

Occupational Health

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Acceptance and Completion of HIV Post-exposure Prophylaxis by Healthcare Workers Following Blood and Body Fluids Exposures

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Background:

Occupational exposures to blood and body fluids (BBF) put healthcare workers (HCW) at risk for infection with bloodborne pathogens (BBP). Post-exposure prophylaxis (PEP) is recommended after significant exposures to HIV+ source patients.

Objective:

To assess acceptance and completion of PEP among HCWs over two 2-year periods (Period 1 [P1]: 1997-1998 and Period 2 [P2]: 2003-2004) to estimate the impact of the introduction of rapid HIV testing and a post-exposure management program.

Methods:

A retrospective cohort study was conducted at Grady Memorial Hospital, a public teaching hospital in Atlanta, GA. A comprehensive review of BBF post-exposure management resulted in the implementation of rapid HIV testing and interventions to improve appropriate case management in P2. Standard ELISA serologic testing was used for source patient testing during P1 and rapid HIV testing was utilized beginning in March, 2003 of P2.

Results:

510 BBF exposures (367 [72%] due to sharps) were reported to Employee Health Services in P1 and 619 (443 [72%] due to sharps) were reported during P2. The most common sharps devices associated with exposures included hollow bore needles (50% in P1 and 53% in P2), suture needles (13% in P1 and 18% in P2) and butterfly needles (11% in P1 and 16% in P2). Housestaff had significantly higher rates of exposures (18.68 per 100 person-years worked during P1 and 24.21 during P2) compared to nurses (14.92 per 100 person years worked during P1 and 6.51 during P2) in P2 ($p < .0001$). The rate of exposure for nurses significantly decreased from P1 to P2 ($p < .0001$), but significantly increased for housestaff ($p < 0.01$). The overall prevalence of BBPs among source patients during P1 and P2 was 20% for HIV, 15% for HCV and 3% for HBsAg+; there was no significant difference in prevalence between the two time periods. The overall prevalence of having any BBP was 29%. PEP was offered to 171 (34%) HCWs in P1 and 125 (20%) in P2 ($p < .0001$). PEP was discontinued after source patient HIV serology was determined to be negative in 44 (47%) of HCWs who accepted PEP in P1 and 17 (21%) in P2 ($p < .001$). Overall, 55% (94/171) of HCWs accepted PEP in P1 and 66% (82/125) accepted in P2 ($p < .0001$). Among HCWs with HIV+ or unknown source patient status offered PEP, 75% (50/67) accepted in P1 and 76% (65/86) accepted in P2. Among the HCWs who initiated PEP, the proportion who completed 4 weeks increased from P1 [36% (18/50)] to P2 [69% (45/65)] ($p < .001$).

Conclusions:

A high prevalence of HIV and HCV infection was noted among BBF exposure source patients at our hospital. The highest rate of exposures occurred among housestaff physicians. Overall, HCW acceptance and completion of PEP increased significantly over time, possibly due to improved post-exposure case management. The introduction of rapid HIV testing of source patients resulted in fewer HCWs unnecessarily initiating PEP.

262 Reduction of Sharps Injuries in the Operating Room Following Implementation of a CDC-recommended Sharps Injury Prevention Program

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Background:

Sharp object injuries (SOI) occur in 1.7%-15% of all surgeries and place health care workers (HCWs) at risk for blood borne infections. SOI in the operating room (OR) are commonly not reported. We identified opportunities to decrease SOI in the OR at our hospital by promoting use of blunt suture needles, protective corks on surgical wires and the neutral zone for passing sharps.

Objective:

To assess the impact of utilizing the *CDC Workbook for Designing, Implementing and Evaluating a Sharps Injury Prevention Program* to develop and implement targeted interventions to reduce SOI in the OR.

Methods:

We assessed OR sharps injury data for Grady Memorial Hospital (GMH), an urban university-affiliated public hospital, prior to (2004) and after (2005) implementation of a targeted educational and training interventions program.

