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**Community-Based Wound Care Intervention Utilizing Non-Clinical
Personnel in the Intravenous Drug Use Population**

by

Jennifer G. Fox

Paper submitted in partial fulfillment of the
requirements for the degree of

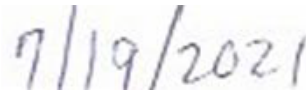
Doctor of Nursing Practice

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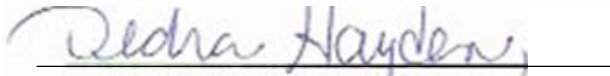
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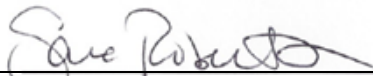
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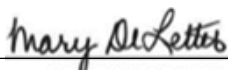
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Abstract

Background: Wounds resulting from injection drug use can increase morbidity and mortality in intravenous drug users (IVDU) (Kerr, et al., 2004; Phillips, et al., 2012; Pieper, 2019). Lack of access to healthcare contributes to self-treatment, worsening wounds, and severe co-morbidities (Robinowitz et al., 2014). Needle exchange programs (NEP) offer clean injecting equipment and infectious disease testing. NEP employees have close contact and high rapport with this population (Robinowitz et al., 2014). NEP can be utilized to assess skin for infection and high-risk injecting behaviors contributing to wound development. Early detection of wounds through assessment and prevention through cleaner injecting behaviors may lead to decreased wound occurrence (Phillips et al., 2012).

Aims: Increase knowledge and self-efficacy of skin assessment, wound development and identification in non-clinical staff (NCS) who work closely with IVDU population. Increase utilization of the Bacterial Infections Risk Scale for Injectors (BIRSI-7) scale to detect high-risk, wound causing injection practices among IVDU.

Methods: Voluntary convenience sample of NCS at a NEP were provided education pertaining to skin wound development and assessment. NCS implemented the BIRSI-7 scale to identify intravenous drug users at high-risk of wound development. Mean scores of pre/post survey knowledge and self-efficacy were measured and compared. Rates of use of the BIRSI-7 scale were also measured.

Short-Term and Long-Term Goals: Increase knowledge and self-efficacy of NCS in wound identification and assessment and maximize use of BIRSI-7 scale among NCS.

Results: NCS knowledge and self-efficacy were increased, the measures of self-efficacy was statistically significantly. BIRSI-7 application occurred approximately 50% of possible visits.

Key Words: *injection drug use; skin abscess; wounds; non-clinical staff; needle exchange*

Community-Based Wound Care Interventions Using Non-Clinical Personnel in the Intravenous Drug Abuse Population

Introduction

The Louisville Metro Department of Public Health and Wellness (LMDPHW) serves more than 750,000 residents of Jefferson County Kentucky and lists their vision as “a healthy Louisville where everyone and every community thrives” (Louisville Metro Department of Health and Wellness [LMDPHW], 2015). In 2015, after a nearby outbreak of the human immunodeficiency virus (HIV) in nearby Scott County located in Southern Indiana, the Louisville Metro Council and community stakeholders partnered with the LMDPHW to implement a needle exchange program (NEP) (LMDPHW, 2015) in an attempt to prevent the same occurrence in Louisville. The Louisville NEP utilizes the Harm Reduction Model to reduce risks associated with intravenous drug use (IVDU) (LMDPHW, 2015). This model addresses the potential risks and harm to individuals and society from drug use, while acknowledging some addicts are simply unable or unwilling to abstain (Marlatt, 1996). The NEP provides IVDU with clean, unused syringes and other paraphernalia anonymously (LMDPHW, 2015). Education for reducing healthcare risks due to IVDU and referral for treatment are also available (LMDPHW, 2015). LMDPHW aims specifically to “reduce the transmission of bloodborne diseases among persons who inject drugs and to protect their sexual partners” (LMDPHW, 2015, p.4). The program also offers free Hepatitis C (HCV) and HIV testing to screen for infection among this population; counseling and referral to HIV and HCV treatment clinics is also available (LMDPHW, 2015).

Problem Description

Background

The NEP offers bloodborne disease testing, treatment referral, and other free and anonymous services for individuals who abuse intravenous drugs (LMPDHW, 2015). Health and wellness needs in this population are evolving and now include measures for identification and prevention of cutaneous wounds from IVDU. This issue is gaining attention as an important topic related to IVDU as studies conducted exhibit a high rate of morbidity and mortality related to skin infection associated with it (Pieper, 2019). As the country's healthcare system continuously struggles to decrease expenses, hospitals are also looking at the costs associated with treatment of these wounds (Pieper, 2019). Development of community-based treatment programs specifically addressing skin infection in this population is becoming a priority for many communities throughout the country (Pieper, 2019).

The goal of implementing a quality improvement (QI) program for NCS at the NEP is to increase knowledge regarding the evaluation of wounds in the IVDU population, thereby identifying wounds earlier in their development, providing resources for treatment, and preventing long-term sequela. Like many other cities, there is a gap in treatment options and prevention education for these individuals who suffer with skin and other soft-tissue infections and injury in Louisville, Kentucky (T. Nunez, personal communication, September 17, 2019). Wound care needs in this population are growing in number and severity, leading to high morbidity and mortality (Phillips et al., 2012; Pieper, 2019).

