Electronic Employee Injury Reporting Format for Healthcare Employee Sharps Injuries and Splash Exposures

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Abstract:

Background: Sharps injuries (SI) and splash exposures (SE) have continued to be a problem among healthcare workers. Poor quality, incomplete and untimely data has delayed investigations and efforts to decrease occupational exposures at the project institution.

Methods: The quality improvement (QI) project added an electronic format for reporting SI and SE within an academic medical center, with more than 3,200 clinical staff (e.g. providers, nurses, allied health, and residents). Data was collected from paper Employee Health records for the pre-intervention assessment and the incident reporting system for the post intervention via the new electronic format and paper forms. Sixty-one follow-up surveys, consisting of five open-ended questions, were sent to those staff to obtain qualitative feedback on the electronic form and process.

Findings: The project evaluation revealed no significant increase in reported incidence, but an overall satisfaction of the new process. There was poor compliance in the initial months of the change with continued improvements seen. The electronic reporting format was found to provide enhanced data collection, timely notification, and improved ability for report creation.

Conclusions: The QI project objectives to develop an electronic reporting format, improve the capture of incidence, and the quality of data collected through the electronic format were met. There was a 7.69% increase in reported incidence during the evaluation period, which did not meet the project goal of a 20% increase. Further efforts will be needed to improve compliance with the new reporting process.

Application to Professional Practice:

Implementation of an electronic reporting process for SI and SE could improve access, increase compliance, and allow for ease of data collection and report creation. The electronic process had enhanced data collection and was more time efficient for employees and involved stakeholders which ultimately could improve employee safety and cost efficiency.

Keywords: sharps injury, needlestick injury, splash exposure, blood and body fluid exposure, exposure reporting

Background

Healthcare workers are at risk for bloodborne pathogen exposures via sharps injuries or splashes with an estimated more than 385,000 sharps injuries occurring in hospitals in the United States each year (Centers for Disease Control [CDC], 2013). The data for splash exposures was not as prevalent as percutaneous injuries, nor was the risk as high (CDC, 2013; Grimmond & Good, 2017). The greatest concern of blood and body fluid exposures (BBE) was the possibility of disease transmission by a contaminated source (Jagger, Perry, Gomaa, & Phillips, 2008; Tarantola, Abiteboul, & Rachline, 2006). The transmission of disease, or even the possibility through bloodborne exposures, could have a life altering impact on the healthcare worker (HCW; Cooke & Stephens, 2017). The most concerning of these infections due to the greatest potential of life altering consequences, was Hepatitis B (HBV), Hepatitis C (HCV) or Human Immunodeficiency Virus (HIV). This could be ever changing with diseases such as the Ebola Virus which have been of concern given recent epidemics (CDC, 2017a). Other newly prevalent viruses such as Zika are not well studied and the risk of BBE remains unclear (CDC, 2018d). Efforts to decrease the incidence of these events are important to all HCWs and supported by many institutional administrations and government agencies. Unfortunately, after years of decreasing exposure rates, the incidence appeared to be trending upward (International Safety Center, 2016; 2018).

Strategies to protect employees have included immunizations, the development of standard precautions, the use of personal protective equipment (PPE), educational programs, initiation of post exposure prophylaxis and development of safety engineered devices (Averhoff et al, 1998; CDC, 2010; Jagger et al., 2008). A financial burden existed for both prevention with modern safety devices as well as with post exposure evaluation and prophylaxis (Cooke & Stephens, 2017). There was also an unmeasurable cost associated with exposure. The emotional and

psychological impact on the affected individual has been reported as significant (Cooke & Stephens, 2017; Wicker et al., 2014).

In the last two decades following legislation by the United States federal government mandating the use of safety engineered devices, a decrease in the number of sharps exposures had been seen (CDC, 2013). More recently the International Safety Center's EPINet report (2016; 2017) for needlesticks and sharp object injuries noted a steady increase since 2013. Injuries increased from 2013 with 21.37 per 100 average daily census to 33.8 injuries per 100 average daily census in 2017 with 31. In addition, the trend has changed from nurses representing the highest incidence occurrence by job title to physicians (International Safety Center, 2018).

The incidence of splash exposures has also been trending upward. In 2013, 24 hospitals reported with 5.91 blood and body fluid exposures per 100 average daily census, compared to 2017 with 10.1 blood and body fluid exposures per 100 average daily census (International Safety Center, EPINet Report for Blood, 2013; International Safety Center, EPINet Report for Blood, 2017). Although splash injuries traditionally have a lower incidence and do not carry the same risk, the U.S. Public Health Service recommended the same screening and post exposure prophylaxis (CDC, U.S. Public Health Service, 2018).

