness,” although commonsensical and established prospectively, were arbitrary and could not entirely reflect the acuity and stress of a particular resident’s day. The observation that senior residents adhered no better to universal precautions than those more junior also may have been influenced by unrecorded factors. For example, the most difficult procedures may have been referred to the more senior house staff, and their poor compliance may have been a reflection of their perceived or real requirement for increased dexterity. Even assuming a legitimate underlying reason for the poor compliance among senior house staff, however, this observation is particularly troublesome, since the senior residents set an example for the interns and second-year personnel. Moreover, it is possible that their poor compliance may have been merely a reflection of diminished commitment to proper practice. Indeed, previous studies also have documented relatively poor compliance among more experienced nurses and higher-level emergency medical services staff compared with their less-experienced counterparts.

These data underline that, despite both public and professional awareness of the dangers of blood-borne pathogens, compliance with universal precautions is poor among pediatric house staff. The lack of association with the technical challenges inherent in pediatric procedures suggests that this poor compliance is amenable to correction. Interventions to increase compliance with universal precautions have had mixed and temporary results, but some studies have suggested that per-
sonnel, particularly those who are less seasoned, may be positively influenced. The observations documented in this study emphasize the need to test such interventions in pediatric practice.

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REFERENCES