Significance

Bacterial infection and skin and soft-tissue injury from IVDU has emerged as a major health complication (Phillips et al., 2017). Prevalence of these wounds in those who inject drugs ranged in studies from 29-68% (Robinowitz et al., 2014). Lloyd-Smith et al. (2010) reported that

wounds from IVDU are among the primary reasons for hospitalization among this population. These hospitalizations and treatment for skin infections are costly, with several facilities that reported sums above one million dollars per year (Grau et al., 2002; Lloyd-Smith et al., 2010; Robinowitz et al., 2014). One facility reported costs of twenty million dollars for one fiscal year associated with the management of IVDU patients and their co-morbidities (Lloyd-Smith et al., 2010). Outpatient, community-based facilities have been shown to reduce this economic burden (Grau et al., 2002) One Baltimore, Maryland NEP added a wound clinic service to its mobile exchange bus and found that it was successful in providing care to a wider range of patients at a lower cost (Robinowitz et al., 2014) This program named ‘Wounds on Wheels’ is an excellent example of how wound clinics can be integrated into already established programs (Robinowitz et al., 2014). Kerr et al. (2004) noted that limited access to primary care providers and reluctance to utilize emergency departments can lead to delayed treatment and longer, more frequent hospitalization. Smith et al. (2015) identified a large need for education specifically dedicated to skin infection identification both for the patient themselves and the people who treat them. Left undetected and untreated, wounds from intravenous drug injection often led to more severe skin infections, possibly contributing to need for amputation or even death (Smith et al., 2015). There is also a heightened risk for systemic illnesses such as endocarditis and osteomyelitis (Smith et al., 2015).

Rationale

Needs Assessment

A needs assessment was performed by interviewing stakeholders at the NEP. Stakeholders identified the need for ways to identify early signs and symptoms of skin and soft tissue infection and injury in the intravenous drug users who come to the NEP. By identifying

wounds earlier in their clinical course and assisting the patient in obtaining medical attention, it was believed that health outcomes for this population could be improved.

Intervention Development

It was identified that staff members who have the most personal contact with the participants at the NEP are NCS who worked closely with the clients and provided them with sterile injection equipment. NCS are defined as both paid and volunteer individuals who work one-on-one with participants of the NEP. Although these NCS have limited knowledge related to skin assessment and wound identification, the literature supports that this population often trusts staff at these programs more than other healthcare providers, contributing to an excellent opportunity for intervention and better health outcomes (Grau et al., 2002; Robinowitz et al., 2014). To offer the best healthcare to the participants at the NEP, this QI project focused education for NCS. The education consisted of key elements for early identification of skin wounds and introduction of the BIRSI-7 scale to screen for high-risk injection practices leading to these wounds by using evidence-based information and tools.

Purpose/Objectives

Purpose

The purpose of this QI project was to improve healthcare delivery to individuals who participate in the NEP located at 400 Grey Street in Louisville, Kentucky. Using the best evidence in the literature, this project aspired to educate NCS to implement basic skin assessments, increase their knowledge of skin infection indicators and increase self-efficacy of performing skin assessments in the IVDU population they serve. Also, NCS were taught to apply the seven-item Bacterial Infections Risk Scale for Injectors (BIRSI-7) to identify those individuals who are at higher risk of developing a wound due to their injection practices. NCS knowledge and self-efficacy related to skin assessment and application of the BIRSI-7 scale was

measured pre-education and post education to evaluate program benefit. Post education utilization of the BIRSI-7 scale by NCS was also measured.

Objectives

Specific objectives were to increase skin infection assessment knowledge and self-efficacy of NCS, increase the frequency of skin assessments performed, and increase utilization of the BIRSI-7 scale to identify NEP participants who are participating in high-risk injection practices known to contribute to wound development. Long-term goals included reducing the number of skin and other soft tissue infections and injury, decreasing morbidity and mortality in this population and lowering costs for the hospitals that most frequently treat these wounds. Another long-term goal of the NEP was to eventually have a provider available onsite at the clinic to evaluate and treat these skin infections in this population.

Environment

Clinical Site/Setting

The NEP is housed within the Jefferson County Health Department located at 400 E. Gray Street, Louisville, KY, 40202. It is overseen by the Health Services branch of administration. The NEP is open Monday-Saturday with varying hours each day (LMDPHW, 2015). For increased privacy, the NEP offices are located in a separate area of the building from other programs. NEP participants are directed to a dedicated space with its own waiting area. Once inside the office, participants are directed to one of four private cubicles where they meet with a staff member to obtain needles and other clean paraphernalia. The Covid-19 pandemic has made it necessary to re-locate this process outside and it is now housed outside tents. Plans are to move back inside the office as soon as possible but no date has been projected.

Stakeholders

Stakeholders for this project are: Dr. Sarah Moyer, Chief Health Strategist; Dr. SaraBeth Hartlage, Interim Medical Director; Stacie Ingram, Director of Nursing; Takeisha Nunez, Health Education Coordinator; Jane Evans, NEP Supervisor; and approximately 10-20 NEP non-clinical employees.

Target Population

Participants included in the QI project are full-time, part-time and volunteer NCS working in the NEP located in the Louisville Metro Health Department. The approximately 20-25 NCS included employees who are in direct contact with the participants of the NEP during their visits to obtain clean needles and other paraphernalia.

Clinical Culture

The NEP has an organizational culture that includes harm reduction for IVDU, and the mission of the program is to provide the best and most comprehensive care possible to this group of individuals. Team values of collaboration, innovation, grit, integrity and quality provide the framework for the culture at the NEP (Louisville-Jefferson County Metro Government, 2021).

Facilitators

The current team of employees at the NEP was in place, ready to learn and implement wound identification and care. The staff at the NEP was empowered to make changes for the betterment of the population they serve. Self-direction and autonomy are high amongst staff. As it is a small group, training was highly individualized.

Barriers

Possible barriers to implementing this project included budget constraints, time constraints, and a change in practices due to Covid-19. Participation by NCS may have been impacted by their workload and other obligations.

