Patterns of Needlestick and Sharps Injuries Among Training Residents

Needlestick and sharps injuries (NSIs), a common occupational hazard for health care workers, are serious due to seroconversion risk. According to the US Centers for Disease Control and Prevention, more than 385,000 needlestick injuries occur annually among US hospital employees. Current research on residents is sparse and conflicting. Needlestick and sharps injuries have been reported highest during the first postgraduate year (PGY), but studies have relied on self-reported data or a small sample of residents in single institutions. Other investigations have not found a pattern of NSIs by PGY level. This study systematically examined whether NSIs varied by PGY level and described patterns of NSIs among house staff.

Methods | After institutional review board approval from Mercy Health Youngstown, the NSIs reported to infection control departments by residents between January 2000 and June 2014 were reviewed. During this period, the hospital trained 924 residents. Tabulation of standard incidence rates by program, PGY level, and other variables was undertaken. Data were analyzed using χ² goodness-of-fit testing with a significance level of .05.

Results | One hundred twenty-nine NSIs were reported (67 occurred during the first year of postgraduate education; 37 during PGY-2; 16 during PGY-3; 7 during PGY-4; and 2 during PGY-5). Incidence of NSIs among first-year residents was higher than expected (χ² goodness-of-fit statistic = 15.889 and P = .003; Figure 1). Of the 67 NSIs that occurred during the first year of training, 42 (62.7%) occurred during the first 6 months.

When NSIs were examined by program, the highest rates were found in dental residents (30.6%; 22/72) and obstetrics and gynecology residents (28.9%; 13/45). Surgery residents also exhibited a high incidence of NSIs (18.5%; 41/222). Lower incidence rates of NSIs were found among internal medicine (12.7%; 47/369) and transitional medicine (3.3%; 1/30) residents. Family medicine residents were the least likely to be injured (2.7%; 5/186).

The anatomical locations of the NSIs appear in Figure 2. Common sites for NSIs were the left index finger (19.4%; 24) and the left middle finger (16.9%; 21). The right ring finger was the least common site of NSIs (0.8%; 1). Left-handed NSIs were more prevalent than right-handed NSIs (80 vs 44, respectively). Five injury reports did not identify the site of the injury.

The most prevalent instrument for NSIs was the suture needle (43.4%; 56). Other common mechanisms were scalpels (11.6%; 15) and blood gas syringes (10.1%; 13). Sixteen source patients were seropositive for hepatitis C (12.4%); and 1 patient tested positive for hepatitis B. No cases involved human immunodeficiency virus. No seroconversion occurred in any cases.

Discussion | Systematic analysis of resident experience is lacking. This study, the largest nonsurvey series reported to date, adds to available knowledge on resident experience.
NSIs. The first 6 months of the intern year was the most common period for NSIs, previously unreported in the literature.

Dental residents were more likely to experience an NSI than other trainees, in contrast to literature findings that suggest surgery residents are at greatest risk.\textsuperscript{3} Previous literature excludes dental trainees. Dental residents may be more likely to experience an NSI based on the nature of their work (i.e., the dark oral cavity with difficult illumination and learning mirrored image procedures).

Resident education and training during orientation may reduce risk. For new residents, additional procedural skill simulation using sharp instruments may decrease NSI. However, a majority of residents felt comfortable in procedures with instruments causing injury.\textsuperscript{3} Despite resident-reported mastery, caution to avoid both overconfidence and decreased attention to NSI risk is warranted.

We found that PGY-1 residents, especially during the first 6 months of training, are at greatest risk of NSI. Highest injury rates were observed for dentistry, obstetrics and gynecology, and surgery. Source patient seropositivity was low in this series. Simulation training during orientation and timeout reminders may increase procedural experience, decrease complacency, and reduce NSIs.

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**Internal Medicine Resident Computer Usage: An Electronic Audit of an Inpatient Service**

In addition to direct patient contact, residents are responsible for communication, order entry, data review, and documentation. With more patient care being facilitated through computers today, there is increasing concern that little time remains for direct patient contact and education.\textsuperscript{1} Electronic health record (EHR) audit reports can provide granular information about workflows, and are being increasingly used to investigate trainee practices.\textsuperscript{2}

Herein, we examine resident behavior on an inpatient general medicine service to describe how trainees use the EHR system as residents balance education and patient care.

**Methods** | Our institution uses the EPIC EHR system. In March 2015 we retrospectively analyzed all time-stamped electronic actions logged between June 25, 2013 and June 29, 2014, by internal medicine house staff at a large academic university hospital by institutional EHR audit. Actions corresponded to behaviors performed on the EHR, recording activities as clinicians move through various parts of the medical chart. These included, but were not limited to, reviewing medical charts, placing orders, accessing laboratory results, and generating notes. Data were extracted with our institutional informatics platform\textsuperscript{3} and linked with residency scheduling information. Bedside computers are reserved for nursing duties while physician workstations are located in separate workrooms. This study was reviewed and approved by the Stanford Administrative Panel on Human Subjects in Medical Research.

Consecutive actions were considered part of a single computer session if they were separated by less than 5 minutes of inactivity. Because patient information is updated through EHR sign-out during transitions of care, total working time was calculated as the difference between the first and last action recorded each day. Data processing was performed with Python software, version 2.7, and R, version 2.13. P values for numerical and count data were calculated by 2-tailed t tests and Fisher exact tests, respectively, with significance thresholds of .05.