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Examination of Exposure Types Association with Stigma and Impacts on Sharps Injury Reporting in Ambulatory Surgical Centers

Timothy William Lynch
Walden University

Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral study by

Timothy Lynch

has been found to be complete and satisfactory in all respects,
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Review Committee
Dr. Twanda Wadlington, Committee Chairperson, Public Health Faculty
Dr. Raymond Panas, Committee Member, Public Health Faculty
Dr. Patrick Dunn, University Reviewer, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

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MS, Colorado State University, 2019

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Public health depends on the efficiency of work delivery among healthcare workers (HCWs) and their positive goal orientation in healthcare. Effective minimizing of needlestick and sharp injuries (NSSIs) and timely reporting are fundamental to meeting public health goals. The specific research problem addressed through this study is whether the independent variable of exposure type (needle stick injury, splash exposure injury, other sharp injuries) has an association with stigma associated with sharps injury reporting (dependent variable) among HCWs in ambulatory surgical centers. A quantitative, cross-sectional design involving secondary data analysis was used. Regression was used to analyze pre- and post-workshop survey data. Of the participants, 82.8% understood the reporting system, and in the past year, only 11.1% had or experienced injury-related cases. Of those experiencing injury, 63.6% reported the injury. Most common reasons for underreporting were not understanding, time-consuming, and low-risk perception. Results showed needlestick injuries, splash exposure, and other sharp injuries were not statistically associated with stigma reporting. The results call for policy changes and additional staff training and awareness promotion. Implications for social change include implementing change measures within healthcare settings to minimize health risks attributed to NSSI exposure.

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Introduction: Foundation of the Study

Public health is the epitome of improving quality of life, lowering potential human suffering, and extending community members' life expectancy. Thus, there is a need to adopt proper health-related measures to support better health outcomes among public members if achieving public health goals whenever possible. For example, needlestick and sharp injuries (NSSIs) rank as a serious healthcare problem, with the incidences in healthcare settings resulting in adverse implications for the wider public community (Stojic et al., 2021; Verbeek & Basnet, 2019). The escalation of NSSIs stems from the prevalent exposures, ranging from needle stick injury exposure on health professionals, bloodborne pathogen exposure, splash exposure injury, and surgical instruments. The combination of all these risks exposes the public to over 20 NSSI related diseases, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) (Gurria et al., 2019; Hasak et al., 2018; Stojic et al., 2021; Verbeek & Basnet, 2019).

Problem Statement

Past studies have documented the negative implications of NSSIs on healthcare workers and healthcare institutions (Grabovac & Lucijanic, 2021; Grimmond & Good, 2019; Motaarefi et al., 2016; Stojic et al., 2021). Moreover, according to the US Occupational Health and Safety Administration (OSHA), around 5.6 million healthcare workers (HCWs) are exposed to occupational risks attributed to various bloodborne pathogens due to NSSIs; multiple health professionals, such as both doctors and nurses,

in public and private institutions are affected (Grimmond & Good, 2019). Stigma among HCWs and the risks associated with NSSIs reporting rank as critical issues linked to NSSIs in health institutions (Motaarefi et al., 2016). Similarly, this risk exposure adversely affects patient care activities by compromising HCWs efficiency (Bilek et al., 2022), with impacts escalating during calamities, e.g., post Covid-19 period (Stojic et al., 2021).

Purpose of the Study

This quantitative, case-control study investigates the association of exposure types (independent variables), i.e., bloodborne pathogen exposure, needle stick injury, splash injury exposure, with stigma (dependent variable). The focus is to examine the data relative to underlying guidelines and standards of 100% compliance, as defined under OSHA regulations. This quantitative study focuses on Eagle County, Colorado, as the sampling frame of the different populations.

Research Questions and Hypothesis

The quantitative research examines exposure types relative to stigma among healthcare workers by applying a cross-sectional design. In meeting this goal, the project is guided by the following research questions and subsequent hypotheses.

RQ1: Is there an association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H1o: There is no association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H1a: There is an association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

RQ2: Is there an association between needle stick injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H2o: There is no association between needle sticks and the stigma of healthcare workers (HCWs) reporting in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H2a: There is an association between needle sticks and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

RQ3: Is there an association between splash exposure injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H3o: There is no association between splash exposure injury and stigma on injury reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H3a: There is an association between splash exposure injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

Theoretical Framework

Needlestick and Sharp Injuries (NSSIs) have been documented by multiple researchers as a healthcare problem with global implications (Bilek et al., 2022; Cook & Stephens, 2017; Gurria et al., 2019). However, the main issue is the inadequate reporting of sharp injury incidences within healthcare settings. For example, Cook and Stephens's (2017) study found that only 14.9-69.4% of sharp injuries are reported, a percentage dependent on the health organization. Considering the lower bound (14.9%), failure to report sharp injuries is a risk for the HCWs and the health system, the level of risk denotes the chance a specific action/activity is happening and harming the affected agent. In healthcare, infection prevention and control (IPC) measures/practices are critical in risk mitigation (Wilkason et al., 2020).

Kahneman and Tversky's (1979) prospect theory exhibit significant concepts that apply to individual and organizational decision-making. This theory is the foundational basis for this study's theoretical framework, as illustrated in Figure 1. Kahneman and Tversky (1979) explain that analyzing decisions and subsequent actions is pegged on the expected utility when under risk. Hence, on an individual level, Kahneman and Tversky (1979) recognize that based on decision utility, persons take time to consider or perceive the usefulness (gains) the specific decision holds under risk. The alternative also holds regarding perceived losses. Given the consequences of an individual's decision on their

reality, people make choices based on existing options (Pan, 2019), which affects their subsequent personal behaviors and actions within their surroundings. As such, Kahneman and Tversky's (1979) concepts have applications in healthcare and decisions HCWs make when dealing with NSSIs risks.

Prospect theory is founded on utility, specifically the expected utility attached to a decision (Pan, 2019). When faced with potential risk, e.g., sharp injuries, the HCWs decide to either report the sharp injury using existing facility measures, or not report the sharp injury. This tradeoff is a widespread problem in private and public healthcare facilities (Bilek et al., 2022; Grimmond & Good, 2019). With prospect theory, there is the assumption that an individual values loss and gains differently, and this attached differentiated utility impacts decision-making, with individuals more likely to make decisions and take actions based on the specific perceived gains related to their activities than the perceived loss (Kahneman & Tversky, 1979). HCWs are also exposed to this concept, affecting the actions taken in case of sharp injury incidences.

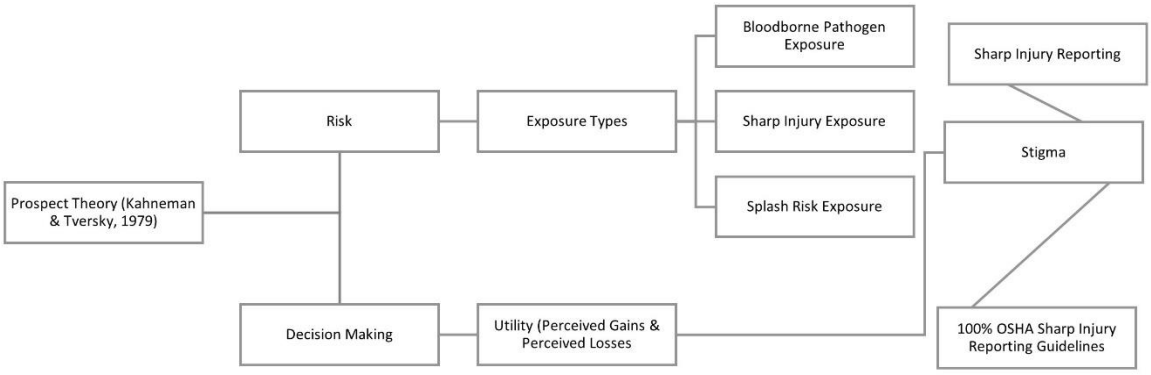
First, despite the risks associated with sharp and needlestick injuries within healthcare facilities, research shows that not all cases are reported (Bilek et al., 2022; Cook & Stephens, 2017; Gurria et al., 2019). According to Kahneman and Tversky's prospect theory, there is a tendency for people to actively fail to respond rationally to risk messages. This paradox arises from people consistently applying judgment and decisions based on heuristics by only adopting simple rules of thumb as the basis for arriving at risk assessments. Despite the enormous information and literature documenting sharp injuries, adverse impacts, and management measures, this also happens in healthcare settings.