Ethics/Permission

As requested by the facility, an outline of the project was submitted to Dr. SarahBeth Hartlage on October 1, 2020. A written approval for project implementation at the NEP was obtained (Appendix A). Permission to use the Bacterial Infections Risk Scale for Injectors was obtained from author Kristina Phillips (Appendix B). Permission to use the Learning Self-Efficacy (L-SES) scale was given under the Creative commons Attribution License as noted on the front page of the article. The proposal for this project was submitted to the University of Louisville Institutional Review Board for approval and is included in Appendix C.

Conceptual Framework

The conceptual framework for this QI project was based on Malcolm Knowles' Adult Learning Theory using the Backward Design Educational Quality Improvement Framework (BDEQIF). The Adult Learning Theory postulates that adults learn differently than children and therefore need different learning environments and techniques (Knowles, 1981). Knowles (1981) identified that adults are often self-motivated learners who are ready to absorb new information when they enter educational programs. Wiggins & McTighe (2005) developed the BDEQIF framework for educational offerings focusing on goal identification and attainment.

Malcolm Knowles identified the need of individualization with adult learning subsequently formulating six assumptions (Knowles, 1981). These assumptions include that adult learners want to know why it is important for them to learn a new subject, experiences (both positive and negative) provide a foundation for learning, adults need to be involved in the way they will learn, the planning of learning activities and evaluation of their knowledge (Knowles, 1981). Adults are also more likely to be interested in learning topics that are pertinent to the work they do already and that is more focused on the goal or problem than the content

(Knowles, 1981). Also, internal motivation is higher than external pressure in adults (Knowles, 1981).

The Backward Design Quality Improvement Framework is used to aide educators in formulating learning experiences and subsequent assessments to identify successful learning (Wiggins & McTighe, 2005). This framework prioritizes individuality, goal setting and attainment (Wiggins & McTighe, 2005). There is a high level of interaction between learning goals, activities, and assessments (Wiggins & McTighe, 2005). The three stages of implementing the framework include describing desired learning objectives, determine how you will measure success of these objectives, and design educational offerings that will prepare learners to do well on assessment (Wiggins & McTighe, 2005). This framework was applied to the educational intervention and noted the goals of the education to increase the basic knowledge of skin assessment skills, increasing the number of skin assessments performed, self-efficacy, and applying and utilization of the BIRSI-7 among NCS.

This theory and framework provided an excellent foundation for the skin assessment education of the NCS members at the NEP. All of the staff included in the intervention were adults and therefore fall into the andragogy category of learners described by Knowles (Knowles, 1981). The staff demonstrated and understood the impact of this topic. They were excited about learning a new skill to better serve this population. They had many life experiences that brought expanded knowledge to the program, as some were recovering addicts themselves. The topic of skin assessment and early identification is highly entrenched in the work they were already doing, and they were internally motivated to learn.

Literature Review

Risks Associated with IVDU

The United States has an estimated 2.2 million intravenous drug users; this is the second largest population of IVDU worldwide (Larney, 2017). There are many health risks associated with intravenous drug use, including viral infections such as Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) (Larney et al., 2016). HCV is the most prevalent bloodborne pathogen in the United States, with an estimated 3.5 million chronically infected (Barbosa et al., 2019). Of the intravenous drug users worldwide, an estimated 17.8 % have contracted HIV and 52.3 % have HCV (Degenhardt et al., 2017). Many factors lead to the development of viral or bacterial infections from IVDU (Larney et al., 2016; Moradi-Joo et al., 2019). Sharing needles is a major indicator in both viral bloodborne disease transmission and bacterial infections (Moradi-Joo et al., 2019; Phillips et al., 2012). Skin infection and wounds are often the result of injecting with non-sterile equipment and participating in other high-risk injection practices (Phillips et al., 2012; Pieper, 2019). The literature pointed to several specific injection practices that correlate to increased frequency of abscess formation (Moradi-Joo et al., 2019; Phillips et al., 2012; Pieper, 2019). These included needle sharing, skin-popping, and injecting vasoconstricting drugs such as cocaine and methamphetamine (Powell, 2011). Skin-popping is described as either intentional or unintentional injection into subcutaneous or intramuscular spaces (Murphy, 2001; Powell, 2011). After years of injecting, it is often difficult or impossible to find a vein to inject into (Powell, 2011). When this occurs, IVDU will inject into subcutaneous or intramuscular spaces in an attempt to absorb some of the drugs (Powell, 2011). Also, failure to effectively clean the skin prior to injection is frequently cited as a contributing factor to skin infection (Kerr et al., 2004; Murphy et al., 2001; Phillips et al., 2012; Pieper, 2019; Vlahov et al., 1992).

Bacterial infections are another complication of IVDU (Larney et al., 2016). Microorganisms can be introduced through the skin when injecting due to many factors leading to cellulitis and abscess formation (Larney et al., 2016). Endocarditis, osteomyelitis, and sepsis can occur from untreated wounds or through introduction of bacteria into the bloodstream directly (Larney et al., 2016). Dahlman et al. (2017) interviewed a group of IVDU for data on wound occurrence and reported a lifetime prevalence of 70% among this population. Smith et al. (2015) notes 34% of IVDU surveyed had current skin infections. Tyagi (2016) found one-third of skin wounds evaluated at out-patient settings were directly related to IVDU.

As the US healthcare system struggles to decrease cost, hospitals are examining the economic burden associated with treating these wounds (Pieper, 2019). A Florida hospital chart review of 349 patients admitted for complications from IVDU found that 64% were due to skin and soft tissue infections; this same study estimated cost of treating these wounds per year at \$11.4 million (Tookes et al., 2015). Healthy People 2020 reported the “total overall cost of substance abuse in the US, including lost productivity, and health and crime-related costs exceeds \$600 billion annually (ODPHP, n.d.).