Results:

In 2004, 61 (30%) of 206 reported SOI at GMH occurred in the OR, and in 2005, 34 (16%) of 209 reported SOI occurred in the OR. The rate of reported SOI significantly decreased following implementation of the program, from 6.7 per 1000 OR procedures (61/9052) to 3.8 per 1000 OR procedures (34/8815) ($p < 0.01$). Decreases in SOI were seen among attending physicians (from 11 [18%] in 2004 to 3 [9%] in 2005), mid-level providers (from 5 [8%] to 0), and surgery technicians (from 14 [23%] to 4 [12%]). Suture needles (chiefly curved suture needles) accounted for the highest proportion of SOI in the OR: 29 (48%) in 2004 and 20 (61%) in 2005. SOI from wires had the largest decrease in proportion of SOI: from 7 (13%) in 2004 to 1 (2%) in 2005. HIV infection among source patients was similar in both years 5 (8%) in 2004 and 4 (12%) in 2005.

Conclusions:

The rates of reported SOI are consistent with underreporting in both years. However, the consistent proportion of HIV infection in source patients suggests the observed decrease in SOI rate in 2005 did not result from a change in reporting behavior of HCWs due to the perceived risk of source patient HIV infection. A targeted educational and training intervention that focused on identifying devices, occupational groups and time of injury in

the OR significantly reduced the number and rate of reported SOI in the OR. Further interventions will target the use of blunt suture needles when possible and the implementation of a safer suturing device that reduces sharps exposures from curved suture needles to further reduce the risk of SOI. Additionally, educational efforts will highlight the importance of SOI reporting.

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Healthcare Personnel Ability to Recall Previous Tetanus-Containing Vaccine Prior to Tdap Vaccination During a NH Respiratory Outbreak

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Background:

Tdap is recommended for health-care personnel (HCP) aged <65 yrs who received Td/TT ≥ 2 yrs earlier (routine HCP). There is little data validating HCP ability to accurately report vaccination history. As part of a study of Tdap safety during a hospital vaccine campaign that was instituted because of a possible pertussis outbreak, we sought to validate HCP responses.

Objective:

To measure HCP ability to report the interval from last Td/TT.

Methods:

We surveyed (paper/electronic) HCP vaccinees to assess safety of Tdap during the 2 weeks after Tdap. Within this survey, we included a request to report time since last Td/TT (≥ 2 yr vs <2 yr), and requested the date of vaccination. The sample studied were respondents who 1) reported the interval; 2) had any vaccination history in their electronic medical record.

Results:

Overall, 4524 (72%) HCP at this hospital received Tdap; 2518 (56%) completed surveys (79% female, median age 45 yrs [range 17-83]); 2315 (92% of respondents) included information about last Td/TT on their survey: 266 (10.6%) reported having had a Td/TT <2 years ago. Of the 2315 respondents with Td/TT information, 328 (14.2%) had previous vaccination information in their medical record. Characteristics of these 328 were similar to the overall respondent population (83.5% female, median age 50 yrs [range 18-74]). The medical record of 299 (91.2%) of the study population verified the reported Td/TT interval. Of the 29 whose record did not confirm their report, 19 (65.5%) reported they had received Td/TT <2 years before while the medical record showed ≥ 2 years.

Conclusions:

The majority of HCP in this setting of a vaccination campaign were able to accurately report their history of previous Td/TT. Our findings suggest similar vaccination campaigns using Tdap can rely on HCP report.

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Effect of a Safety-engineered Phlebotomy Device on Activation Compliance and Sharps Injury

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Background:

400,000 percutaneous injuries (PI) occur in US hospital workers yearly, resulting in potential transmission of bloodborne pathogens and significant cost.

Objective:

Determine the effect of a safety-engineered blood collection set on safety-feature activation and PIs.

