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UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science

DOCTOR OF NURSING PRACTICE PORTFOLIO

by

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A portfolio presented to the

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IMPROVING HIV POSTEXPOSURE FOLLOW-UP IN HEALTHCARE WORKERS

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Conflict of Interest

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, University of San Diego, or the United States Government. This work was prepared while the author was a student at the University of San Diego and as part of the author's official duty. Title 17 U.S.G. 105 provides 'Copy-right protection under this title is not available for any work of the United States Government.' Title 17 U.S.C. 101 defines a United States Government work as a work prepared by a military service member or employee of the United States Government as part of that person's official duties.

KEYWORDS

HIV, Postexposure Follow-up, Healthcare Workers, Blood and Body Fluid Exposure

Abstract

The purpose of this evidence-based practice (EBP) project is to improve the HIV postexposure follow-up (PEFU) rate in healthcare workers (HCWs) through implementation of a revised infection control policy and reminder system. Occupational exposure to HIV is a significant risk for all healthcare workers. In the United States every year, 1 out of 10 U.S. healthcare workers suffers a blood or body fluid exposure (BBFE). Transmission of one serious blood-borne infection can cost more than a million dollars for medications, follow-up laboratory testing, clinical evaluation, lost wages, and disability payments. Completion of HIV PEFU in HCWs is very low nationally. It is estimated only approximately 27-43% of HCWs complete PEFU, even when the source patient is known to be HIV positive. The PEFU adherence rate among HCWs at a southern California medical center was poor, none of the 52 HCWs reporting BBFE in 2013 completed recommended PEFU. Since initiating this EBP project December 2014- June 2015, 100% of employees (N=37) involved in BBFE have completed recommended HIV PEFU.

Problem Statement

The problem identified for this evidence-based practice (EBP) project is low HIV postexposure follow-up (PEFU) in healthcare workers (HCWs) involved in a blood or body fluid exposure (BBFE) at a major southern California medical center. This EBP project is designed to improve PEFU in HCWs involved in BBFE from 0% to 50% in seven months.

Evidence of the Problem's Existence

Occupational exposure to human immunodeficiency virus (HIV) is a significant risk for all healthcare workers. It is estimated that there are more than 400,000 parenteral injuries suffered by healthcare workers in the United States every year and that 1 out of 10 U.S. healthcare workers suffers a BBFE or a needle stick injury (Henderson, 2012). Transmission of one serious blood-borne infection can cost more than a million dollars for medications, follow-up laboratory testing, clinical evaluation, lost wages, and disability payments (Leigh et al., 2007). The emotional impact on the HCW can be long lasting, even in a low risk exposure that does not result in transmission of infection. Healthcare workers may experience emotional and psychological symptoms such as depression, fear, anxiety, difficulty with sexual relationships, trouble sleeping, difficulty concentration, and doubts regarding career choice (Green & Griffiths, 2013; Lee, Botteman, & Xanthakos, 2005). When occupational exposure to HIV occurs, every incident should be considered an urgent medical concern, and an immediate initial risk assessment of the source should be conducted. Postexposure prophylaxis should be initiated immediately for HCWs, if indicated, to prevent HIV transmission. In addition

emotional support and counseling should be provided for the HCW to reduce anxiety and fear associated with this type of occupational exposure.

The U.S. Public Health Service (USPHS) 2013 Guidelines recommend that institutions develop a clear evidence-based protocol for the management of occupational exposures to HIV to decrease transmission of HIV to HCWs. The protocol should include formal expert consultation, appropriate initial source patient and exposed HCW baseline laboratory testing, procedures for counseling the exposed HCW, and available onsite HIV postexposure prophylaxis (PEP) if indicated. In addition to a clear protocol, USPHS recommended that a mechanism for complex outpatient services for HCWs be established to help ensure complete postexposure follow-up (Kuhar et al., 2013).

Completion of HIV postexposure follow-up is very low worldwide, with one study indicating that only approximately 27-43% of HCWs completed scheduled follow-up, even when the source patient is known to be HIV positive (Ko et al., 2011). In a study of 130 Argentinean HCWs, only 86% had partial adherence or were lost completely to postexposure follow-up. In a Malawian postexposure prophylaxis (PEP) program, just 25.2% of HCWs who began PEP attended the first follow-up visit and only 1.9% completed all four visits (Vaid, Langan, & Maude, 2013).