The seven-point Bacterial Infections Risk Scale for Injectors (BIRSI-7) can be used to identify participants utilizing high risk injection practices and optimistically decrease these behaviors (Phillips et al., 2017). Developed by the authors, this scale is a 7-item index can be used to detect high-risk injecting behaviors that are noted to increase the occurrence of skin and soft tissue bacterial infections (Phillips et al., 2017). Non-clinical team members at the NEP can be taught to use this scale and monitor IVDU for wounds based on its ability to identify higher-risk injection practices (Phillips et al., 2017).

Safer Injection Behaviors Can Make a Difference

Several studies demonstrated that certain high-risk injecting behaviors lead to increased numbers of skin and soft-tissue infections (Phillips et al., 2012; Phillips et al., 2017; Powell, 2011; Tyagi, 2016; Vlahov et al., 1992). Avoidance of high-risk injection practices along with proper skin cleaning prior to injection have been shown effective in decreasing skin infections (Phillips et al., 2012; Phillips et al., 2017; Tyagi, 2016; Vlahov et al., 1992). Phillips et al. (2012), conducted “Skin,” a randomized control trial involving education provided to IVDU in the Denver, Colorado area. This skin and needle hygiene intervention aimed to decrease occurrence of skin and other infections through educating participants about safer injection practices (Phillips et al., 2012). The “Skin” study started with 48 participants, 41 (85%) of which were present for the entire intervention demonstrating long-term follow up with this population is possible (Phillips et al., 2012). Prior to intervention, only 50% of the skin cleaning steps taught were correctly performed; following skin cleaning education, this number increased to 95.5% (Phillips et al., 2012). Eighty-two percent of participants were still performing skin and needle cleaning correctly at the one-month follow up, and 70.2% at the six-month follow up (Phillips et al., 2012). “Skin” is a clear example of a successful pilot study that reduced skin infections associated with IVDU through targeted education related to safer injection practices (Phillips et al., 2012). Researchers concluded educating addicts and changing their behavior is both possible and effective at reducing infections associated with IVDU (Phillips et al., 2012).

Vlahov et al. (1992) surveyed a group of 1,057 current IVDU concerning their frequency of skin cleaning prior to injection for the past six months to ascertain if improved skin cleaning practices are associated with fewer cutaneous infections. This survey consisted of questions regarding the incidence of infectious complications such as endocarditis and skin abscesses (Vlahov et al., 1992). To validate abscess occurrence, reported history was compared with the

physical examination (Vlahov et al., 1992). The study indicated a reduction in both abscess formation and endocarditis in participants who reported always cleaning their skin when comparing to individuals with no reported or less consistent cleaning practices. (Vlahov et al., 1992). Researchers concluded “the relatively simple procedure of encouraging intravenous drug users to clean their skin prior to injection will not eliminate but might reduce the frequency of these serious and expensive infectious complications” (Vlahov et al., 1992). While this study was dated, it is useful due to the specific skin cleaning instructions provided to the population of interest and the success demonstrated with those measures.

Non-Clinical Individuals Can Learn to Assess, Educate, and Change Behavior

The World Health Organization (WHO) defined task shifting as “the process of delegation whereby tasks are moved, where appropriate, to less specialized health workers” (WHO, 2008, p.7). This concept was introduced in response to the lack of appropriate numbers of healthcare workers in several foreign countries and has spread to use in Australia, Great Britain, Northern Ireland, and the United States (WHO, 2008). It was noted both by personal interview with stakeholders and the literature that NEP employees have close, frequent contact with the IVDU population, and excellent rapport (Comiskey et al., 2019; Fast et al., 2008; Grau et al., 2002). Non-clinical staff employed at the NEP and other community-based out-patient care centers can serve as a vital front-line in the detection of skin wounds in the IVDU population (Bamberger, n.d.).

Colon et al. (2009) conducted a pilot study using community outreach workers to educate IVDU about drug preparation practices that were shown to lead to high rates of infection. This study found that education by these non-clinical individuals was valued among the IVDU included (Colon et al., 2009). Participants were educated about four injection drug preparation practices that could be modified to decrease risk (Colon et al., 2009). These included adoptions

of promoted practices, changes in traditional practices, receptive drug sharing, and syringe acquisition and cleaning (Colon et al., 2009). Following a 16-week intervention period, it was noted that several behaviors had been changed in the IVDU (Colon et al., 2009). At an 18-week follow up there was a 65.6 % increase in skin cleaning with hand sanitizer and a 68.8 % increase in carrying of personal syringe rather than sharing a common syringe (Colon et al., 2009). This study is an excellent example of successful education by non-clinical personnel.

A recent study assessed the quality of non-clinical assessments (Osti et al., 2019). A brief training program was provided for NCS using criteria from the International Alliance for the Control of Scabies in 2018 (Osti et al., 2019). Then, non-clinical assessment results were compared to a diagnosis by two proficient examiners (Osti et al., 2019). Researchers determined it is possible for NCS to successfully assess skin for scabies and impetigo (Osti et al., 2019). Authors noted that to implement effectual treatment programs it is first important to accurately identify cases (Osti et al., 2019). Individuals in the best position to identify illness and provide basic treatments may be non-clinical (WHO, 2008). It is important to recognize the value these non-clinical examiners provided and empowered them with the basic knowledge and necessary skills to assist the populations they served (Colon et al., 2009; Osti et al., 2019; WHO, 2008).