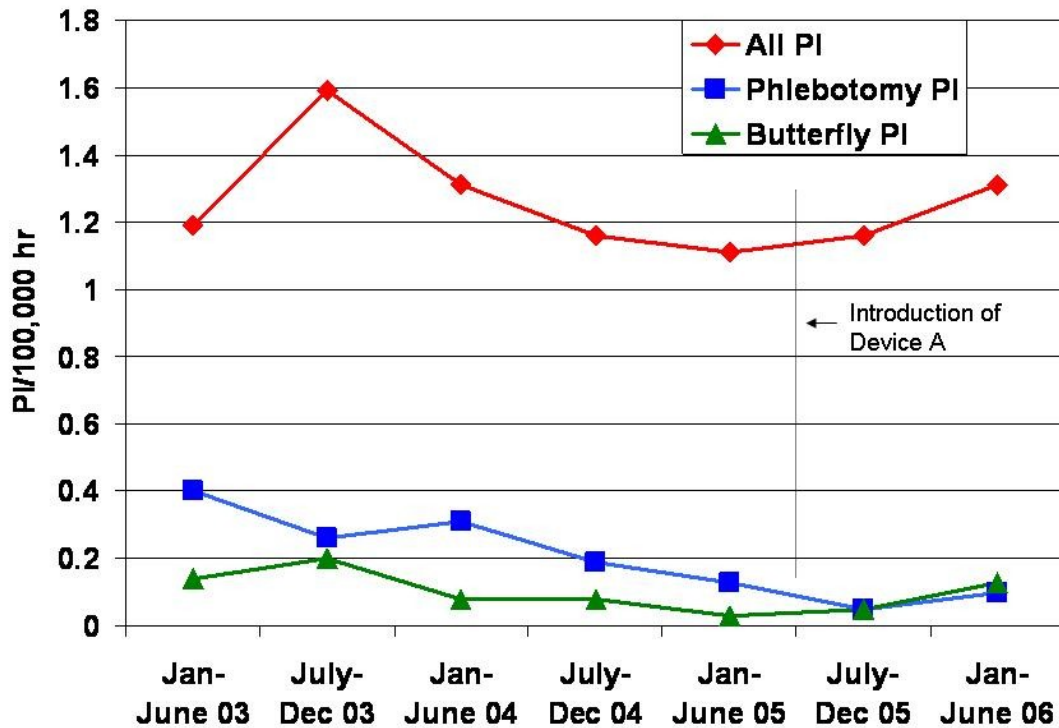
Methods:

In July 2005, device (A): BD Vacutainer® Push-Button Blood Collection Set (Becton Dickinson, Franklin Lakes, NJ) replaced device (B): Punctur-Guard® Winged Blood Collection Set (Bio-Plexus, Vernon, CT). Safety feature activation was assessed by examination of sharps disposal boxes content at baseline, 1 mo, 3 mo, 6 mo, and 12 mo following device introduction. A confidential survey administered to phlebotomists at baseline and 3 months after introduction of device A was performed to assess attitudes regarding safety-engineered devices and PI reporting. PIs were monitored by the Employee Health Dept.

Results:

At baseline, the activation rate for device B was 74.3% (371/499) and was 87.8% (396/451), 96.8% (456/471), 95.7% (627/655), and 97.6% (601/616) at 1 mo, 3 mo, 6 mo, and 12 mo, respectively for device A ($p < 0.1$ at each time point relative to device B at baseline). 58 (97%) phlebotomists completed the baseline survey. Four (7%) had experienced a PI in the past 12 months and 100% indicated that they had reported the PI. 47% experienced a total of 1-5 PIs ever while working as a phlebotomist and 52% reported no previous PIs. PI was significantly associated with age ($p = 0.009$) and number of years as a phlebotomist ($p=0.002$). 96% believed that safety-engineered devices reduced the risk of PI and 89% reported always activating the safety feature. Three months following device A introduction, 61 (100%) phlebotomists completed the post-introduction survey. 95% indicated satisfaction with device A, and 97% indicated that the safety feature was easier to activate than device B. As shown in figure 1, the rate of all PIs (injuries per 100,000 hours worked) remained constant following adoption of device A (mean 1.27 ± 0.19 to 1.24 ± 0.11 , $p = 0.6$). The rate of PI associated with phlebotomy decreased following adoption of device A (mean 0.26 ± 0.1 to 0.08 ± 0.04 , $p = 0.02$). However, the rate of PI specifically reported to involve butterfly needles did not

change substantially (mean 0.11 ± 0.065 vs 0.09 ± 0.057 , $p = 0.5$).