In a 2013 retrospective chart review (N= 52) at a major southern California medical center revealed that only 21% of the HCWs completed PEFU recommendations and none of the 52 HCWs completed all five recommended PEFU visits. Incomplete HIV postexposure follow-up does not meet the national standard for assuring prevention of HIV transmission to HCWs.

Table 1. Postexposure Follow-up Among HCWs in a Southern California Medical Center for 2013 (Number of HCWs =52)

	Exposed to HIV Negative Source	Exposed to HIV Positive Source	Exposed to Unknown Source	Total
Number of HCWs	21	3	28	52
Completed Initial Labs	6	2	3	11
Complete All Recommended Follow-Up	0	0	0	0

A gap analysis was performed to determine the extent of the problem among HCWs not completing postexposure follow-up after a blood or body fluid exposure in the facility. The retrospective chart review revealed that 1.7% of HCWs completed recommended HIV postexposure follow-up from 2008 to 2013. It also revealed inaccurate tracking and documentation of postexposure follow-up in HCWs involved in BBFEs. For this analysis, the potential exposure to HIV employee epidemiological follow-up log was reviewed and compared to the facility OSHA report. These data were compiled and revealed a poor postexposure follow-up rate and incomplete documentation, inconsistent follow-up recommendations by healthcare providers, incomplete baseline source lab collection, and lack of knowledge among HCWs of the importance of immediate reporting of BBFE. This analysis also revealed that the facility's current Infection Control Policy was based on outdated 2005 national guidelines.

Table 2. Analysis of PE Follow-up in a Southern California Medical Center 2008-2013

(Number of HCWs =349)

HIV Follow-Up	2008	2009	2010	2011	2012	2013
Completed follow-up	2	1	2	0	3	0
Incomplete follow-up	1	16	2	7	26	11
Number of employees recorded in epidemiology Follow-up Log	3	17	4	7	29	52
Number of actual cases reported in OSHA log	58	46	66	69	56	54

The southern California medical center infection control policy (ICP) that outlines the facility's recommendations for PEP and HIV postexposure follow-up was based on outdated 2005 USPHS guidelines. The old ICP recommended postexposure follow-up labs for HCW be completed at baseline, 6 weeks, 3 months, 6 months and 1-year following exposure. This lengthy postexposure follow-up was encouraged even if the

source patient was HIV negative in an attempt to ensure the source was not in the “window period” (the period between initial HIV infection and the development of detectable HIV antibodies). The 2013 USPHS guidelines state, “To date, no transmission to health care workers from an exposure source during the window period has been detected in the United States” (Kuhar et al., 2013, p. 880). It is no longer recommended to routinely screen HCWs exposed to known HIV negative sources (Kuhar et al.). Therefore the extensive ICP follow-up regimen is no longer indicated if the source is HIV negative. In addition to the newest guideline recommendation, evidence shows a simpler follow-up regimen, leads to increased compliance by up to 24% (Atreja, Naresh, & Levy, 2005).

Setting

The project was initiated at a major southern California medical center. It involved healthcare workers, students, residents, volunteers, and trainees from different specialties and backgrounds. The program took place in the Occupational Health Clinic and Emergency Department after hours. It focused on treating healthcare workers that identified themselves as being involved in a blood and body fluid exposure. The program involved providing face-to-face education about post-exposure HIV follow-up and PEP.

Study Question

The project was designed to answer the following question: Does implementation of revised infection control guidelines that include a shorter follow-up system and reminder system improve the HIV postexposure follow-up rate in healthcare workers.

Nursing Model

This particular evidence-based project was implemented using the Johns Hopkins Nursing Evidence-Based Practice Model (JHNEBP). The JHNEBP Model has three key phases, Practice Question, Evidence, and Translation. This model was selected because it provides tools for practice question development, process and critiques, evidence rating scale, and evidence appraisal. It is useful in a variety of healthcare settings and is applicable across specialty areas and can be easily reproduced in a multitude of healthcare disciplines.

Ethical Issues

Prior to implementation, project approval was obtained from the southern California medical center Institutional Review Board and the University of San Diego's Institutional Review Board (IRB) with permission to disseminate de-identified clinical findings.

Intervention Implementation

The intervention included updating the Infection Control Policy's (ICP) postexposure follow-up guidelines to reflect new shorter evidence-based national guidelines and implementation of a tracking and email reminder system to call back HCWs who failed to return for postexposure follow-up labs. Implementation of a shorter/simpler follow-up system as well as a reminder system has been shown to improve follow-up compliance by up to 24% and 30% respectively (Atreja, Naresh, & Levy, 2005; Salameh, Olsen, & Howard, 2012).