Analysis of Evidence/ Synthesis Evidence Appraisal

Evaluation of the evidence as a whole, article titles, abstracts, and introductions provided clarity related to the purpose, study design, and rationale of this project. The literature review supported that skin infection and wound development from IVDU is a major health problem which increases morbidity and mortality in this population (Roose et al., 2009; Smith et al., 2015). It is commonly noted that certain injecting behaviors contribute to the development of these wounds (Phillips & Stein, 2010; Roose et al., 2009; Smith et al., 2015; Vlahov et al., 1992).

The literature also indicated that avoidance of these high-risk injection behaviors may reduce the number of skin wounds developed (Murphy et al., 2001; Vlahov et al., 1992).

Another common finding was that IVDU have poor access to and utilization of healthcare (Roose et al., 2009; Smith et al., 2015). There are few community-based services specializing in wound care and often the sole option is to visit an emergency department (Kerr et al., 2004; Smith et al., 2015). The literature described reluctant use of services provided by emergency departments, self-treatment, and hesitancy to seek assistance due to many societal, behavioral, and access factors (Roose et al., 2009; Smith et al., 2015). A common theme throughout the literature was that there is a huge need for more community-based wound care programs for this population (Smith et al., 2015). The few studies that presented examples of clinic based wound care showed the most positive patient outcomes (Bamberger, n.d.; Fast et al., 2008; Grau et al., 2002).

Methods

Project Design and Intervention Team

This quality improvement (QI) project utilized a convenience sample and the communication, educational content delivery, and data collection was conducted virtually. The participants consisted of non-clinically trained staff at the NEP who worked closely with IVDU to obtain clean injecting equipment. All NCS were invited to participate, and demographic data of participants was collected. Implementation used an on-line format via PowerPoint for an educational presentation and Microsoft Forms for data collection to accommodate practice changes and restrictions during the Covid-19 Pandemic. This QI project was implemented over a period of three months during the spring of 2021. Intervention team participants consisted of the project coordinator (DNP student), NEP supervisor, and NEP non-clinical staff (NCS).

Human Subjects Protection/ Informed Consent

All electronically collected data was deidentified and stored on an encrypted, password protected computer. Hard copy data collected at the NEP was kept in the locked office of the NEP director. This QI project was designed to be nonhuman subjects research with little to no risk for participants and therefore was exempt from full IRB review. As this was QI project that implemented survey measures, informed consent was obtained through a preamble describing the project and providing contact information for the project coordinator and IRB office. The project coordinator administered pre and posttests. Responses were de-personalized using a participant specific identifier of the first letter of their mothers first name, first letter of their fathers first name and the last 4 digits of their phone number. No identifiable information was used when analyzing data or during dissemination of findings.

Financial/Budget Needs

This project was cost neutral and there was no cost for the instruments or participants. The DNP project facilitator conducting testing and education donated the time needed for the project. Staff participating in the educational QI project did not incur overtime for their participation. Estimated cost of NCS time was approximately \$400. No funding was received for this QI project.

Timeline for Project Implementation and Data Collection

Project implementation commenced in the spring semester of 2021. Appendix H includes a Gantt chart for visual representation of entire project timeline.

The following is a step-by-step outline of phases:

1. Proposal submission to IRB occurred in Spring 2021 semester.
2. Email addresses of NCS were obtained from the NEP Director.

3. Following IRB approval, an electronic invitation to participate was sent via email to NCS participants describing the educational program. This email included dates NCS would have access to demographic survey (Appendix D), knowledge and self-efficacy pre-tests (Appendix E & G), and electronic educational power point presentation.
4. During a period of 3 weeks, the demographic survey (Appendix D) and knowledge and self-efficacy pre-tests (Appendix E & G) were available online to NCS. These instruments were made available using Microsoft Forms. NCS received reminder emails throughout this time period.
5. Educational content related to basic wound assessment skills and BIRSI-7 application was delivered electronically via a power point presentation. This was available for viewing for 2 weeks.
6. Following viewing of the educational power point presentation, the knowledge and self-efficacy posttest (Appendix E & G) were administered via Microsoft Forms to measure change.
7. Following introduction of BIRSI-7 scale to NCS, rate of utilization was calculated by comparing a pre-set number of visits (350) to the number of BIRSI-7 scales administered by NCS during that period of time.

Measurement

Measured outcomes include:

- Comparison of mean test scores related to knowledge and self-efficacy of basic skin assessment among NCS at the NEP as indicated by scores on pre and posttests. Using the paired t-test, scores were evaluated for improvement following intervention.

- The number of BIRSI-7 screenings carried out by NCS after the intervention was measured. This was accomplished by evaluating how many BIRSI-7 scales were utilized during a preset number of visits (350).

Instruments

A demographic survey was developed by the DNP project facilitator to acquire information about the population that participated in this QI educational program (Appendix D). An evidence-based quiz to evaluate pre and posttest knowledge of skin assessment and wound identification was also developed by the DNP project facilitator (Appendix E).

The Learning Self-Efficacy Scale for Clinical Skills (L-SES) by Kang, Chang, Kao, Chen, and Woo (2019) (Appendix G) was used to measure the self-efficacy of NCS pertaining to wound identification and high-risk injection practice. The original L-SES consisted of 12 questions each scored with a Likert scale, with an answer of 1 indicating disagreement with the statement and an answer of 5 indicating agreement. The L-SES consists of three categories, each containing four questions: Cognitive, Affective, and Psychomotor. The authors of this scale acknowledge that all questions may not be pertinent to specific projects and allow modification of the original scale. For this project, six of the 12 questions and only 2 categories were used (Appendix G).