Conclusions:

Device A was well accepted and safety feature activation was judged to be easier. Safety feature activation increased after introduction of device A and was sustained for 12 mo. PIs associated with phlebotomy decreased after introduction of device A. PIs specifically noted to involve butterfly needles did not change appreciably, but limited statistical power precludes a conclusion regarding the impact of device A on butterfly needle associated PIs.

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Assessing Noncompliance with Influenza Vaccine in Healthcare Workers

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Background:

Nationally, only 40% of healthcare workers (HCWs) receive influenza vaccine each year. JCAHO recently mandated that hospitals annually evaluate vaccination rates and reasons for noncompliance, and to implement enhancements to the vaccine program to increase participation.

Objective:

To determine reasons for HCW noncompliance with influenza vaccination.

Methods:

In October 2006, our 820-bed academic medical center offered inactivated influenza vaccine to HCWs over all shifts during a 6-day period in a convenient, central location. These sessions resulted in the vaccination of 46% of our ~8,000 HCWs. In order to assess reasons for not receiving vaccine, a simple 3-question online survey was sent via email link to 4,295 HCWs who did not receive vaccine.

Results:

580 (13.5%) of the unvaccinated HCWs responded to the survey. Reasons for not receiving the vaccine were: conflicting work or personal obligations (21%), plans to receive the vaccine elsewhere (16%), fear of side effects (12%), vaccine felt not to be needed based on rarely getting influenza (11%), fear of acquiring influenza from the vaccine (9%), had an acute illness when the vaccine was offered (7%), contraindications for vaccination (5%), and fear of needles (2%). Miscellaneous other reasons were cited by 12%. 15% reported they would be interested in receiving the intranasal vaccine. Following the vaccine clinics, HCWs were notified that live intranasal vaccine was available; however, only 1 HCW opted to receive it.

Conclusions:

If the HCWs responding to the survey are representative of all HCWs not receiving vaccine: (1) offering additional opportunities for vaccination could potentially reduce unvaccinated HCWs by 28%, (2) additional educational opportunities could reduce noncompliance by 32% maximally, and (3) fear of needles is not a major factor in noncompliance with influenza vaccination and our HCWs showed little interest in intranasal influenza vaccine.

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Healthcare Workers' Knowledge and Attitudes about Pertussis and Pertussis Vaccination

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Background:

To reduce the risk of spread of pertussis within healthcare institutions, healthcare workers (HCWs) are recommended by the Centers for Disease Control and Prevention (CDC) to receive a dose of acellular pertussis vaccine.

Objective: HCWs were surveyed to determine their knowledge and attitudes about pertussis and pertussis vaccination.

Methods:

Eligible participants included all HCWs employed at Vanderbilt University Medical Center (VUMC) who stated that they participated in direct patient contact. Participants were recruited through institutional electronic mail to complete a self-administered, web-based survey that assessed their intent to receive pertussis vaccine, their attitudes about the vaccine, and their perceptions about pertussis disease.

Results:

Recruitment messages were sent to approximately 13,000 VUMC employees. The number of those employees who participate in direct patient contact is unknown. A total of 1,819 surveys were completed. Most respondents did not plan to receive the pertussis vaccine (N = 1281, 70%), and only 13% of respondents planned to receive or reported receiving the vaccine within the previous year. Of those 13% stating that they would be vaccinated, reasons cited included: protection of patients (88%) and family (83%) from contracting pertussis, pertussis is a severe disease (77%), and perception of a significant risk of contracting pertussis (48%). Reasons cited by those not planning to be vaccinated included: no one recommended the HCW be vaccinated (80%), vaccination as a child (55%), and perception of no significant risk of contracting pertussis (41%). Multivariate logistic regression analysis identified four significant predictors of intent to receive the pertussis vaccine: belief that HCWs may spread pertussis to patients and family, encouragement by a coworker to be vaccinated, physician recommendation for vaccination, and awareness of CDC recommendations for pertussis vaccination of HCWs (Table).