Hence, despite evident risks, the outcome is that healthcare workers fail to actively report injuries. HCWs suffering stigma is one negative outcome associated with underreporting sharp injuries (Gurria et al., 2019).

In a healthcare setting, this inefficiency stems from HCWs evaluating the alternatives, e.g., suffered stigma, and considering perceived gains on their decisions. With the foundation of Kahneman and Tversky's (1979) prospect theory, this quantitative, case-control study investigates the association of exposure types (independent variables), i.e., bloodborne pathogen exposure, needle stick injury, and splash injury exposure, with stigma (dependent variable), guided by 100% OSHA reporting guidelines, towards the realization of efficient sharp injury reporting goals.

Figure 1

Theoretical Framework



Literature Search Strategy

Conducting research relies on evaluating past studies, which makes conducting a proper search strategy pivotal. To meet the desired article size goal for study inclusion,

the search covered critical databases with medical field sources, including EBSCOhost, MEDLINE, PubMed, Google Scholar, and BioMed Central (BMC). Likewise, keywords relative to the current study were used to ensure good source compilation and were completed individually during each session. The search keywords included *Sharp Injuries, Needlestick injuries, Sharp Injuries AND stigma, stigma AND injury reporting, sharp injury AND exposure, sharp injury in Ambulatory centers,* and *stigma OR low-risk transmission*. Lastly, to reflect the newest discoveries and modern best practices on needlestick and sharp injuries, only articles within 5 years were included (2017 - 2022).

Literature Review

Public health forms a fundamental fragment of the widely recognized health systems, which according to the Centers for Disease Control and Prevention (2020), entails actions undertaken as a society towards reassuring and promoting conditions vital in meeting people's health needs. To ensure community/public wellness, a fundamental objective is to eliminate and mitigate the healthcare system's challenges that risk public wellness. Since public health aims to improve a population's/community's health outcomes by meeting disease prevention objectives (CDC, 2020), it is vital to promote proper behaviors in health settings that minimize communicable and non-communicable disease risks and high injuries (Cooke & Stephens, 2017; d'Ettorre, 2017), while ensuring public access to required and quality health services.

Ambulatory surgery centers (ASCs) are core in the healthcare system, facilitating the provision of same-day surgical care, required diagnostic measures, and subsequent preventive procedures. In realizing this objective, the goal aligns with 100% OSHA

Sharp Injury Reporting. Nonetheless, healthcare workers experience challenges, and with associated stigma as part of the workplace, underreporting of these events continues (Cook & Stephen, 2017). Of the different theories, Kahneman and Tversky's (1979) prospect theory offers in-depth concepts that help decipher the rationale for the poor reporting of NSSIs among healthcare workers (HCWs). The escalation of exposures, i.e., bloodborne pathogen exposure (BPE), sharp injury exposure, and splash risk exposure, have adverse implications on patient care, given the associated dangers to HCWs (Stojic et al., 2021). Preventative care forms a core aspect of evidence-based practices (EBPs) instead of cure measures later in the patient's care process (CDC, 2020; Larsen, 2019). In this sense, achieving 100% OSHA reporting exposure risks is core to improving patient care.

Theoretical Basis and Connections to the Research Objectives

The scope of evidence-based practices (EBPs) lies in efficiently adopting fundamental research toward better care outcomes (Larsen, 2019), which also assist in managing increasing exposure risks. Given the problem of sharp injury underreporting in healthcare (Cook & Stephens, 2017; Gurria et al., 2019), the goal lies in examining underlying concerns and applying measures for problem prevention. Based on Kahneman and Tversky's (1979) prospect theory, individuals' final decisions are based on considering available options. With the likely harmful elements associated with workplace stigma, the likelihood of individuals (i.e., HCWs) making biased judgments, as is the basis of prospect theory (Kahneman & Tversky, 1979; Pan, 2019) is high. Research shows that HCWs understand the risks associated with underreporting (Guthrie,

2021; Motaarefi et al., 2016), yet the problem still exists (Verbeek & Basnet, 2019). In prospect theory, decisions are biased, and there is less consideration of facts as the basis in decision-making (Kahneman & Tversky, 1979; Pan, 2019). Hence, when subjected to stigma and the extreme risks that can be perceived if one reports the exposures they face in the workplace, Kahneman and Tversky depict the notion that HCWs are more likely not to report needlestick and sharp injuries in their workplace.

Stigma and Needle Stick Injury

Stigma within health settings is problematic to patient wellness and healthcare workers themselves (Van Brakel et al., 2019). Stigma after suffering needlestick injuries negatively affects the HCWs care-seeking actions and behaviors. Fears, e.g., being seen as incompetent, and likely losing jobs upon exposure to pathogens have adverse behavioral outcomes. Increasing incidences of stigma and accidental needlestick injuries have a bi-directional implication on each other. With underlying stigmatization rising, there is a rising likelihood of injuries, and experienced injuries potentially lead to fears and stigma among health workers. The adverse implications of needlestick and sharp injuries (NSSIs) have also been examined as problematic by other authors. For example, Bilek et al. (2022) undertook a cross-sectional study covering 840 nursing students that examined the relationship between occupational health and safety (OHS) awareness and empowerment levels and NSSIs occurrence and reporting. Their research found that participating in and receiving OHS and NSSIs training increased their NSSI awareness and other public care measures among the examined nursing students. Overall, the awareness training contributed to lower NSSI occurrences and improved reporting. Using

Bilek et al.'s (2022) study findings, health agencies and professionals can actively adopt evidence-based practice control measures vital in managing risks associated with NSSIs, while raising awareness of the risks among health workers.

Cook and Stephens (2017) examined needlestick injuries (NSIs) burdens among healthcare workers with a critical focus on the clinical, humanistic, and economic implications. The researchers' findings documented that successful needlestick injury reporting is only 14.9-69.4%, with other cases going unreported, which depicts the problematic status within healthcare settings. Economically, NSSI accounts for US$ 747 in average costs. Since public health is core to realizing prolonged life (CDC, 2020), making social and economic changes in healthcare, as documented by Cook and Stephens, is fundamental to ensure community wellness.

In d'Ettorre (2017), researchers examined NSSI occurrence frequency within healthcare settings, as well as how their prevalence affected settings workdays, nightshifts, cumulative hours, and forward-rotating shift schedules for the different registered nurses (RNs) in a hospital setting. Overall, d'Ettorre (2017) reported that with rising NSSI frequency, higher night shifts (three or more-night shifts) escalated injury cases for a seven (7) day timeline. Similarly, in depicting how risky excessive work has on NSSI incidences, higher cases were seen among nurses working over nine-night shifts than those working under four-night shifts before NSSI occurrence relative to 28 working days. Based on d'Ettorre's (2017) findings, excessive work contributes to NSSI incidence rises, promoting the need to adopt proper working conditions and reasonable work shifts.

Stojic et al. (2021) conducted a retrospective cohort study taking a comparative approach to evaluating sharp injuries relative to the year before the onset of Covid-19 and years after, focusing on pre-chosen hospital emergency departments in Croatia. They found that needle sticks and sharp injuries (NSSIs) were significantly higher during the pandemic for hospitalized patients; however, serology tests, especially for Hepatitis and HIV, had no significant difference across the two timelines. This study is pivotal as it documents the implications of external factors, the Covid-19 pandemic on NSSIs, and the measures to ensure public health in calamities. Lastly, Verbeek and Basnet's (2019) meta-analysis covering 45 studies found that the population's injury risks in the surgical units were at 13.2 per 100 time-unit. Of ten surgical operations, one resulted in sharp injury for healthcare workers.

Stigma and Bloodborne Pathogen Exposure (BPE)

Stigma and discrimination are common attributes in health conditions recognized as being either incurable, dangerous, or contagious (Van Brakel et al., 2019). This means for bloodborne pathogen cases, HCWs are pre-disposed to stigmatization elements. For HCWs, three of the well-known bloodborne pathogens are Human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) (Stojic et al., 2021; Yasin et al., 2019), with risky implications for entry into the worker's bloodstream. Therefore, as a mechanism for ensuring healthy workplaces and minimizing risks to HCWs, using evidence-based practices (EBPs) becomes necessary. As core variables in this research, bloodborne pathogen exposure (BPE) and splash injuries are risks that HCWs face (Kaweti & Abegaz, 2017). Given the routine activities care workers engage

in daily, there is the likelihood of splashes from the utilized catheter bags and bedpans and during activities such as suction cup emptying. Hence, irrespective of the specific roles the care provider is engaged in, there is an evident likelihood that one of more activities exposes them to risks. According to Kaweti and Abegaz (2017), Splash (blood and other body fluids – BBFs) exposure to the HCWs providing their respective services is likely to result in health risks, part of which also exhibits associated complications. These include chronic diseases for the HCWs, psychological distress due to underlying illnesses and worry about their wellness, and extreme incidences of death (Chongswatdi et al., 2022; Kaweti & Abegaz, 2017).