The 7-item BIRSI scale (Appendix F) for identification of high-risk injection practices among IVDU was implemented by NCS. This scale was developed by Phillips, Anderson, Herman, Liebschutz, and Stein (2017) to identify specific injection behaviors shown to increase likelihood of skin infection and wound development. Answers to questions about injection practice is dichotomized as absent or present and a score is calculated. A higher score indicates increased risk for wound development. Application of this scale to IVDU participating in the

NEP was taught to NCS to better identify those individuals at heightened risk of wound development.

Validity and Reliability

The L-SES was developed for use as a generic and universal learning self-efficacy scale (Kang et al., 2019). Validity of the L-SES was measured using *t* tests. Values for the 12 questions ranged between 11.719 and 24.175 with statistical significance indicated by $p < 0.001$ (Kang et al., 2019). Each individual category of questions had the following ranges of *t* values: cognitive 13.450 and 21.193, affective 12.194 and 18.283, psychomotor 11.791 and 24.175 (Kang et al., 2019). All three categories had confidence intervals > 0 and did not cross 0 and *p* values for discrimination were < 0.001 , indicating high validity (Kang et al., 2019). Kang et al, 2019 report that their scale has high reliability as evidenced by a Cronbach's alpha coefficient of 0.931 for the questions included. Cronbach's alpha coefficient varied between 0.922 and 0.928 when each question was deleted (Kang et al., 2019). This indicates high reliability.

Neither the BIRSI-7 scale nor the quiz for knowledge of skin and wound identification have had internal validity calculated.

Data Analysis

The Statistical Package for Social Sciences (SPSS) version 27 was used to compare means of pre-test and posttest scores. The paired *t*-test was chosen to analyze data as this project compared the same variable at two different points. This test was chosen to evaluate if the QI education had a positive impact on the NCS knowledge and self-efficacy when dealing with skin wounds in the IVDU population. Also, data pertaining to number of BIRSI-7 scales administered to NEP participants indicated if the scale was utilized by NCS.

Results

Sample Description

Of a total of 26 possible participants, 8 completed all three of the required surveys and were included in data processing. The 8 participants ranged in age from 29 to 72 years with a mean age of 42.50 ± 13.79 years. Time working with the substance use population ranged from 6 months to 25 years with a mean time of 5.64 ± 8.70 years. Time working specifically with the intravenous drug use population ranged from 6 months to 4 years with a mean of 2.06 ± 1.43 years.

Table 1

Respondent Characteristics (n=8)

Characteristic ^a	No.	%
Age		
20-30 years	1	12.5
30-40 years	4	50
40-50 years	1	12.5
50 years and Older	2	25
Gender		
Male	1	12.5
Female	6	75
Other	1	12.5
Level of Education		
Some College	1	12.5
Bachelor's Degree	3	37.5
Graduate Degree	3	37.5
No Response	1	12.5
Years in Substance Use Treatment		
< 1 year	2	25
1-5 years	5	62.5
> 5 years	1	12.5
Time in IVDU Treatment		
Less than 1 year	1	12.5
1-5 years	7	87.5
Knowledge of Wound Care		
None	1	12.5
Limited	2	25
Some	4	50
Expert	1	12.5

The majority of participants described having some knowledge of wound care in the intravenous drug use population, were female, and had some level of college education.

Program Outcomes

Using a paired t-test to analyze pre-test vs posttest knowledge it was found that the difference was not statistically significant. This was determined as the computed t-test statistic of -1.00 is not less than the critical value of -2.31. The posttest score was an average of 0.50 points higher than the pretest score. Pre and post intervention self-efficacy was also compared using the paired t-test. It was found that there was a statistically significant difference in self-efficacy following intervention. The computed t-test statistic was -6.41 which is less than the critical value of -2.31. The posttest self-efficacy was an average of 10.63 points higher than pre-test scores. Also, use of the BIRSI-7 scale for identifying participants at risk of wound development was positive with 184 scales being filled out for 350 visits, meaning nearly half of participants during that period chose to be screened for high-risk injection practices.

Discussion

Summary

Intravenous drug users are at high risk of developing skin infections and often have limited resources for caring for these wounds (Dahlman et al., 2017; Larney et al., 2016; Phillips et al., 2017). Community-based programs are an important component of substance use treatment and staff at these programs have been shown to develop excellent rapport with clients (Grau et al., 2002). These non-clinical personnel are key in first line identification of wounds (Osti et al., 2019; Robinowitz et al., 2014). Utilizing NCS and their positive relationship with IVDU is one way to bridge the gap in care for this population of patients.

Interpretation

Data collected indicated that the educational intervention increased mean scores pertaining to knowledge and self-efficacy among non-clinically trained staff. Scores for increased knowledge were not increased as much as scores for self-efficacy. It is inferred that NCS had a solid base of

wound identification knowledge prior to the intervention, as the majority stated they had some knowledge prior to education on wound identification. Data implies they do feel more confident in their skills post intervention as indicated by the statically significant increase in self-efficacy scores. Wound care services provided as part of community-based programs is a relatively new model for care (Robinowitz et al., 2014). The literature reports that those programs in place throughout the country have made positive impacts on the resources and care available to IVDU (Phillips et al., 2012; Robinowitz et al., 2014).

This QI project has impacted the IVDU population in a positive way by increasing knowledge and self-efficacy of the NCS who are often the first to see skin infection and wounds. This project also increased awareness of high-risk injection practices that lead to higher rates of wound development through the introduction of the BIRSI-7 scale. This scale allows NCS to quantify risk of wound development for individuals who consent to answering the questions.