Variable	OR	95% CI	p
Yes: "A physician recommended that I get the vaccine."	9.14	[5.59 - 14.94]	<0.001
Yes: "The CDC recommends the pertussis vaccine for all healthcare workers with direct patient contact."	6.75	[4.64 - 9.83]	<0.001
Yes: "A coworker encouraged me to get the vaccine."	4.72	[2.47 - 9.03]	<0.001
Strongly Agree: "I may spread whooping cough to my patients or family."	1.72	[1.12 - 2.66]	0.01
Only significant factors on univariate analysis were included in the multivariate analysis.			

Conclusions:

Few HCWs intended to receive the pertussis vaccine. Perceived lack of recommendation for vaccination and misconceptions about pertussis and pertussis vaccination were cited as reasons to not receive the vaccine. HCWs planning to be vaccinated were more likely to have been recommended to receive the vaccine by coworkers and physicians, to report awareness of CDC recommendations for pertussis vaccination of HCWs, and to strongly agree they may spread pertussis to patients or family. Institutional pertussis vaccination campaigns should focus on the risks of nosocomial pertussis and new recommendations for pertussis vaccination.

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Pertussis Vaccination Can be Successfully Combined with an Employee Flu Vaccination Program

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Background:

Pertussis is emerging as an important cause of morbidity in adolescents and adults and several outbreaks have been reported in healthcare settings. In 2005, a tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine (Tdap) was licensed in the United States for use in persons aged 11-64 years. The Centers for Disease Control

(CDC) recommend a single dose of Tdap for all healthcare workers. Providing Tdap vaccination at employee influenza clinics is one way to reach large numbers of healthcare workers, but there has been concern that this approach may interfere with the successful delivery of influenza vaccine.

Objective:

To assess the impact of adding the Tdap vaccine to the annual employee influenza vaccination program.

Methods:

Annual employee flu vaccination at our institution is accomplished primarily through large-scale clinics conducted over a 3 week period in the employee cafeterias. These clinics are supplemented by peer vaccination programs and mobile carts. In 2005 and 2006, Tdap was offered at all of these venues, in addition to the influenza vaccine. Employees who had not received a tetanus and diphtheria toxoid (Td) vaccine in the past 5 years and had no contra-indications to Tdap were eligible to receive Tdap in 2005. The minimum Td-Tdap interval was decreased to 2 years in 2006 as per the CDC recommendation.

Results:

During the 2005-6 influenza season, 19,982 doses of flu vaccine were administered to employees at the cafeteria clinics along with 5,626 doses of Tdap. During the 2006-7 season, 21,164 doses of influenza and 4,362 doses of Tdap vaccine were administered. The process was streamlined by an internet-based eligibility form that employees could pre-fill and by on-site access to the electronic medical record whereby the date of the last Td could be verified. Employee flu vaccination rates were 72% and 73% in 2005-6 and 2006-7 respectively. This was comparable to employee flu vaccination rates in previous years (range 40-77%).

Conclusions:

Employee influenza vaccination rates were not negatively impacted by adding Tdap to the flu vaccine clinics. Employees appreciated the opportunity to receive both vaccines at the same time. Education about Tdap and access to the immunization data in the electronic medical record were key to the success of the program.

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Sharps Injuries Occurring with the Use of Safety Devices: Providing Safer Devices is Not Enough

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Background:

Sharps injuries are common and can put healthcare workers at risk of acquiring blood-borne infections. Safety devices are now in widespread use to prevent some of these injuries. Most of these safety devices require an activation step before the safety feature is engaged. If safety devices are not activated or are incorrectly activated, sharps

injuries can occur.