The efficient working of HCWs is essential; however, BPE incidences are associated with the worker's profession, existing healthcare policies, and workload (Kaweti & Abegaz, 2017), among other factors. HCWs in surgical departments have higher risks for BPE based on the critical aspects of their work and interactions with different equipment. Moreover, work overload, mostly linked with multiple responsibilities, results in other effects, e.g., stress, tiredness, and poor concentration, which raise HCW's risks of exposure (Kaweti & Abegaz, 2017; Yasin et al., 2019). With these incidences rising, one risks getting infected with unforeseen pathogens due to their unforeseen transfer through the different tools into the HCW's mouth, exposed wounds, eyes, and sometimes through the nostrils (Kaweti & Abegaz, 2017). Additionally, for HCWs, there is the likelihood of experiencing psychological stress that adversely affects their workplace efficiency (Sweileh, 2022). On an organizational level, splash exposure and increasing cases or incidences of bloodborne pathogen exposure (BPE) within the

health facilities are associated with financial costs due to prophylaxis treatment and drugs required for the affected HCWs (Sweileh, 2022).

Similarly, Gurria et al. (2019) examined the implications of adopting a quality and safety improvement program for bloodborne pathogen exposure (BPE) comprised of nurses, surgical technologists, surgeons, and health specialists. Results showed that within a year, there was a 15.6% decrease in BPE incidences upon program implementation. Because of the various causal reasons, needlestick suturing ranked as the cause of 47.6% of reported Bloodborne pathogen exposure (Gurria et al., 2019).

Stigma and Splash Exposure Injury

Accidental splash exposure incidences within healthcare settings are noted as a occupation-based healthcare issue with significant implications for healthcare workers (Kaweti & Abegaz, 2017; Sweileh, 2022; Yasin et al., 2019). Moreover, with variations in healthcare technologies across countries, and differences in HCWs' expertise in adopting evidence-based practices (EBPs), there are higher cases of splash exposure in developing countries (Kaweti & Abegaz, 2017). The inadequately implemented safety practices, weaknesses in continued healthcare workers' training (Yasin et al., 2019), and inadequate worker protection measures and devices contribute to rising splash exposures (Kaweti & Abegaz, 2017).

Grimmond and Good (2019) document blood exposure proportions by undertaking a survey encompassing members of the Association of Occupational Health Professionals in Healthcare (AOHP) across 37 US states. Their study found that of all sharp injuries (SIs), 40.5% were attributed to surgical procedures, doctors reported 29%,

nurses reported only 39.8%, and mucocutaneous exposures (MCE) were 27% of all reported exposures. Likewise, pediatric surgery ranked as one event resulting in the most injuries, i.e., 19.0% (Gurria et al., 2019), which subsequently pre-disposed the healthcare workers to pathogen entry into the bloodstream. Hasak et al. (2018) studied needlestick injury prevalence in an urban-based surgery department, attitude changes among the sample participants, and changes in prevention measures for needlestick injuries; they reported that only 38.7% reported needlestick injuries. Underreporting of needlestick injuries creates risky entry points for pathogens, and subsequent patient interactions put healthcare workers in more danger. Managing the associated risks of fluid and blood splashes relies on effective control of other exposure risks, i.e., needlestick injuries and bloodborne pathogen exposure (BPE) incidences. Moreover, Yasin et al. (2019) and Kaweti and Abegaz (2017) note how workload and workplace settings as also impacting splash exposure incidences. Of the different hospital settings, HCWs in operation and delivery rooms have the highest splash exposure risk (Kaweti & Abegaz, 2017).

Definitions

Bloodborne Pathogen Exposure (BPE): Records the reported numbers or proportions of BPE cases, representing infectious microorganisms as the core cause of diseases. The level of measurement for this variable is the ratio.

Needle Stick Injury: Entails an array of wounds suffered by health providers attributed to unintentionally puncturing the skin with needles. This variable's measurement level is a ratio representing injury incidences and reported counts.

Splash Exposure Injury: Encompasses exposure risk type due to bodily fluids splashing into health provider's open incisions, wounds, or membranes. This variable's measurement level is a ratio depicting reported cases or counted incidences.

Stigma: In the context of needlestick and sharp injuries (NSSIs) reporting, it entails the hostile perception healthcare workers (HCWs) receive due to their distinctive attributes or personal traits related to sharp injury errors/mistakes. The level of measurement for this variable is a ratio, represented by the average of the responses by the participants on evaluated individual stigma elements. According to Van Brakel et al. (2019), stigma measurement encompasses multiple elements; in measuring stigma, core considered elements might encompass "Alienation, Stereotype Endorsement, Perceived Discrimination, Social Withdrawal, and Stigma Resistance" (p. 16). These individual items are measured on an ordinal scale, and the average for each response results in obtaining a ratio scale type of measurement. Thus, when based on ranked ratings, their summarization offers a single quantitative value represented numerically, hence quantitative study. With each participant reporting their stigma levels on each element, computing the average of the total responses helps obtain a numeric value per participant.

Assumptions

The completion of this research was attributed to considering specific assumptions reassuring the study's reliability and generalizability. The research was based on data collected from healthcare professionals and statistical tools; there is documenting core assumptions vital for study results. The study completion was based on assumptions relative to this study methodology. The assumption is that for the primary

data, the responses provided by the health professionals at the planned workshop (Guthrie, 2021) are truthful and represent the participant's true practices, skill level, and behaviors.

Another assumption regards generalizability. The sample data covered multiple health professionals, offering responses relative to their specific practices. As such, the study maintains the assumption that the research findings are generalizable in informing practices and behaviors for the wider healthcare population and supporting policy changes. The last assumption regards normality. This research is quantitative, utilizing association statistical techniques that require assessing normally distributed data. The reporting of sufficient findings in this study relies on using primary quantitative data and completing statistical analysis by holding the normality assumption as accurate.

Scope and Delimitations

Considering the scope and impact the completed research will have on the population, it is essential to explain core delimitations associated with the study. Notably, the research process is extensive, and with the numerous questions that can be asked and examined, the scope and delimitations help explain the core aspects of the research process. The scope and delimitations considered in the quantitative study included the following. This study is quantitative and applies statistical analysis, incorporating previous evidence to make conclusions. Despite other approaches such as qualitative and mixed research (McCusker & Gunaydin, 2015), the current research only focuses on quantitative methods since this aligns with the study objectives and the available primary data. The scope of healthcare research is diverse; nonetheless, this research only focused

on needlestick and sharp injuries at ambulatory centers. With health facilities having different units, findings can vary upon application, making it vital to focus on ambulatory centers as the basis for offering department-specific findings that can inform policy changes.

This quantitative research centers on only three research questions with specific variables (i.e., bloodborne pathogen exposure (BPE), needle stick injury and splash exposure injury, stigma). Based on evaluated past research, several factors are associated with needlestick and sharp injuries (Stojic et al., 2021; Verbeek & Basnet, 2019). The primary data contains additional variables and elements (Guthrie, 2021). For convenience and to follow the research methodology and meet the specific research objectives, the research questions only focused on the preselected variables that align with the research methodology and design.

Limitations

The research process encompasses various stages; with methodologies varying from mixed, qualitative, and quantitative (McCusker & Gunaydin, 2015), the adoption of the individual method exhibits potential shortcomings. The current research follows a quantitative approach, relying on a cross-sectional design to effectively meet the study objectives. Based on the features of quantitative research, and the specific applied tools towards the completion of the study, there are noticeable limitations attributed to the design, materials used in supporting the findings, and the overall methodology applied.

One limitation is that this study centered on data collected from multiple healthcare professionals, i.e., nursing supervisors/managers, pre-op nurses, registered

nurses (RNs), operating room technicians, and gastroenterology technicians (Guthrie, 2021). Given the varied work specialization for distinct health disciplines, this multiplicity lowers limits offering specific evidence-based practice (EBP) findings. A focused analysis can offer more in-depth findings, despite this approach allowing for broader results and supporting generalizability. Reliance on primary data from the past as the basis for the research's collected data is another limitation. EBPs rely on current research to support care practices (Larsen, 2019). The reliance on primary data from the past limits the provision of modern results that depicts current behaviors within healthcare settings.