Evaluation Plan

Data were collected through review of the Potential Exposure to HIV/HBV Employee Epidemiological Follow Log and the annual Occupational Safety and Health Administration (OSHA) report. The review will be done at 2, 4 and 6 months and the post exposure follow-up completion rate will be reported to the Infection Control Committee and compared to the previously collected data for 2013.

The HIV postexposure follow-up rate among HCWs at a major southern California medical center was calculated based on a review of the Potential Exposure to HIV/HBV Employee Epidemiological Follow Log and the annual Occupational Safety and Health Administration (OSHA) report for all HCWs reporting a BBFE in 2013. The Potential Exposure to HIV/HBV Employee Epidemiological Follow Log kept in OHC was compared to the facility OSHA log to ensure all exposures are captured and accounted for. The total number of BBFEs reported in the OSHA log for 2013 was 54, two of these cases were excluded because one was a dog bite, and one was an exposure to a clean instrument. The total number of BBFEs to a human source in HCWs for 2013 was 52. The retrospective review revealed, 21% of the HCWs had partial adherence to PEFU recommendations and none of the 52 HCWs completed all five recommended PEFU visits. Incomplete HIV postexposure follow-up does not meet the national standard for assuring prevention of HIV transmission to HCWs.

Measured Improvement

The effect of this EBP project was measured by an ongoing retrospective chart review from December 2014 to June 2015. The two improvement measures evaluated were (a) postexposure follow-up rate in HCWs involved in BBFE and (b) cost savings related to the

elimination of unnecessary laboratory screening. The cost savings is reported as dollars spent and compared to the costs associated with utilizing the outdated policy. The postexposure follow-up rate is reported as the percent of PEFU completion under the new policy compared to the PEFU rate under the old policy.

Results

The anticipated outcome of this EBP project was to eliminate unnecessary laboratory screening costs and improve HIV PEFU from 0% to 50% in seven months. Improved postexposure follow-up compliance will help prevent the substantial costs associated with testing the transmission of HIV to HCWs involved in BBFE. The total number of BBFEs in HCWs from December 2014 to June 2015 was 37. The retrospective chart review revealed all of the 37 HCWs had 100% adherence with all four recommended PEFU visits under the new ICP. Postexposure follow-up for this facility is now 100% well above the national standard, assuring all measures are taken to prevent HIV transmission to HCWs involved in a BBFE.

Discussion

Although occupational exposures pose a significant risk for HCW, there are limited clinical trials available for occupational exposures to HIV due to the relatively low frequency of HIV seroconversions. There have been no human randomized control trials (RTC) assessing the comparative efficacy of PEP regimens and postexposure follow-up in this population. It is difficult to perform quantitative studies or case-control studies due to the low frequency of seroconversions. In addition, comparative studies and drug efficacy in HCWs are not available due to continual change in drug regimens, making any studies done almost obsolete once enough cases have accumulated. Due to the limited human RCTs in this population, national USPHS guidelines that outline PEP and postexposure follow-up recommendations were developed based on expert consensus of reviewed literature. I am including a quasi-experimental study and a quantitative study that support recommendations of the PHS guidelines.

The U.S. Public Health Service's "Guidelines for the Management of Occupational Exposure to Human Immunodeficiency Virus and Recommendations for Postexposure Prophylaxis" is a metasynthesis of new available literature since publication of the 2005 guidelines. This report is based on expert opinion formulated from available research. The new 2013 guidelines encourage use of HIV PEP regimens that are optimally tolerated.

New guidelines offer an option to conclude HIV follow-up testing of exposed HCW at 4 months if the 4th generation HIV screening assay is utilized. Although 4th generation testing was not utilized for this project due to its lack of availability at the time of the project, 4th generation testing can shorten the PEFU even further from four visits to three visits.

The guidelines continue to emphasize primary prevention, accurate initial risk assessment, prompt initiation of PEP, expert consultation, rapid HIV testing of source patients, and post exposure follow-up counseling for exposed HCWs to reduce the risk of transmission of HIV to HCWs involved in BBFE (Kuhar et al., 2013).