Objective:

To assess missed opportunities to prevent sharps injuries by the failure to activate safety devices and to assess injuries occurring during device activation.

Methods:

Sharps injuries occurring at Emory Crawford Long Hospital, Emory University Hospital and Grady Memorial Hospital during 2005 were studied using the CDC Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program. Results: Safety devices used included disposable syringes, butterfly needles, IV catheter stylets, vacutainer needles, and scalpels. In most locations of the hospitals, the safety device was the only one in use (except scalpels). 435 sharps injuries occurred during 2005 including 243 needlestick injuries, 102 suture needle injuries and 90 other sharp object injuries. 122 (28%) of these injuries occurred with a safety device. 75 (60% of injuries with safety devices or 17% of total injuries) occurred after the procedure involving use of the device was completed. Of these 75 post-use injuries, 49 occurred because the safety device was not activated, 21 occurred during device activation (either from improper technique, from device failure or both) and 5 injuries occurred after an activation attempt, because the device was not fully engaged.

Post-use safety device injuries included 31 with disposable syringes (11 during activation), 20 with butterfly needles (7 during activation), 12 with IV catheter stylets (3 during activation), 7 with vacutainer needles and 5 with scalpels. Reasons reported for not activating safety devices included not being instructed on how to properly activate the device, staff being unaware that the device had a safety feature, past attempts to activate similar devices failed, and not recognizing importance of activation.

Conclusions:

Lack of activation of safety devices and injuries during or following attempted activation contributed to 17% of all sharps injuries at our hospitals and comprised 60% of injuries occurring with the use of safety devices. Injuries occurring during device activation may be due to misuse or poor device design. Supplying safety devices is necessary but not sufficient to protect healthcare workers. Providing education on device use and ongoing evaluation of device functionality and safety are important parts of a sharps injury prevention program. This study was funded by the CDC Foundation by a grant from Premier Safety Institute.

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Adverse Events After Tdap Vaccine in Healthcare Workers

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Background:

The burden of pertussis outbreaks in the healthcare setting is substantial, and children with incomplete immunity are at high risk if exposed to healthcare workers (HCW) with pertussis. A new pertussis vaccine for adults is now available for use in the U.S.

Objective:

To determine the safety of a Tdap (tetanus, diphtheria, and acellular pertussis) vaccination program for healthcare workers at a pediatric institution.

Methods:

HCW receiving Tdap vaccine were recruited to participate from Aug-Sept 2006. Date of last tetanus booster (Td) was recorded. Prospective active surveillance was conducted using a web survey completed by HCW 2 weeks after receipt of vaccine. The survey contained questions about local and systemic adverse events. The primary outcomes were rates of adverse events after vaccination. Associations between adverse events and several predictors, including age and length of time since last Td, were assessed using chi-square tests and logistic regression.

Results:

251 subjects were initially enrolled and 207 (82%) completed the adverse events survey. The median age of respondents was 39.2 years. The interval between Td and Tdap was <2 yrs (2%), 2-4.99 yrs (29%), 5-9.99 years (38%), and ≥10 yrs (31%). Adverse events included pain (77%), swelling (11%), redness (7%), headache (9%), fever (4%), and fatigue (14%). Shorter interval since last Td was significantly associated with pain at injection site ($p=0.03$), but not with other symptoms. Compared with HCW over 30 years of age, those under 30 were more likely to experience headache (relative risk 3.2, 95% CI 1.4-7.5) and fatigue (relative risk 3.1, 95% CI 1.6-6.0). Median duration of symptoms was 3 days for local adverse events and 2 days for systemic adverse events. There was no association between duration of symptoms and time since last Td. Adverse events were severe enough to interfere with work and non-work activities in 0.5% and 6% of recipients, respectively.

Conclusions: Local and systemic adverse events are common in HCW who receive Tdap vaccine and may interfere with non-work activities. Pain at the injection site is more common with shorter interval since last Td. Younger HCW more frequently experience headache and fatigue. These findings will help guide counseling for HCW who receive Tdap vaccine.