Time change forms another limitation. Since the study follows a cross-sectional approach, examining and tracking behavior changes when the analysis and research are conducted is challenging due to the passage of time. With a one-time primary data collection, policy changes, workplace operations, and health professionals' ethics, skills, and behavioral changes cannot be fully managed. Further, the primary data collection approach was physical and used convenience sampling. The style has limitations as it only includes willing and accessible participants, which sidelines other participants who could have offered better responses in impacting the research objectives.

Significance

The study is pivotal to support past literature with current research findings that report on the problem of needlestick and sharp injuries in healthcare. Evidenced-based practices (EBP) utilize current research as the epitome of improved healthcare practices (Larsen, 2019). These are core for safer care approaches and help minimize risks and cost

implications (Larsen, 2019; Motaarefi et al., 2016). As such, this study offers newer findings whose application are an addition to existing EBP literature that is necessary for patient care. On a practice and profession level, the study results are core to improving healthcare practices within ambulatory centers and offering health professionals evidence-based tools for better care processes. Given the identification of needlestick and sharp injuries as significant problems in care delivery (Motaarefi et al., 2016; Stojic et al., 2021), adopting fact-based techniques is fundamental for patient wellness.

Social change implications are evident upon this quantitative study's completion. First, efficiency in care professionals has positive implications on the patients who form society. With the risks associated with NSSIs, i.e., illness transmissions like HIV, Hepatitis B, and C (Stojic et al., 2021; Verbeek & Basnet, 2019), the study helps inform best practices that can be used for better patient care. Similarly, the quantitative findings establish measures for implementing change practices within health facilities for evaluation and reinforcing best health practices, from an EBP perspective, which are useful in meeting health organizations' goals. The efficiency realized within the health facilities could have long-term positive effects on public health.

Summary

Public health is a vital step in supporting a healthy life, which makes the adoption of proper health-based measures in improving patient outcomes essential. This research takes a quantitative approach in examining exposure types (bloodborne pathogen exposure, needle stick injury, splash injury exposure) and their association with cases of stigma within healthcare settings as contributors to inadequate sharp injury reporting.

Based on this objective, the research focuses on three main research questions, adopting Kahneman and Tversky's (1979) prospect theory as the foundational basis for the investigation.

As shown, needlestick and sharp injury incidences and poor reporting are problematic for HCWs and the healthcare system, and this remains an issue despite existing evidence and measures for controlling the problem. According to Kahneman and Tversky's (1979) prospect theory, this high rate of underreporting can be attributed to the expected utility individuals attach to outcomes when faced with risks and the need to make decisions. Under risk scenarios, there is a tendency to fail to make rational decisions. Using prospect theory and the available literature, this research focuses on HCWs in ambulatory centers as the basis for making conclusions.

Section 2: Research Design and Data Collection

Introduction

The research adopts a quantitative methodology to investigate the association of exposure types, i.e., bloodborne pathogen exposure, needle stick injury, splash exposure injury, other sharp injuries, and other surgical instrument exposure, with stigma (dependent variable). In meeting this goal, the focus is to examine the data relative to underlying guidelines and standards of 100% compliance defined under the Occupational Safety and Health Administration (OSHA) regulation. This study focuses on Eagle County, Colorado, as the sampling frame of the different populations, incorporating quantitative-based techniques. The study also documents the implications of identified exposures on sharps injury reporting among healthcare workers (HCWs) in ambulatory surgical centers. And in meeting these objectives, the research offers answers to three research questions and their associated hypothesis, as explained in the following section.

The subsequent sections in this chapter cover the primarily applied research methodology, i.e., the quantitative approach, and the specific research design, i.e., cross-sectional design. Similarly, the section evaluates the research design and documents the rationale for choosing the technique compared to other research designs. Hence, there is considerable documentation of the importance of the selected method and a listing of the significant aspects that makes it preferable in this study and for use with collected secondary data.

Research Design and Rationale

Relative to this study's research questions, the research has specific independent and dependent variables and the control variable as a benchmark. The dependent variable is stigma, and the independent variables are exposure type, i.e., reported bloodborne exposures. The array of exposure types under focus includes needlestick injury exposure, splash exposure, sharp injuries, and surgical instrument exposure injury. In this study, the control variable is reporting. Reporting, in this case, indicates needlestick and sharp injuries (NSSIs) reporting and compliance among the ambulatory centers following 100% OSHA guidelines.

A cross-sectional study design, focusing on an analytical approach, is applied in this quantitative research to meet the current research goals. A cross-sectional study design entails a distinct observational study design, where investigators simultaneously measure study participants' outcomes and exposures (Spector, 2019; Wang & Cheng, 2020). With this research comprising three core questions and using the analytical cross-sectional design, the goal is to evaluate predefined hypotheses through the assessment of the determinants of injury underreporting. Similarly, this analytical approach evaluates the study's hypothesis by deciphering contributing factors, exposure types underreporting, risks associated with this failure, and contributory factors within ambulatory centers. Although other techniques could have been used, adopting a cross-sectional design aligns with the study goals for some key reasons. First, in the current research, the selection of the participants and data for use was based on a specific inclusion criterion instead of relying on observing outcome status in participants, a case

that is evident in case-control studies (Spector, 2019; Wang & Cheng, 2020). Secondly, there is no focus on examining participants and the data based on exposure status in the current research, which is evident when adopting cohort studies (Wang & Cheng, 2020). Hence, of the varied designs, the cross-sectional design is helpful in this study, as the data are of a point in time than over periods. Thus, the single point-in-time concept makes adopting a cross-sectional design appropriate for the study and relates to available data.

The current research examines association with a comparison across multiple independent variables, i.e., exposure types. Of the various research designs, collecting data and applying cross-sectional design becomes helpful in realizing these goals as it allows for comparing subjects in the different data groups. Needlesticks and sharp injuries (NSSIs) are primary healthcare problems with varying adverse implications in healthcare settings (d'Ettorre, 2017; Grimmond & Good, 2019; Hasak et al., 2018). As such, data on exposure levels can be analyzed and used. The cross-sectional design approach helps compare how the implications of the needlestick and sharp injuries vary across the different variables and their measurement levels.

Methodology

Overview

This quantitative research utilizes secondary data based on previously completed primary research. The primary dataset used is that of Guthrie (2021) on *Improving Exposure Prevention and Sharps Injury Reporting at an Ambulatory Surgery Center*. As a directed scholarly project, Guthrie's data are relevant as the project has data on exposure types useful in current research objectives, i.e., bloodborne pathogen exposure,

needle stick injury, splash exposure injury, other sharp injuries, and other surgical instrument exposure and data on stigma. Similarly, as a directed study submitted to Bradley University, the data collection and findings process meets the proper guidelines required in research studies since there is involvement and closer collaboration with faculty advisors assisting in initial phases and study design development, and regular overseeing of students' progress. The secondary data were comprised of pre-and-post workshop findings, which are fundamental in evaluating the health professionals' knowledge upon participation in the bloodborne pathogen (BBP) exposure workshop (Guthrie, 2021).

Population

The population in the data was comprised of 123 health professionals, of which a pooled sample of 99 was used in the final data analysis. Part of the primary data gathering was voluntary participation upon request to access the participants. Participants were nursing supervisors/managers, pre-op nurses, registered nurses (RNs), operating room technicians, and gastroenterology technicians (Guthrie, 2021). The participants were from ambulatory surgery center settings in Eagle County, Colorado facilities. The power analysis explained in the sampling procedures is based on the 99 pooled samples and gives the decision-making criteria relative to the study's hypothesis.

Sampling Procedures Used by the Original Creators of the Dataset

Convenience sampling was used in the initial data collection process by the researcher. This approach was nonprobability and involves utilizing respondents because they are convenient to access and meet the research goals, instead of adopting a specific

recruitment pattern for inclusion (Edgar & Manz, 2017). The researcher, Guthrie (2021), allowed the voluntary participation of health professionals who attended a pre-prepared nursing workshop. According to Guthrie (2021), the health professionals participated in an educational workshop on BBP exposure, after which voluntary participation was in the prepared survey. The attendees were informed through mail about the project, of which one had to choose to participation or not while attending the BBP exposure workshop.