Occurrences of disease transmission are reported in case reports; however, there is no publicly available database. In addition to lacking a comprehensive and organized reporting system in the U.S., worldwide reports have indicated under-reporting of the incidence of exposures with rates as high as 34% to nearly 87% (Ersin, Koruk, & Yilmaz, 2016; Lauer et al., 2014; Nambudiri, Qureshi, & Vleugels, 2016; Zhang & Yu, 2013). This was prevalent across all disciplines of HCWs. Perceived lack of time and difficult reporting processes are some of the

reasons cited for not reporting BBEs (Deipolyi et al., 2017; Ersin, Koruk, & Yilmaz, 2016; Zhang & Yu, 2013). Unreported occurrences are missed opportunities to provide proper post exposure prophylaxis for disease transmission and hinder the ability to perform a root cause analysis. SI and SE has remained a problem for today's occupational health practices and improved reporting and data collection may lead to actionable interventions.

The quality improvement project consisted of implementing and evaluating an electronic employee injury form for reporting healthcare employee sharps injuries and exposures to blood and body fluids at the selected institution. The project aims were to 1) improve the process of reporting, 2) increase the number of exposed reporting, and 3) improve the quality of data reported. There was an expected increase in the reported incidence by 20% by the end of the third month of the project period evaluation. The new sharps injury and splash exposures reporting was utilizing an electronic process that was embedded into the electronic incident reporting system at the organization. The previous format was a pen and paper process with manual data collection. This improved reporting process would have enhanced data collection capabilities and would provide valuable information to address problematic areas. Reports would be generated electronically and be available for stakeholders to review and intervene real-time. The format was easily accessible with the intent of increasing employee reporting. Ultimately decreasing sharps injuries and splash exposures in HCWs was desired.

Project Methods

Project Description Overview

Within the large select academic healthcare facility employing over 3,200 patient care staff there was increasing incidence of BBE. Occurrences initially declined after implementing strategies (such as needless systems and safety engineered needles) as mandated by the

Needlestick Safety and Prevention Act of 2000 (NSPA) before beginning to trend up again. A committee was developed to review the trends and recommendations were provided. There were findings of process breakdown with inconsistent reporting practices, missing data, inadequate information and delayed event notification. These occurrences had the potential to lead to untimely and inadequate follow up for HCWs. The previous means of reporting SI and SE was a pen and paper process that was manually completed by the employee, investigated by management staff, then entered into an Excel spreadsheet by the Employee Health staff for OSHA reporting. Given the manual process reports were often delayed and distributed to stakeholders in an untimely fashion.

Description of the Intervention

An electronic format for SI and SE with a comprehensive set of questions was developed and built within the institution's electronic incident reporting and management system. A category for employee events was added to the available selections. The format included demographic data, multiple mandatory questions regarding the incident with opportunity for narrative in addition to open ended questions regarding contributing factors. The new system was easily accessible from any computer at the institution and provided reminders to employees to report to Employee Health. Institution wide education took place regarding SI and SE prevention as well as instruction for completion of the new electronic format. The Employee Health Department, department manager, and safety department were provided a real time email alert that a report had been filed. Employees had the option to create the report anonymously if so desired. Managerial staff could document their investigational findings within the same electronic document. The system could generate real time reports that could be tailored to identify trends in departments, roles, products and more. Given the automation of the system, it should decrease

the workload on Employee Health, decrease time away from work for the employee and expedite the investigation into the occurrence. The new system had the ability to extract the required data and create reports that could be submitted electronically to OSHA.

Population Description

The setting for the project implementation was a large academic Level 1 trauma center in the Southeast United States as well as a nearby satellite hospital. The institution employed more than 3,200 patient care staff including 441 physicians both attendings and residents, 216 associate providers including advanced practice registered nurses and physician's assistants. 1,570 nurses and 1,020 ancillary staff in various technical patient care roles. The project intervention and evaluation included any employee of the institution or its affiliates that experienced a reported BBE. The project had the approval from the UF Health Jacksonville and Jacksonville University Internal Review Board (IRB).

The committee who assisted in developing and approving the new format was made up of nursing and provider staff representatives as well as managerial and education staff. The project intervention and survey evaluation included any employee of the institution or its affiliates who utilized the electronic format for reporting SI or SE and the investigating managers during the time period of February through June 2019. After the implementation of the electronic reporting format these individuals were invited to complete an anonymous survey evaluating the new electronic process and given opportunity to provide feedback. The secure anonymous survey link was provided via email with waiver of consent. Data was also collected from both the paper and electronic formats from two time periods for comparison including three months before and three months after education and implementation. Data was collected from both paper and

electronic records. The project had the approval of the institution's Institutional Review Board as an exempt project.