Limitations to USPHS guidelines are that no human randomized control trials assessing the comparative efficacy of current guidelines versus recommendation in the 2005 guidelines in regards to follow up and management in this population. It is difficult to perform quantitative studies or case-control studies due to the low frequency of seroconversions in HCW. However, these guidelines are very important to clinical practice as expert consensus and review of available research is essential in the development and implementation of concise evidence-based protocols given the limited quantitative studies available. The literature supports that a well established hospital

control plan that consists of immediate implementation of PEP and PE follow-up for HCWs can substantially decrease transmission of HIV to HCWs involved in BBFEs (Joyce, Kuhar, & Brooks, 2015).

Conclusions and Implications

The PEFU adherence rate among HCWs at a southern California Medical Center was poor; none of the 52 HCWs reporting BBFE in 2013 completed recommended PEFU. Since initiating the EBP practice change from December 2014 to June 2015, 100% of employees (N=37) involved in BBFE have completed recommended HIV PEFU.

There is an average of 60 BBFE at this facility annually. The new policy eliminated unnecessary PEFU in 75% of HCWs, an estimated saving of \$5,220 per year. In addition, preventing transmission of one serious blood-borne infection can save the facility more than a million dollars for medications, follow-up, lost wages, and disability payments.

The new policy and reminder system should be continued in the setting and expanded to other similar settings.

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CANP Abstract
**Nurse Practitioner-Led Practice Change to Improve HIV Postexposure Follow-up in
Healthcare Workers**

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Introduction: The purpose of this evidence-based project is to improve the rate of adherence to infection control policy and national guidelines for HIV postexposure follow-up (PEFU) in healthcare workers (HCWs) involved in occupational blood and/or body fluid exposure.

Background: Occupational exposure to human immunodeficiency virus (HIV) is a significant risk for all healthcare workers. It is estimated that there are more than 400,000 parenteral injuries suffered by healthcare workers in the United States every year; 1 out of 10 U.S. healthcare workers suffers a blood or body fluid exposure or a needle stick injury (Henderson, 2012). Transmission of one serious blood-borne infection can cost more than a million dollars for medications, follow-up laboratory testing, clinical evaluation, lost wages, and disability payments (Leigh et al., 2007). Completion of HIV postexposure follow-up in HCWs is very low worldwide, with one study indicating that only approximately 27-43% of HCWs completed scheduled follow-up, even when the source patient is known to be HIV positive (Ko et al., 2011).

The postexposure follow-up rate among HCWs for a major southern California medical center indicated poor adherence; none of the 52 HCWs reporting BBFE in 2013 completed all postexposure follow-up visits even when the source was known HIV positive.

Methodology/Design or Practice Change: The evidence-based project involved development of a new infection control policy based on new US Public Health Service recommendations for occupational blood/body fluid exposures to HIV, staff education, and creation of a reminder system for follow-up care.

Data Collection: A retrospective record review of employees included in the OSHA occupational exposure log and the employee HIV epidemiologic follow-up log will be used to collect adherence rates for HIV postexposure follow-up before and after implementation of the policy change, education, and reminder system. Elements to be extracted from the record review include source baseline HIV status (negative, positive, or unknown) and employee adherence to follow up at baseline, 6 weeks, 3 months, and 6 months.

Findings: The PEFU adherence rate among HCWs at a southern California medical center was poor; none of the 52 HCWs reporting BBFE in 2013 completed recommended

PEFU. Since initiating the NP-led practice change in December 2014-June 2015, 100% of employees (N=37) involved in BBFE have completed recommended HIV PEFU.

Clinical Significance: It is expected that there will be an increased adherence rate to the new infection control policy improving the rate of HIV postexposure follow-up in healthcare workers. Long-term effects will include absence of HIV infection in healthcare workers involved in an occupational blood and body fluid exposure. This knowledge may be helpful in guiding occupational health practice at other facilities to improve postexposure follow-up in healthcare workers, ensuring no transmission of HIV and reducing employee stress and time away from work.

DNP Capstone Poster

Stakeholder Presentation

Evidence of Problem

- Occupational exposure to human immunodeficiency virus (HIV) is a significant risk for all healthcare workers.
- It is estimated that there are more than 400,000 healthcare workers (HCWs) who suffer parenteral injuries in the United States every year (CDC).
- It is estimated only approximately 27-43% of HCWs complete HIV postexposure follow-up (PEFU), even when the source patient is known to be HIV positive (Ko et al., 2011).
- Transmission of one serious blood-borne infection can cost more than a million dollars for medications, follow-up laboratory testing, clinical evaluation, lost wages, and disability payments (Leigh et al., 2007).
- The emotional impact on the HCW can be long lasting, even in low risk exposure that does not result in transmission of infection (Green & Griffiths, 2013; Lee, Botteman & Xanthakos, 2005).