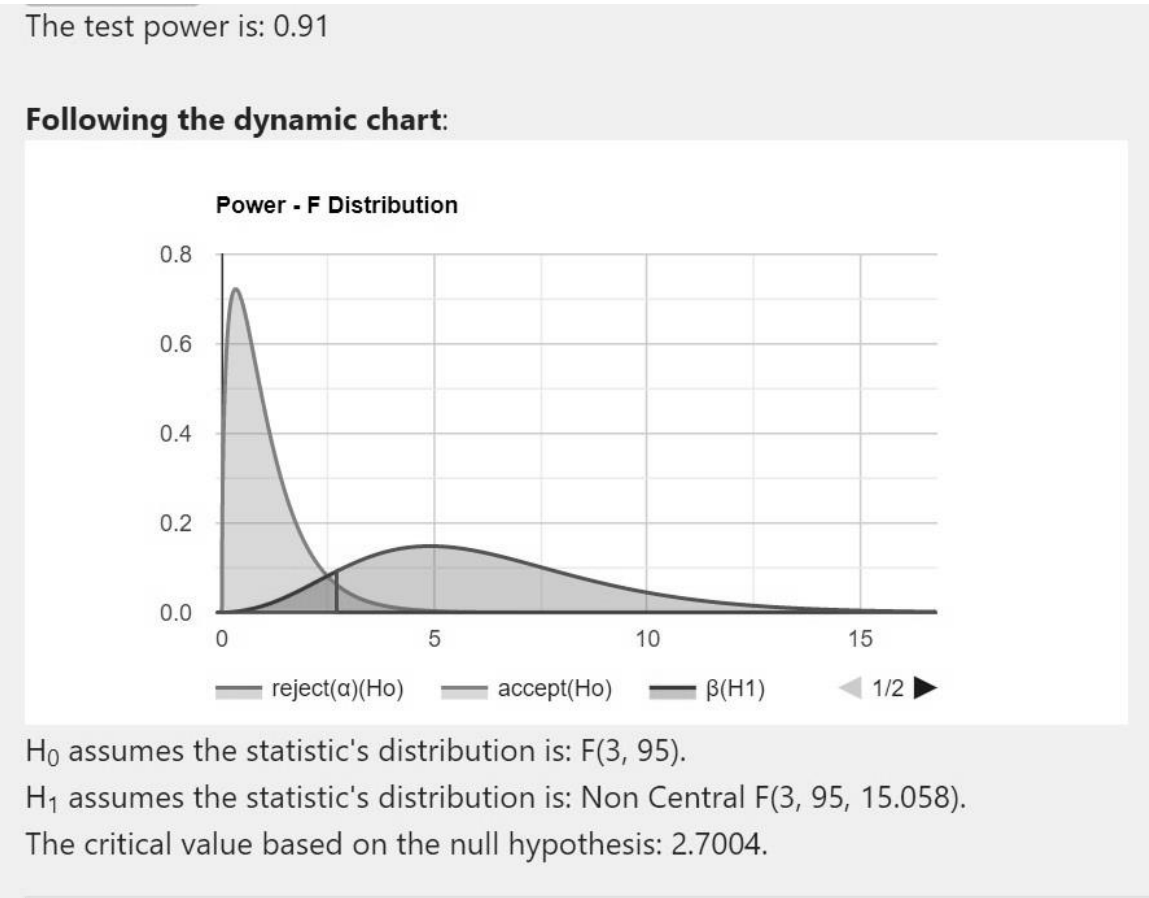
Power analysis is critical in designing and implementing the planned research protocol (Kang, 2021; Liu & Wang, 2019). As such, for this quantitative research, power analysis helps determine the study's optimal sample size, which is core to assuring adequate power in detecting statistical significance (Liu & Wang, 2019; Shieh, 2020). To meet the power analysis goal, it was essential to pre-define the proper power value, which is core in aligning with study objectives. For any study, 80% (0.80) is considered the ideal power (Kang, 2020). In completing the power analysis, an online power calculator was used (Statistics Kingdom, 2022).

Using an online power analysis calculator (Statistics Kingdom, 2022) with a pre-chosen alpha of $\alpha = 0.05$, a 99 pooled sample size gives the power value of 0.91 (Figure 2). This value lies within the ideal power for consideration, as it lies above 80%, i.e., 0.80 (Kang, 2020; Liu & Wang, 2019). For the study, $\alpha = .05$ is chosen as the decision-making alpha value in supplementing hypothesis conclusions. Based on the computed power analysis, the value for utilization is critical value (CV) = 2.7004, as shown in the computed summary in Figure 2. Secondly, power analysis considers different statistical tests, e.g., T-Test, Z-Test, Regression, ANOVA, Chi-Square, and Proportion power

analysis (Statistics Kingdom, 2022). However, for this study, the emphasis is on the association; thus, the choice of regression power as the basis for completing the power analysis was necessary.

Figure 2

Power Analysis Computation (Statistics Kingdom, 2022)



Based on the power analysis (Figure 2), core decision rules will be applied as part of making hypothesis testing conclusions. That is:

- Region of Acceptance - accept the null hypothesis if the statistic value is in this area.

- Region of Rejection - reject the null hypothesis if the statistic value is in this area.
- Significance level ($\alpha = .05$) - The probability to reject the H 0 when H 0 is correct.
- β: the probability of accepting the H 0 when H 1 is correct.

Instrumentation and Operationalization of Constructs

In the data collection, Guthrie (2021) applied multiple tools to get the essential data for completing the research, forming the current study's secondary data. Kirkpatrick's training evaluation model (1993) evaluated participants' education effectiveness and levels. This model was comprised of four levels, i.e., reaction, learning, behavior, and results (Guthrie, 2021). Given the need to educate health professionals, especially nurses, in preventing sharp injuries and subsequent exposure, the adoption of Kirkpatrick's training evaluation model helped document specific data relative to the study.

In the model, reaction (Level 1) focuses on measuring the participants' engagement levels and their value from participating in the ongoing training, i.e., BBP exposure education workshop. In meeting this goal, techniques used in gathering this data include observing attendees body language, asking them to answer survey questions, and filling out feedback forms (Guthrie, 2021). The model's learning (Level 2) evaluates learners' understanding levels by comparing pre-training abilities and their post-training or post-workshop results. Questionnaires and interviews were used to collect the correct data to meet this assessment level (Guthrie, 2021).

The model's behavior (Level 4) focuses on comprehending the level of implementation of the gained/learned skills by the trainees. Hence, as opposed to only concentrating on impacting health professionals with the knowledge and evidence-based practice measures, the undertaking of subsequent evaluations and assessments is pivotal to gauge the effectiveness of the gained knowledge and whether there is a need for health changes (Cooke & Stephens, 2017; Gurria et al., 2019; Guthrie, 2021). Finally, in the results (Level 4), the model evaluates the outcomes associated with the undertaken training, i.e., BBP exposure prevention. There is an emphasis on understanding whether the information gained from the workshop was implemented and if functional changes were realized in the specific settings (Guthrie, 2021).

To support the original data collection, Guthrie (2021) relied on occupational health and charged nurse reports, Excel, EpiNet, and Quantros, i.e., an online reporting platform for healthcare-related incidences (Guthrie, 2021). Some data entered into the Quantros platform included patient falls, fire incidences, sharp injuries, near misses within the facilities, and established healthcare protocols (Guthrie, 2021).

Research Question and Hypothesis

RQ1: Is there an association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H1o: There is no association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H1a: There is an association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

RQ2: Is there an association between needle stick injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H2o: There is no association between needle sticks and the stigma of healthcare workers (HCWs) reporting in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H2a: There is an association between needle sticks and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

RQ3: Is there an association between splash exposure injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

H3o: There is no association between splash exposure injury and stigma on injury reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for 100% compliance by OSHA regulation.

H3a: There is an association between splash exposure injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers while controlling for100% compliance by OSHA regulation.

Data Analysis Plan

The collected data for adoption in the current research was quantitative and was stored in a prepared Excel for subsequent analysis. With the study investigating and reporting an association between variables, the collected pre-, and post-workshop training data were compared to make conclusions. Using Excel functions and graphical representations, comparing and calculating count and percentage differences in the pre-learning and post-learning descriptive scores.

The completion of hypothesis testing also forms a significant phase in the data analysis. Different statistical tests exist, with the research objective and specific data characteristics essential in determining the test choice (Edgar & Manz, 2017). In answering the pre-listed research questions in this project, regression analysis, i.e., a statistical technique for analyzing and deciphering the relationship between one dependent variable (continuous) and multiple/several independent variables, i.e., continuous (Salkind & Frey, 2021). In this research, the research questions of which the null hypothesis conclusions were made, are based on the multiple regression coefficient's table summary results.