Data Collection

All data was obtained from paper Employee Health records for the pre-intervention assessment and the incident reporting system for the post intervention electronic format. Data was received and entered into REDCap data management system. Data collected included demographic variables (gender, age range, employee position), work department, day or night shift, type of exposure, the type of device in use, whether the device was a safety engineered device, whether the device was contaminated, and the task being performed during the exposure. A survey offered to injured employees and investigating managers included demographic data (gender, age range, position), years of hospital employment and experience in healthcare, and highest degree. This was followed by Likert Type Scale questions with the options from strongly agree to strongly disagree (Table 3).

Data Analysis

Data was transferred into SPSS for data analysis. Descriptive statistics were used to summarize the project variables and reported. The results of the survey were reported in table format. There were insufficient numbers of returned surveys to complete reliable analysis of the data. Qualitative data was summarized as reported by stakeholders involved in the SI and SE committee at the institution.

Findings

There were a total of 81 SI and SE reviewed. There were 39 occurrences of SI and SE reported prior to the intervention with a total of 42 occurrences reported after the rollout of the electronic process. After implementation of the electronic process, 20 (47.6%) were reported

utilizing the new method with over half (n=22, 52.4%) continuing to utilize the traditional paper format (see Table 1).

The first objective of the project of improving sharp injury and splash exposure reporting using an electronic process was reached. The new process was successfully implemented and utilized by nearly half of employees who reported an occurrence. However, the electronic reporting format was not fully adopted by the staff nor the employee health department at the completion of the project. The second objective of increasing the number of exposed reporting was met, but, did not reach the anticipated goal of increasing reports by 20%. There was only a slight increase of 7.69%. This may be due to other efforts that were employed and may have decreased the incidence. There was an upward trend of electronic format utilization during the post intervention period (See Figure 1).

The post intervention data was reviewed to determine where improvements may be needed to improve compliance. As seen in Table 2, this showed that physicians were unlikely to have utilized the new format with only two of 13 exposures reported electronically (p=0.001). Age was found to have been omitted in the new electronic format and was being corrected. There were no other significant findings. The third objective of improving the quality of data collected was also reached. The HIPAA compliant electronic format included standard demographic data with some auto-population features regarding the employee and the patient involved in the exposure.

There were multiple informational questions that were not on the paper form to aid in identification of problem areas. These include questions regarding whether personal protective equipment was used and the type of equipment in use, whether the object was contaminated, if there was visible blood on the object, what the task being performed was, when did the injury

occur (before use, during use, after use but before disposal, or during clean up) as well as further information on these various time periods, what device was being used including brand if known, what type of hollow bore needle was used if applicable, whether the device had a safety feature and was it utilized, was there a failure of the safety feature, and what type of fluid resulted in splash. These questions were in addition to a narrative section that allowed the employee to describe the event in their own words. The electronic form also had an open-ended question that asked for feedback on whether they felt there was something that placed them at higher risk during the incident. Examples such as patient movement, lighting, or equipment were given. The electronic format had built in hard stops to prevent important information from being omitted. These additional inquiries were anticipated to allow for management and stakeholders to perform early evaluation and track potential problem areas.

To evaluate the new format there were 61 surveys offered to both managers and exposed employees, with only seven surveys returned (11.5% response rate). Two were injured employees and five investigating managers. The survey included five questions for employees and six for managers (see Table 3). There was an additional open-ended question requesting feedback for improvement of the new format, however there were no recommendations. There were inadequate survey responses to conclude any significance.

Additional feedback regarding the new electronic format was positive. This included timely reports, ease of creating reports for review and identification of areas with high incidence with a breakdown of details regarding what was being used and the task performed. Other consequences of the new format included the ability to build out other employee events and injuries within the electronic reporting system. As this occurred it did create some confusion and allowed employees to report outside of the identified SI and SE format.

The project had the initial cost of employee time for creation of the new format, development of education and building the format in the existing electronic incident reporting system. The potential for cost savings existed in replacing the current purchased software for OSHA reporting as well as employee time for manual data entry and decreased time spent investigating reports. Unrealized cost savings would occur if earlier detection of problem products or areas are addressed in a timely manner preventing further occurrences. Similar systems could easily be replicated in other institutions with an electronic event reporting system or in and independent electronic system. The enhanced data would provide the ability for stakeholders to easily identify problem areas and employ further interventions contributing to a safety culture.

Discussion

Despite system wide education there continued to be paper reports submitted to the Employee Health Department. The project was evaluated early on after implementation and continued education will need to be provided to ensure employee adjustment to change. It was expected that the electronic format would become the only means of reporting SI and SE. Further outreach to employees to improve compliance to change will need to take place.