Problem Statement

- The problem identified for this project is low HIV postexposure follow-up in healthcare workers(HCWs) involved in a blood or body fluid exposure at Long Beach VA Medical Center.
- A retrospective chart review revealed that only 2.29% of exposed HCWs completed recommended follow-up from 2008 to 2013

HIV PE Follow-up in HCWs at Long Beach VA Medical Center CY 2008 to CY 2013

Factors Contributing to the Occurrence of the Problem

- Inaccurate tracking and documentation of postexposure follow-up in HCWs involved in BBFEs
- Incomplete documentation and inconsistent follow-up recommendations by healthcare providers
- Incomplete baseline lab collection for source patient
- Lack of knowledge among HCWs of the importance of immediate reporting of BBFE
- Outdated Infection Control Policy

John Hopkins Evidence-Based Practice Model

Proposed Solution

- Revise LBVA Infection Control Guidelines to reflect current National Guidelines for HIV postexposure follow up in HCWs
- Implementation of shorter/simpler follow-up regimen. Evidence shows a simpler follow-up regimen, leads to increased compliance by up to 24% (Atreja, Naresh, & Levy, 2005).
- Implementation of a new reminder system. Evidence shows a reminder system can improve follow-up compliance by up to 30% (Salameh, Olsen, & Howard, 2012).

Postexposure Follow-Up Among HCWs at Long Beach VA Medical Center for 2013

Anticipated Program Outcomes/Impacts

- Improve HIV postexposure follow-up completion in HCWs from 0% to 50% in 6 months
- Eliminate unnecessary laboratory screening costs
- Ensure zero transmission of HIV infection to HCWs involved in blood and body fluid exposure in the workplace.

PEFU Among HCWs in a Southern California Medical Center for Dec. 2014-June 2015

Measured Improvements

- The total number of reported BBFEs in HCWs from 12/2014-6/2015 was 37. The retrospective chart review revealed, all 37 HCWs completed all recommended PEFU visits
- Postexposure follow-up rate for VALB is 100%, well above the national standard
- No transmission of HIV to HCWs involved in BBFE

Cost Savings

- The new policy eliminated unnecessary PEFU in 75% of HCWs, an estimated saving of \$5,220* per year (N=60)
- Preventing transmission of one serious blood-borne infection can save the facility more than a million dollars for medications, follow-up, lost wages, and disability payments

Program Evaluation

- The HIV PEFU program compliance was measured by performing a retrospective chart review and facility OSHA log audit. Chart review and OSHA log audit were measured before, during implementation and upon completion. All reviews calculated the number of HCWs that completed recommended follow-up and were compared to HIV PEFU from previous years.
- Screening costs were measured by calculating the costs of one HIV screening test and multiplied by the number of recommended screening per case. The cost of PEFU screening under the new ICP and subtracted from the cost of screening under the old ICP, this is reported in total dollars spent.
- IRB Approval obtained from LBVA and USD .

Barriers/Limitations

- Staff turn over, staff relocation and off tour employees posed a challenge in implementing the new program change.
- Dissemination of information, forms and changes facility wide, was complicated by the change of location of electronic Infection Control Guidelines.
- Difficult to accurately measure and quantify decreased productivity, emotional costs associated with fear and anxiety from worrying about the possible consequences of an exposure, direct and indirect costs associated with drug toxicities and lost time from work

Conclusions

- Improved HIV postexposure follow-up rate in HCWs at Long Beach VA Medical Center from 0% to 100%
- There were zero transmission of HIV infection to HCWs involved in blood and body fluid exposure in the workplace.
- Eliminated unnecessary laboratory screening costs, saved the facility \$2626.12* estimated at \$5,220 annually

Future Work

- Blood and body fluid exposures are significantly under reported in healthcare workers, CDC estimates that more than 50% of HCWs do not report when BBFE occurs (CDC, 2010).
- A survey of HCWs revealed 38% had sustained at least one needlestick in the past year alone and 74% had suffered a needlestick injury during their careers (Johns Hopkins Medical Institution, 2007).
- A study from Johns Hopkins indicated that 99% of surgeons-in-training experienced an average of eight needle-stick injuries in their first five years of training.
- Future work includes development of an education campaign to promote the importance of reporting all BBFE in HCWs.

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