RQ1: Is there an association between bloodborne pathogen exposure and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

RQ2: Is there an association between needle stick injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

RQ3: Is there an association between splash exposure injury and stigma on reporting by healthcare workers (HCWs) in ambulatory surgical centers in Eagle County, Colorado, while controlling for 100% compliance by OSHA regulation?

Multiple linear regression was chosen in answering the three research questions, with stigma (dependent variable) and exposure types as the independent variables. The general multiple linear regression results, i.e., the *F* test computed., will be used to decipher the model's significance, while the respective individual variable's significant levels, i.e., for each variable, assists in answering each research question. The three research questions, which focus on each of the [three] exposures [Bloodborne pathogen, needlestick injury, and splash exposure], examine their implications on stigma. Multiple linear regression is preferred as the statistical test since it aligns with the research objectives and meets the data assumptions required for regression. In completing multiple regression, the dependent and independent variables must be continuous (Salkind & Frey, 2021; Verbeek & Basnet, 2019). For this research, stigma, the dependent variable, is reported numerically, with the average participant responses on the specific stigma-associated elements. For stigma, multiple contributing elements can be evaluated, including, and not limited to HCWs "Alienation, Stereotype Endorsement, Perceived Discrimination, Social Withdrawal, and Stigma Resistance" (Van Brakel et al., 2019, p. 16). Hence, upon collecting individual ratings of responses on these elements, the results are averaged to attain the stigma level and summarized in the analysis values. Secondly, stigma (dependent variable) is quantitative, as explained in the variable definitions, and is examined on how it associates with three independent exposure variables, i.e.,

bloodborne pathogen exposure, needle stick injury, and splash exposure injury. The reporting of the exposure types is in numeric form (quantitative) based on the specific responses of their occurrence from the sampled health professionals. The combination of stigma (dependent variable) with the pre-chosen three exposure types (independent variable) allow for the completion of multiple regression.

Multiple regression provides tabulations, one of which is the Analysis of Variance (ANOVA) table that has the *F-ratio* that assists in assessing the overall significance levels of the model and whether it is a good fit for the utilized data (Laerd Statistics, 2018; Salkind & Frey, 2021). This is based on the *p-value* and the pre-selected alpha (α). For this research, as explained in the Power Analysis, the decision rule for the null hypothesis compares to the significance level, i.e., $\alpha = .05$. Next, the multiple regression table gives the "*coefficients*" table, core in assisting in concluding on the independent variables' statistical significance, i.e., the respective three (3) independent exposure variables. Since the *p-values* and the respective *t-values* are in the table, under the "*Sig*." and "*t*" columns, conclusions on the null hypothesis can be made for each independent variable (Laerd Statistics, 2018), thus answering the three research questions. Hence, for the three (3) research questions, each independent variable will be interpreted based on the tabulated *p-value* in the "*coefficients*" table. The decision rule is; If the *p*-value < .05, the coefficients relative to the specific independent variable are statistically significant (Laerd Statistics, 2018).

Threats to Validity

In the current research, four (4) main threats to validity can be identified, entailing primary research quality, testing, maturation, and instrumentation techniques applied in the data collection process.

Quality of Primary Research. Completing the current research suffers from critical threats to validity. First, the reliance on secondary data subjects the results to the original author's effectiveness and efficiency in data collection. The primary researcher, Guthrie (2019), collected pre-and post-workshop data on bloodborne pathogen (BBP) exposure. Given the utilization of the secondary data, subsequent data analysis and interpretation are pegged on the original data collection quality.

Testing. Testing instruments used by the original researcher pose validity threats in the current study. In the initial research, multiple survey tools were used in collecting pre-test (pre-workshop) and post-test(post-workshop) survey data on the participants. Given that the same participants, i.e., HCWs or professionals, were used in the pre-evaluation and post-evaluation, the familiarity with the survey questions and focus subject potentially affects the response results.

Instrumentation. As documented in the original research, data was based on the healthcare professionals' pre-and post-workshop evaluations upon attending the BBP exposure training workshop. This setup risks affecting the research outcomes, as the same participants are used in pre- and post-survey evaluations. Due to the inability to maintain the same environmental conditions, knowledge awareness of the study, and the skillset levels in the HCWs, there is a risk of obtaining unfavorable outcomes due to the

instrumentation process. Variation in survey data collection mechanisms in the pre-and post-workshop survey affects the study's outcome validity.

Maturation. In the data collection, the survey was conducted during the pre-and post-workshop period, with participants asking for their responses before and after the workshop completion within their workplace settings. The natural time between the undertaking of the pre-workshop data collection and the post-workshop data collection risks affecting the efficiency of the HCWs and the response quality in the survey. The adverse implications of time variation risk impact the validity of the results.

Summary

The current research follows a quantitative methodology approach. A case-control design is used to answer the research question on the association between exposure types and stigma among HCWs and their implications on needlestick and sharp injuries (NSSIs). Given the chosen quantitative approach, secondary data meet the research goals while answering three (3) research questions and the associated hypothesis. The secondary data was collected from 123 health professionals as the primary survey participants (respondents) during a BBP exposure education workshop. The used data comprises pre-and post-workshop survey data applied in evaluating the results and implications of the training workshop. Lastly, the research faces threats to validity attributed to testing, instrumentation, maturation, and quality of primary research.

Section 3: Presentation of the Results and Findings

Introduction

The research process covers multiple phases, with data analysis and the subsequent documentation and provision of reliable results essential to see the study's impacts. This quantitative research incorporates a case-control design to answer three research questions. The study's main objective was to investigate the association of stigma to exposure types, i.e., bloodborne pathogen exposure, needle stick injury, splash exposure injury, other sharp injuries, and other surgical instrument exposure. To ensure the alignment with existing standards, the focus population for the study is health professionals in ambulatory units, with emphasis on Eagle County, Colorado, as the research location. This section provides an overview of the study's preliminary results, using tables to illustrate the main findings and concepts. The section also gives the main results and an interpretation of the specific areas relative to this study's three research questions and the associated hypotheses. Descriptive statistics and statistical analysis are reported, which form the basis for supporting the research implications and evaluating if the previously defined research objectives are attained. The summary section gives a precise overview of the chapter, as well as introducing the next chapter on the research's social change and implications.

Results

Understanding Needlestick and Sharp Injury Reporting Policies

The examination of needlestick and sharp injuries (NSSIs) is among the core aims of this research, making it vital in documenting the differences in reporting incidences

across the sampled health professionals. Using the sample data, differences in reporting across the health professionals were identified, as illustrated in Table 1.

Table 1

Level of Understanding Reporting System

	Frequency	Percent
Understands reporting system	82	82.8%
Does not understand reporting system	17	17.2%

The descriptive statistics show that of the sampled participants, 82 (82.8%) understood their workplace's sharp injuries reporting system, with 17 (17.2%) reporting that they did not understand the reporting mechanism or policies in their workplaces or institution. As timely understanding and continued training of health employees on reporting procedures and policies is essential in minimizing sharp injuries and risks (Bilek et al., 2022; Kaweti & Abegaz, 2017), the tabulation shows a sufficient proportion of health workers aware of the proper reporting policies and procedures.

Health Care Workers (HCWs Injury Proportional Level

It was also essential to document the proportional rates of injuries among healthcare workers as fundamental in understanding the level to which sharp injuries are problematic in ambulatory centers. The tabulation (Table 2) provides an overview of the injury levels sustained by the HCWs in 2020.

Table 2

Injury in Past Year

	Frequency	Percent
Had an injury	11	11.1%
Did not have an injury	88	88.9%

The descriptive statistics show that of the sampled participants, only 11 (11.1%) sustained an exposure or sharps injury within the last year, with 88 (88.9%) having no exposure or experiencing sharp injuries in the same period. However, irrespective of only 11.1% of the participants being exposed or experiencing sharp injuries, the reporting levels were low, with more than a third not reporting the cases. As shown from Table 3, of the 11 participants who noted being exposed or injured, more than a third did not report (or did not state they reported the exposure and injuries), with only 63.6% indicating having reported the incidences.

Table 3

Reporting Adherence Levels

	Frequency	Percent
Report	7	63.6%
Did not report	2	18.2%
N/A	2	18.2%

Table 4

Reporting Across Specific Variables

	Frequency	Percent
Needlestick	98	99%
Splash Exposure	89	90%
Other Sharp	90	90.2%

Regarding the reasons contributing to sharp injuries and exposure reporting, the most common reason for not reporting (Table 5) is not understanding the system (8%); other reasons are that it is time-consuming (4%), the risk is low (4%), and stigma is a factor (3%). Most people did not state the reason or did not see any reason as valid as all

the cases should be reported. The other columns show the reasons for the different injuries; however, the numbers do not differ from the total. Table 5 summarizes the descriptive statistics on underreporting reasons.