The process was simplified and made readily available to both employees and managers with increased ability for stakeholders to access real time data. The quality of the data was enhanced by obtaining more data electronically than was previously available on the paper format. The electronic format carried potential for stakeholders to access information in a timely manner and there was ability to create detailed monthly reports. Inadequate time had elapsed to identify trends in areas or products. Further inquiry in a later time period would be necessary to determine if the new format was advantageous in identifying trends. The system also provided

the opportunity to build out other employee injuries or incidents such as falls which may be helpful for tracking purposes.

Conclusion

Worldwide, there continues to be a considerable number of healthcare workers exposed to infectious diseases via sharps injuries and splash exposures and the true incidence was under-reported (Ersin, Koruk, & Yilmaz, 2016; Lauer et al., 2014; Zhang et al., 2013; Zhang & Yu, 2013). Although it was clear that safety engineered devices have decreased these incidences, the fiscal impact of new products being employed to prevent sharps injuries has not been well studied. As Chambers, Mustard, and Etches (2015) noted there was still a significant problem, and there was no systematic monitoring of the problem to understand its extent and causes. Independent monitoring sights, such as EPINet in the United States, have continued to collect data from institutions that voluntarily provide this information. However, with only 31 institutions submitting data in 2017, these data are limited (International Safety Center, 2018).

The burden of sharps injuries could be reduced by continuing to make available safety equipment and device alternatives that can continue to lower the incidence of sharps injuries. It would require commitment on the part of institutions to continue to seek ways to decrease their occurrence. Encouraging employees or enacting policy regarding face masks with shield or with eye protection could decrease the number of eye and mucocutaneous exposures. Standard precautions should continue to be enforced. No doubt, there will be associated upfront costs; however, safety endeavors prove to be cost effective in the end.

Identifying accurate incidence and factors contributing to exposure was the first step in addressing the issues at the institution. The aims to improve the process of reporting and improve the quality of data collected through the electronic format were met. The aim to

increase the number of exposed reporting did not reach the 20% goal as expected. Despite system wide education, there remained a large number of employees who continued to complete the paper format. Compliance should improve with continued education and direction. With electronic data collection the opportunity existed to accurately describe events, record investigations and track potential problem products or areas in a timely fashion. Employee health and safety departments have the ability to create reports in real time compared with delayed manual data entry. Ultimately, the change was expected to improve stakeholders ability to evaluate the need for further changes within the institution to further develop a culture of safety.

Applications to Professional Practice Insert/Box

Healthcare worker's exposures to sharps injuries and splash exposures has remained a problem with financial and psychological impacts on institutions and employees. To address the increasing issue within the selected institution, it was important to quantify the problem and update the previous reporting method. This quality improvement project focused on developing, implementing and evaluating an electronic format for reporting healthcare worker's sharps injuries and splash exposures. Similar quality improvement projects could easily be replicated by occupational health within healthcare institution's incident reporting systems enabling an electronic process with enhanced data collection. By implementing an electronic process there was ease of access, as well as improvements in data obtained, stakeholder notification and investigation process.

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Table 1.

Injury Reports Pre and Post Intervention

n=81	
Pre	39 (48.1%)
Post	42 (51.9%)
Electronic	*20 (47.6%)*
Paper	*22 (52.4%)*
Total	100%

Table 2.

Post Intervention Comparison of Electronic Versus Paper Reports

Variable	Electronic (n=20)	Paper (n=22)	*p* value
Gender			
Female	18 (90%)	15 (68.2%)	0.135
Age			
18-29		8 (36.3%)	
30-39		12 (54.5%)	N/A
40-49		1 (4.5%)	
50-59		0	
Not recorded	20 (100%)	1(4.5%)	
Position			
Nurse	13 (65%)	6 (27.3%)	0.209
Technician	5 (25%)	2 (9.1%)	0.229
Physician	2 (10%)	13 (59.1%)	0.001
APP	0	0	--
Other	0	1 (4.5%)	0.999
Injury Type			
Sharps	11 (55%)	13 (59%)	0.99
Splash	9 (45%)	9 (41%)	
Shift			
Day	12 (60%)	14 (63.6%)	0.267
Night	5 (25%	8 (36.4%)	
Not recorded	2 (10%)	0	

Table 3.

Employee Injury Report Form Evaluation

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
The form was easy to complete.	4(57.1%)	3(42.9%)	0	0	0
I was able to understand the information that was requested.	4(57.1%)	3(42.9%)	0	0	0
The form provided detailed questions regarding the injury.	3(42.9%)	3(42.9%)	0	1(14.3%)	0
The form took an appropriate amount of time to complete.	3(42.9%)	4(57.1%)	0	0	0
Overall, I was satisfied with the form.	2(28.6%)	5(57.1%)	0	0	0
Managers only: The form included all needed information for investigation into injury.	2(28.6%)	2(28.6%)	1(14.3%)	0	0

LEGEND: *Figure 1.* Percent who used electronic format for reporting showing data points representing increased usage of electronic format institution wide since introduction.

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