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A Large Teaching Hospital Response to Mumps Exposures During an Outbreak

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Background:

In 2006 the largest outbreak of mumps was reported in U.S. since vaccine licensed. Potential for nosocomial spread of mumps from patients, visitors and healthcare workers (HCW) is well recognized but impact of community outbreak on health care settings is not well known.

Objective:

Describe the response of a large teaching hospital to mumps exposures during the outbreak.

Methods: Setting: 508 bed urban university hospital located in northeast KS. Population: 3082 hospital and 2721 university employees. Intervention: A hospital multidisciplinary task force representing administration, nursing, lab, occupational health (OH), human resources, infection control, infectious disease and public health was formed to formulate a response to mumps exposures. A protocol was developed based on CDC/ACIP recommendations and group consensus. Blood was tested by EIA for mumps IgG (ARUP Lab, Salt Lake City), from employees, students, and exposed patients with values ≥ 1.10 considered pos. Diagnosis of mumps was made on clinical presentation and based on CDC/ACIP definitions. Demographic information, mumps and vaccine histories were obtained from OH records. IgG neg persons were offered vaccine per protocol. HCW were furloughed based on clinical and epidemiologic criteria. Cost expenditures were calculated for testing, HCW personal time off and administrative leave. Results: From 1/29/06-9/30/06 there were 909 confirmed/probable cases of mumps reported in KS. 22 cases of mumps were identified at the hospital; 9 employees (2 university and 7 hospital), 3 students and 10 patients. 1 of 9 employee cases was confirmed; 8 were probable. No patients and 2 employees acquired mumps nosocomially (1 from a visitor and 1 from an employee). Over a 24 wk period 4625 HCW were screened. Age distribution: 5-17 years (2), 18-24 years (461), 25-49 years (2939), ≥ 50 (1212). 558/4625 (12%) were neg. 187/558 (33%) had a previous history of vaccination and 12 (2.2%) had a history of natural disease. 426 (76%) of seronegatives received vaccine. 9/426 HCW were retested and seroconverted. 112/1212 (9%) of persons ≥ 50 yrs were neg. 7/112 (6%) had a previous history of vaccine and 8 (7%) had a history of natural disease. 94/112 (84%) did receive subsequent vaccine. 38 HCW were furloughed due to exposure. Hospital costs were: lab \$56,000, 971 hrs personal time off \$22,524, and 911 hrs paid leave \$20,158.

Conclusions:

Rate of seronegativity is consistent with previous reports of vaccine efficacy. Negative IgG titers could be due to vaccine failure or waning immunity. Persons born prior to 1957 (≥ 50 yrs) were previously considered immune before outbreak. New policies to test HCW of all ages at hire or annual review and vaccinate if indicated were instituted to prevent nosocomial spread and HCW furlough. New, rapid and inexpensive tests are needed to measure immunity accurately to justify cost of intervention.

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The Effectiveness of an Educational Video Promoting Use of the Hands-free Technique During Surgery

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Background

A potential means of reducing occupational blood and body fluid exposure from percutaneous injury and contamination during surgery is use of the hands-free technique (HFT) most of the time during surgery. The HFT, whereby no two people handle the same sharp item at the same time, is a work practice recommended by professional and occupational organizations, that was shown to reduce risk by 60% in surgeries in which the HFT was used 75% or more of the time, with at least 100cc bloodloss, in a previous US study of 3,765 surgeries.

Objective

We report the results of a recently conducted quasi-experimental study used to evaluate the effectiveness of a specially developed HFT training video promoting and demonstrating HFT use in a variety of surgical sub-specialties.