Limitations

There were limitations that impacted the outcomes of this QI project. The main one being sample size. There were several participants lost to follow-up once they completed the pre-test survey. The Covid-19 pandemic affected the educational intervention by requiring this QI project to be completed virtually versus in-person. An in-person delivery may have decreased the number lost to follow-up. In addition, many staff at the LPMHD found themselves involved in Covid-19 vaccination clinics. Findings from this QI project apply to NCS at the NEP in Louisville Kentucky but can be generalized to other NEP programs, especially NEP programs that rely on volunteers and NCS staff.

Conclusions

Sustainability

Implementation of basic skin assessment and the BIRSI-7 scale is a sustainable process for the NCS at the NEP to utilize and will assist in identifying both active and potential skin infection. Due to low cost and ease of use, this process can be easily continued in the future. The process is quickly and easily utilized and provides a standardized way for NCS to assess IVDU for active skin infection and future risk.

Implications for Future Study and Practice

Further QI projects could include identification and formulation of a referral process to other community resources. Current protocol for referral of individuals with identified skin wounds needing treatment is to encourage them to visit one of the nearby emergency departments. Often, NCS offer to physically walk with individuals to the ED. This process will continue throughout this project to ensure the safety and health of NEP participants. Also, recently a nurse has been hired at the NEP and will be available to assess participants if their screening with the NCS warrants further evaluation. Helping IVDU in the community who may not be able to get to the NEP gain access to wound care is another element that could be evaluated in the future.

The NEP has also hired a full-time advanced practice registered nurse (APRN) to evaluate and treat wounds. The literature supports that community-based programs aimed at improving access to healthcare has positive outcomes and this step by the NEP will provide care to a population that often has limited resources.

Dissemination

Information about wounds in the IVDU population and this QI project will be discussed during a poster presentation August 6, 2021, at the University of Louisville. The DNP project

coordinator will have a podium presentation about this QI project during the Kentucky Harm Reduction Summit August 11, 2021. This QI project will also be evaluated for submission to peer reviewed journals such as *The Journal of Addiction Medicine* and *The American Journal of Public Health*.

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Appendix A: Written Site Approval for Project Implementation at NEP



PUBLIC HEALTH AND WELLNESS
LOUISVILLE, KENTUCKY

GREG FISCHER
MAYOR

SARAH MOYER, MD, MPH
DIRECTOR

October 26, 2020

This letter is written to convey approval for Jennifer Fox's project to provide educational sessions on skin assessment and wound care to staff in the Syringe Services Program at the Louisville Metro Department of Health and Wellness during the spring of 2021. We understand that IRB approval will be gained by Ms. Fox and she will be using Pre- and Post-tests with staff to measure education gains.

We look forward to collaborating on this project.

Signed,

SarahBeth Hartlage, MD MS

Interim Medical Director

Louisville Metro Department of Public Health and Wellness

Appendix B: Written Approval for Use of BIRSI-7 Scale

Hi Jennifer,

I hope you are doing well. Yes, you can have permission to use the scale and can cite our 2017 paper for the 7-item index (see attached). Please note that the BIRSI measure hasn't been studied in detail or validated. In the 2017 paper, we eliminated some items and dichotomized the response choices. However, this more brief version hasn't been validated and needs a full psychometric analysis with an independent sample. I am attaching a file with both versions, see the notes at the end for how to distinguish.

As far as self-efficacy, I haven't seen anything like this, but the construct could be measured with one or more simple ratings (e.g., 1-10) of different behaviors/skills, such as "How confident are you that you could identify a skin infection resulting from injection drug use? Circle a number from 0 (Not at all confident) to 10 (Very confident)." Some years back I developed a harm reduction self-efficacy measure for PWID (see attached 2008 paper, measure at end). At one point, I recall seeing a government pamphlet that helped providers identify various skin infections, but I cannot seem to locate it.

As far as referring those who inject to the emergency dept., unfortunately that is often one of the only options. However, needle exchange staff could try to follow-up with participants to see if they went or not. It may also be worth seeing if there are any drop-in clinics that may serve PWID (I'm guessing you've probably already suggested that). One option that the needle exchange might consider down the road is hiring someone, even PT, for wound care. Our harm reduction program in Honolulu has someone who does clinic and street-based wound care, though she is full-time and has other responsibilities. Here is a link to their wound care program:

<https://www.hhhrc.org/woundcare>

Let me know if you have any other questions. You might also be interested in this new publication on our intervention that was just accepted for publication.

<https://onlinelibrary.wiley.com/doi/10.1111/add.15236>

Best,
Kristina

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Appendix C: University of Louisville IRB approval

**UNIVERSITY OF
LOUISVILLE**

Human Subjects Protection Program Office
MedCenter One – Suite 200
501 E. Broadway
Louisville, KY 40202-1798

DATE: March 10, 2021
TO: Whitney A Nash
FROM: The University of Louisville Institutional Review Board
IRB NUMBER: 21.0208
STUDY TITLE: Community-Based Wound Care Intervention Utilizing Non-Clinical Personnel in the Intravenous Drug Abuse Population
REFERENCE #: 723101
DATE OF REVIEW: 03/08/2021
IRB STAFF CONTACT: Sherry Block 852-2163 sbloc04@louisville.edu

The IRB Chair/Vice-Chair (or An IRB member) has reviewed your submission. The project described does not meet the "Common Rule" definition of human subjects' research. The IRB has classified this project as Non-Human Subjects Research (NHSR). The project can proceed.

This submission has been determined to be quality improvement, and not human subjects research, based on the goal(s) stated in the protocol.

Institutional policies and guidelines on participant privacy must be followed. If you are using protected health information, the HIPAA Privacy rules still apply.

Any changes to this project or the focus of the investigation must be submitted to the IRB to ensure that the IRB determination above still applies.