Table 5

Reasons for Underreporting Cases

	Total		Needlestick		Splash		Other	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Time Consuming	4	4.04	4	4.08	4	4.49	4	4.44
Stigma	3	3.03	3	3.06	3	3.37	3	3.33
Do not understand	8	8.08	8	8.17	8	8.98	8	8.87
Low risk	4	4.04	4	.4.08	4	4.49	4	4.44
Other	4	4.04	4	4.08	4	4.49	4	4.44
N/A	82	82.82	81	82.65	72	80.89	73	81.11

Statistical Significance and Hypothesis Results Relative to Stigma

In documenting how stigma, the dependent variable, is explained by the independent variable, regression analysis was done on the dataset, with significant results reported for conclusions. Multiple linear regression was done to answer the three research questions, with stigma as the dependent variable and exposure types as the independent variables. The general format of multiple linear regression offers results with *F* test summaries, with the individual items relative to each included variable in the model used to decipher statistical significance for individual variables relative to the dependent variable, which in this case was stigma. In using regression, having the dependent and independent variables as continuous is a necessity as part of the assumptions (Salkind &

Frey, 2021), of which for sample data, stigma was numerical based on participant's average responses. Similarly, the included independent variables were continuous, i.e., ratio measurement scale type, supporting the adoption of quantitative approach. Power analysis, which was done as the basis for selecting the statistical tool (Figure 2), was also used as a pre-requisite for checking normality assumption; the method assumes the included populations as normality distributed (Salkind & Frey, 2021). With the selection of *F* distribution, test power was 0.91.

Based on the regression Table 6, beta and expected effect sizes were used to conclude the association across the research variables. As part of the research objective, three regression analyses were completed on needlestick, splash exposure, and other sharp injuries. To make hypothesis testing inferences, the reported p-value (Sig.) was examined to summarize whether the effect (B) was statistically significant. For values in which the p-value was below .05, there was a rejection of the respective research question's null hypothesis in lieu of the alternative hypothesis. In the regression analysis results, the R^2 gives explanatory power, depicting how impactful the independent variable influences the dependent variable.

Statistical Table 6 for stigma and needlestick gives the R^2 value results, representing the correlation magnitude between stigma and needlestick injuries, i.e., 0.047. This low value indicates a low correlation degree across the sampled participants. The results say that the regression can explain only 4.7% of why the sampled participants have chosen stigma as the reason for underreporting.

Table 6

Stigma and Needlestick Regression

	β	Std. Error	Std. Beta	t	Sig.	R^2	Adjusted R^2	Boost. Low	Boost. High
(Constant)	-.155	.184	-	-.841	.402	0.047	0.027	-.375	-.035
Needlestick	.059	.171	.034	.343	.732			.017	.136

On the surveyed HCWs, the significant column (Sig.) shows $p > .732$, which is higher or more than the pre-chosen study's alpha (.05). This indicates that for the examined stigma and needlestick variables, the developed regression model is not statistically significant in successfully predicting the dependent variable, i.e., stigma. The model, in this case, is not a good fit for the data. There is no significant effect, and thus no evidence that supports the hypothesis that needlestick injuries are related to stigma in reporting incidences among the sampled healthcare professionals in ambulatory centers.

In using regression analysis to examine stigma and splash exposure for the sampled participants, the statistical Table 7 gives a positive R^2-value, i.e., 0.049, as the correlation magnitude, which indicates a low correlation degree across the sampled participants; the regression model explains 4.90% of reasons why sampled participants have chosen stigma when reporting.

Table 7

Stigma and Splash Exposure Regression

	β	Std. Error	Std. Beta	t	Sig.	R^2	Adjusted R^2	Boost. Low	Boost. High
(Constant)	-.125	.079		-1.581	.117			-.302	-.029
Splash Exposure	.033	.057	.058	.586	.559	0.049	0.030	.002	.101

Splash exposure contributes 4.90% - of the changes realized on stigma as the dependent variable. On stigma and splash injury exposure variables, of the sampled HCWs, the significant column (Sig.) for splash exposure and stigma is p > .559 for HCWs, which is non-significant as it is greater than the default .05. Hence, for stigma and splash exposure, the regression model is statistically non-significant, making it a poor fit in predicting stigma as the basis in explaining reporting incidence differences among the healthcare workers.

As part of the study, Table 8 depicts the statistical findings between stigma and other sharp injuries. From the significant column in Table 6, stigma and other sharp injuries exposure had no significant association (p > .936). Thus, other sharp injuries also had a non-significant effect on reporting outcomes.

Table 8

Stigma and Other Sharp Injuries Regression

	β	Std. Error	Std. Beta	t	Sig.	R^2	Adjusted R^2	Boost. Low	Boost. High
(Constant)	-.100	.074		-1.341	.183	0.046	0.026	-.231	-.021
Other Sharp	.005	.061	.008	.081	.936			-.013	.023

In addition, with an R^2 of 0.046, the regression model explains 4.60% of changes in the dependent variable for the sampled HCWs on choosing stigma as the reason for the reporting differences in their workplaces. With the effect for the independent variable to the dependent variable being non-significant among health staff who reported not understanding the system (i.e., no effect), no evidence shows other sharp injuries, splash

exposures, and needlestick injuries are related to reporting stigma. There is a need to undertake the study by adopting a sample with a bigger size to find the evidence.

Summary

The documentation of the completed analysis offers an in-depth overview of the participants, with descriptive and statistical insights fundamental in concluding the research objectives. Based on the analysis, most sampled participants understood their workplace's needlestick and sharp injuries reporting procedures and policies. This essential outcome is pivotal in minimizing risks and injuries. Similarly, of all sampled HCWs participants, 63.3% noted being compliant and reported the potential exposures and sharp injuries within the last year. Nonetheless, a considerable proportion of HCWs still did not undertake the proper reporting of injury and exposure incidents (18.2%)

On reasons for underreporting, the top reasons were not understanding (8.08%), viewing the issue as low risk (4.04%), and as time consuming (4.04%). In undertaking statistical testing, the hypothesis testing summary showed there was no statistically significant effects for stigma and exposure types for the sampled HCWs as a contributing facet to reported injuries ($p < .732$), splash exposure ($p < .559$) and other sharp injuries ($p < .936$). Across stigma and the three chosen exposure types, the R-Square values showed varying levels of variance on the individual independent variables. The highest variance was seen between stigma and splash exposure type ($R^2 = 0.049$), indicating splash exposure contributed to 4.90% of the variation in choosing stigma as the reason for reporting differences. This was followed by needlestick having implication to stigma

(0.047), i.e., only 4.7%. The lowest variance was by other sharp injuries ($R^2 = 0.046$), indicating an effect of only 4.6%.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The study adopted a case-control approach, utilizing quantitative statistical techniques to examine the association between stigma and prechosen independent variables, i.e., needlestick injuries, splash exposure, and other sharp injuries. As reporting cases is one of the core requirements in ensuring proper health delivery, healthcare workers failing to report occurring incidences is problematic with adverse implications. Using regression analysis, the results showed valuable insights regarding how the different variables correlate with stigma when reporting needlestick injuries, splash exposure in health facilities, and other reported sharp injuries among the sampled healthcare workers. Of the sampled participants, for those aware of the reporting policies, there was a tendency to report stigma as the reason more often than not. That is, the statistical regression results showed no significant effects, i.e., significant values were non-significant ($p > .05$). Thus, there is no evidence indicating that the injuries reported by the healthcare workers in the sample were related to stigma reporting. As a future research aspect, there is a need to adopt a bigger sample size as the basis for finding the evidence.

Interpretation of the Findings

The research findings affirm data from past studies, such as those by Hasak et al. (2018), Stojic et al. (2021), and Grimmond and Good (2019), on the prevalence of underreporting in healthcare facilities and a percentage of healthcare workers not complying with existing proper reporting measures. Likewise, of the reasons noted by the

sampled participants, stigma emerged as one, in addition to other reasons like not understanding, and seeing the exposure and injuries as low risk. These findings affirm the study by Van Brake et al. (2019), who recognized stigma in healthcare as problematic, associated with discrimination tendencies, and adversely affecting care practices. According to Van Brake et al. (2019), there is a perception of most health conditions as risky, contagious, or sometimes incurable. For those associated with immorality and breaking social norms and taboos, there is the subsequent association of the conditions with stigma and discrimination (Van Brake et al., 2019). Hence, as health providers, contracting or getting associated with such illnesses creates an element of fear, likely lowering the ability to report potential incidences effectively.