Methods

Effectiveness, increased HFT use by the surgical team, was assessed during 3 data collection periods in 3 intervention hospitals, located in 2 Canadian cities, and during 4 data collection periods in 2 control hospitals, located in 1 other Canadian city. Intervention hospitals received the video intervention, immediately after HFT use categorized as: approximately 100, 75, 50, 25 or 0%, was measured in Period 1. Following the intervention, HFT use was reassessed during data collection Period 2, and, after an interval of 5 to 6 months, again during a 3rd Period. HFT use was assessed during corresponding periods in control hospitals and also during a 4th Period after the intervention. Circulating and scrub nurses were trained to categorize HFT use. The 25 minute video, developed based on semi-structured interviews of nurses and surgeons, was presented with discussion at educational inservice sessions. Data collection continued in each period in each hospital until approximately 400 surgeries were observed. In the control city, a policy promoting HFT was operating room policy. In one of the intervention cities, a similar HFT policy was introduced between Period 2 and Period 3.

Results

HFT use was assessed in 9,102 surgeries: 4,845 in intervention hospitals and 4,257 in the control hospitals. Between Periods 1 and 2 in the control hospitals, use of the HFT 75% of the time of more increased from 25% of surgeries to 33%, suggesting a modest effect of observation on use. However, in the intervention hospitals, overall use increased from 9% to 25% between Periods 1 and 2, following the intervention. In the intervention city where there was no HFT policy, use declined from 28% to 14% between Periods 2 and 3, whereas in the city where HFT policy was introduced, use increased from 24% to 45%. Between periods 3 and 4 in the control hospitals, following the intervention, use increased from 30% to 41% ($p < 0.01$, all comparisons).

Conclusions

The video-based intervention increased HFT use. Introduction of formal policy enhanced its effect.

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Respirators: Recent Research on Mechanisms of Viral Penetration and Counter Measure Activities

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Background:

Bioterrorist events, outbreaks caused by emerging microbes, and the threats of pandemic influenza have heightened concern over the level of respiratory protection provided our healthcare providers. These concerns have been heightened as we try to understand recent occupationally acquired infections of SARS, measles, influenza, pertussis, tuberculosis, mumps, RSV infections and Varicella,; in some cases in spite of

strict compliance to PPE guidelines.

Objective:

Our objective was to understand filter capture and failure mechanisms, evaluate the appropriateness of respirator qualification assays for predicting viral filtration efficacy, and compare the performances of commercially available NIOSH certified respirators. This study also evaluated the viability of captured microorganisms within different respirator types (“contaminated sponge” scenario).

Methods:

Phase 1) The Bio-aerosol Test System (BATS) is a well control test apparatus. MS2 phage was aerosolized utilizing a Collison nebulizer. The titer and duration of challenge depended on the test performed. The Flow rate was equivalent to 85 LPM, the same rate used by NIOSH for their certification testing and represents the inhalation effort of an individual performing heavy workload activity. Phase 2) A smaller study was performed utilizing Influenza A H1N1 for 2 hour challenge at 10^5 . Phase 3) Staphylococcus bacteria and Φ X 174 coliphage were used to contaminate sample respirators. Replicate samples were held for 10 minutes, 30 minutes, 2 hours and 8 hours, and then quantitatively assayed.

Results:

It was determined that not all NIOSH approved respirators equally filter out viruses ranging in their performance from <95% to > than 99.99% efficacy. Velocity and aerosol size and microbial load dramatically impact penetration. Some respirators fatigue over time revealing a repeating slow increase in efficacy followed by a drastic decrease, in an overall downward slope. Viruses pass through holes created by staple shafts. Virus and bacteria captured by all respirator samples evaluated, except one, were viable in high numbers up to 8 hours after contamination.

Conclusions:

It is a common held belief by most healthcare providers that NIOSH certified respirators are very effective in filtering out viruses. This is not necessarily the case. A more strenuous test method than the current NIOSH 0.3 micron salt assay is needed to determine viral filtration efficiency; one that is extended past the current 20 minute assay to be able to detect in-use performance decay. Users need to utilize caution when removing respirators to avoid self-contamination. There is a significant difference in the performance of respirators. Novel approaches, including the use of antimicrobial-treated respirators should to be considered to reduce viral penetration and to minimize risks posed by the “contaminated sponge” phenomenon.