Amendments for personnel changes or study closures are not required.

If you have any questions, please contact: Sherry Block 852-2163 sbloc04@louisville.edu

We value your feedback; let us know how we are doing: <https://www.surveymonkey.com/r/CCLHXRF>

Sincerely,



Paula Radmacher, Ph.D., Vice Chair,
Biomedical Institutional Review Board
PR/slb

Appendix D: Demographic Survey

To better understand the population participating in this project, please answer the following questions:

1. Age _____
2. Gender Identification _____
3. Highest level of education obtained? _____
4. Indicate if you have a clinical licensure?

_____ Medical Assistant

_____ LPN

_____ RN

_____ APRN

5. Describe your level of knowledge related to skin wounds from Intravenous Drug Use (IVDU)?

_____ None

_____ Limited

_____ Some

_____ Expert

6. How long have you worked in addiction treatment? _____
7. How long have you worked specifically with intravenous drug use? _____
8. How long have you worked at the needle exchange program at the Jefferson County Health Department? _____
9. What barriers do you believe are keeping skin assessments for needle exchange program (NEP) participants from occurring? {These can be personal, learning, systemic}

Appendix E: Skin Assessment and Wound Identification Knowledge Quiz

1. What are signs of infection in a skin wound? (select all that apply)
 - a. Redness
 - b. Swelling/hardening around wound
 - c. Increased pain
 - d. Heat around the wound

2. Redness and swelling of the site exceeding _____ from the wound should be reported.
 - a. 1 inch
 - b. 2 inches
 - c. ½ inch
 - d. Redness around site is a normal finding

3. Drainage of pus from a wound is an indication of infection. (True or False)
 - a. True
 - b. False

4. A red streak radiating from the wound is a sign of infection. (True or False)
 - a. True
 - b. False

5. Fever may be present if a wound infection is developing. (True or False)
 - a. True
 - b. False

6. A deficit in systematic oxygen levels can contribute to delayed wound healing. (True or False)
 - a. True
 - b. False

7. There are _____ stages of wound healing.
 - a. 3
 - b. 2
 - c. 5
 - d. Unlimited amount

8. Unless a wound is obviously infected or has heavy discharge, it is common to leave chronic wounds covered with clean, dry dressings and only change every _____ ?
 - a. 24 hours
 - b. 48-72 hours
 - c. 36 hours
 - d. 5 days

Appendix F: BIRSI-7 Scale

SKIN CLEANING AND HYGIENE PRACTICES

1. In the past 3 months, when you injected, how many times did you clean your skin?

- I always clean my skin before I inject 0
- I clean my skin most of the time (75%) before I inject 1
- I clean my skin about half of the time (50%) before I inject 2
- I clean my skin sometimes (25%) before I inject 3
- I rarely or never (0%) clean my skin before I inject 4

2. In the past 3 months, when you injected, how many times did you wash your hands with soap & water, hand sanitizer, or alcohol wipes before you injected?

- I always wash my hands before I inject 0
- I wash my hands most of the time (75%) before I inject 1
- I wash my hands about half of the time (50%) before I inject 2
- I wash my hands sometimes (25%) before I inject 3
- I rarely or never (0%) wash my hands before I inject 4

INJECTION LOCATION

3. In the past 3 months, when you injected, how many times did you inject under your skin rather than into a vein {skin pop}?

- About once per month or less 1
- A few times each month 2
- About once a week 3
- A few times each week 4
- At least once per day 5

4. In the past 3 months, when you injected, how many times did you inject into your muscle {muscling}?

- About once per month or less 1
- A few times each month 2
- About once a week 3
- A few times each week 4
- At least once per day 5

INJECTION SUPPLIES

5. In the past 3 months, when you injected, how many times did you use a NEW, never before used needle to inject?

- I always (100%) use a new needle to inject 0
- I use a new needle to inject most of the time 1
- I use a new needle to inject about half of the time 2
- I sometimes use a new needle to inject 3
- I rarely or never use a new needle to inject 4

INJECTION FREQUENCY

6. In the past 3 months, how many times did you inject cocaine or a cocaine and heroin mix {speedball}?

- About once per month or less 1
- A few times each month 2
- About once a week 3
- A few times each week 4
- At least once per day 5

OTHER INJECTION RISK PRACTICES

7. In the past 3 months, how often have you been to a shooting gallery/house or other place where users go to shoot-up?

- About once per month or less 1
- A few times each month 2
- About once a week 3
- A few times each week 4
- At least once per day 5

* **Scoring:** Sum score for each question; higher score = higher risk of wound development

Appendix G: Learning Self-Efficacy Scale for Clinical Skills

COGNITIVE

disagree <<<<>>>>agree

- | | | | | | |
|---|---|---|---|---|---|
| 1. I can recall how to perform a basic skin assessment | 1 | 2 | 3 | 4 | 5 |
| 2. I understand the content of the BIRSI-7 scale and can demonstrate it to others | 1 | 2 | 3 | 4 | 5 |
| 3. I can verbally explain the purpose & principle of applying the BIRSI-7 scale | 1 | 2 | 3 | 4 | 5 |
| 4. I can verbally explain the sequence and interrelationship between each step of the skin assessment | 1 | 2 | 3 | 4 | 5 |

PSYCHOMOTOR

- | | | | | | |
|--|---|---|---|---|---|
| 5. I can precisely imitate the instructor's steps & actions of the skin assessment | 1 | 2 | 3 | 4 | 5 |
| 6. I can smoothly complete the operation steps of the skin assessment | 1 | 2 | 3 | 4 | 5 |

* **Scoring:** Sum score for each question; higher score = higher rate of self-efficacy & knowledge