This research also showed how reasons for underreporting come from multiple causes, and sample members varied in their understanding and injury frequencies. Past studies affirm this aspect, indicating that needlestick injuries, splash exposure, and other risks are attributed to multiple factors in health units, such as existing health policies, country, and devices used (Cooke & Stephens, 2017; Hasak et al., 2018). There is a need for continued improvement in awareness levels among healthcare providers towards the realization of efficient care delivery. As shown from the descriptive results, irrespective of the higher number of sampled healthcare workers reporting an understanding of the injury reporting system, the fact that a proportional of the healthcare workers (11.1%) still do not understand creates the need for continued health promotion and education.

Implementing safety features and preventative measures (Hasak et al., 2017; Wilkason et al., 2020) and adopting proper injury practices and policies within health

units are core steps to lower exposure risks (Cooke & Stephens, 2017). For the current study, a higher proportion of the sampled healthcare providers reported understanding the reporting system within their workplaces; however, data on associated reasons for underreporting elicited a need for better training and awareness improvement.

Across the three examined variables, some of the noted reasons for underreporting or failing to follow the proper reporting system rules were seeing the process as time-consuming (4.04%), stigma (3.03%), not understanding (8.08%) and seeing the issues as low risk (4.04%). The descriptive summary showed how not understanding forms the main problem, thus forming the basis for risk to the patients' and healthcare providers' wellness. Needlestick and sharp injuries (NSSIs) are hazards to surgeons and nurses alike (Bilek et al., 2022; Hasak et al., 2017), and with the associated bloodborne pathogens, put the staff in danger of contracting other illnesses, e.g., HIV, Hepatitis B and C (Gurria et al., 2019; Hasak et al., 2018; Stojic et al., 2021; Verbeek & Basnet, 2019). Hence, the inability to understand the risks of sharp injury, needlestick injury, and splash exposure creates a riskier environment within the workplace.

In the descriptive statistics, the summary showed notable differences across healthcare workers on their understanding of their workplaces' proper reporting guidelines. Of the pre-selected independent variables, there were no statistically significant results ($p > .05$). Despite the descriptive statistics depicting how HCWs still have problems in effectively reporting cases based on different reasons (Table 5), the inferential results depicted stigma as not having statistically significant implications on the descriptive differences. In the participants' demographic data, evident frequency

differences were reported, with a proportional number of HCWs not aware of their workplaces reporting system; this pinpointed a managerial weakness that could be explored as the basis for improving reporting rates. The inferential results indicated positive implications of the independent variables to stigma, as shown with the reported R-Square as aa measure of variance. Nonetheless, despite the notable variance, overall results were non-significant; thus, the conclusion for no sufficient evidence supporting the claim of injuries being related to the reporting of stigma.

In work by Bilek et al. (2022), the researchers undertook a study focused on underreporting incidences among nursing students. Notably, it was shown that students actively taking OHS and NSIs sessions on preventative training showed better and higher empowerment levels (Bilek et al., 2022). These results support the effectiveness of awareness promotion, as there is a positive correlation to the overall reduction in potential needlestick and sharp injuries (NSSIs) in health units and the decline in underreporting rates (Bilek et al., 2022; Cook & Stephens, 2017; Gurria et al., 2019).

The theoretical framework is fundamental in acting as the benchmark in establishing the research arguments. For this quantitative cross-sectional research, Kahneman and Tversky's (1979) prospect theory was the foundation on which this research was based as part of the theoretical framework. Relative to this study's results, that is, there are still underreporting challenges among HCWs (Table 3), despite the available research on the risks of NSSIs, e.g., bloodborne pathogen infections (Cooke & Stephens, 2017), and campaigns towards improving reporting in health institutions (Hasak et al., 2018), there still exists underreporting cases. The underlying reasons

contributing to these statistics closely relate to Kahneman and Tversky's prospect theory as the basis for influencing HCWs' decisions. According to Kahneman and Tversky (1979), when faced with alternatives, the final made human decisions get based on the perceived utility associated with each decision. Hence, irrespective of the outcomes, there is an emphasis on examining the actions and outcomes relative to the attached decision utility, i.e., gains and usefulness (Kahneman & Tversky, 1979). Moreover, with the research findings supporting past research on how stigma is problematic in adversely affecting HCWs' efficiency (Van Brakel et al., 2019), the related adverse outcomes subsequently impact the effectiveness of HCWs in reporting NSSI incidences.

The findings thus establish the negative outcome of underreporting among HCWs in ambulatory centers, arising from external negative influences, one of which is stigma. In addition, from the reasons associated with not reporting, part of the participants noted the reasons for viewing the process as time-consuming (4.04%) and low-risk (4.04%), as depicted in Table 5. These reasons show the alternative that HCWs have, supporting the existence of varying perceptions of the risks of NSSIs. Hence, with prospect theory attributing people's behaviors to envisioned utility, the outcome becomes inefficiencies and differences in NSSIs reporting. Thus, based on prospect theory by Kahneman and Tversky (1979), with the HCWs evaluating exposure types, stigma, and associated risks when they occur, and the linked utility, i.e., perceived usefulness, there is impacting on their reporting. The findings showed for the sampled HCWs no significant relationship existed ($p > .05$), across the three independent variables and stigma. However, the R-Square summary values depicted notable variance levels that the independent variables

have relative to stigma as one of the reasons associated with reporting differences. Of the variables, splash exposure had the largest variance indicating it had the most proportional variance impact ($R^2 = 0.049$). Next was needlestick (0.047) and finally other sharp injuries ($R^2 = 0.046$) had the lowest proportional impact in relation to stigma among the investigated HCWs. In summary, the *R-Square* results helps depict which of the investigated variables contributes most to the variation in the dependent variable, which is hereby seen as being splash exposure.

Limitations of the Study

The secondary analysis for this research exhibited limitations worth recognizing relative to the research objectives. First, the generalizability of the study is limited to only three variables, lowering its applicability as the basis for healthcare policy changes. Based on the regression analysis, only three variables were cross-examined relative to stigma, i.e., needlestick injuries, splash exposure, and other sharp injuries. Hence, with a need to support healthcare changes, the results can only be applied in areas that centers on the three variables. And with the R-Square reported being low across the variables, the model is insufficient in explaining stigma in incidence reporting.

A second limitation was the sample size adopted in completing inferential statistics, which is noticeably tiny to support better insights. With a 99 data sample used in the analysis, the utilization of a more significant sample would have improved the statistical reporting as part of the quantitative research process. The sample population used in the secondary analysis focused on Eagle County, Colorado, which limits the study's generalizability for impacting social change and healthcare practices.

Constraining the sample to only one county limits the ideas, suggestions, and problems faced by healthcare workers and how the rise in needlestick and sharp injuries (NSSIs) is problematic in ambulatory centers. Finally, strictly adopting quantitative or statistical techniques as the basis for completing the analysis eliminates core ideas and perspectives that could have been inferred using qualitative tools and techniques. The study has the limitation of excluding opinions, and perspectives that could have been obtained from participants, had other data collection and analysis methods been used, i.e., qualitative measures and tools like interviews, focus group discussions, textual analysis, and observations (McCusker & Gunaydin, 2015).

Recommendations

Incorporate a multidimensional awareness campaign and approach for ambulatory centers healthcare workers. As shown from the descriptive statistics, the awareness levels of reporting policies and procedures are different across the sample, and the reasons for poor reporting of the incidences. These variations depict differences in healthcare workers and can also help illustrate variations in skills and understanding. As a recommendation, adopting multiple awareness tools is necessary to meet the understanding needs of healthcare workers. Health staff injury risks and behaviors vary in experience, age groups, gender, i.e., females and males, experience years, profession type or level [e.g., residents vs. doctors], and health institution policies (Cooke & Stephens, 2017; Hasak et al., 2018). Also, NSSI risks are highest among female staff, as the female staff is the ones who are more involved in handling needles compared to male healthcare workers (Cooke & Stephens, 2017), creating differences in exposure risks. Thus, to

ensure efficient reporting, different educational tools and campaign mechanisms are needed to align all healthcare workers with evidence-based practices.

Additional training is needed to improve the skillset and expertise of health professionals in ambulatory centers and other units within health institutions. The rationale for this change and recommendation stems from the reported results, which indicated a considerable proportion of healthcare workers are still unaware of the injury reporting processes and measures within their workplaces. As the basis for improving patient care and preventing further injuries for healthcare workers, constant overview and retraining are necessary.

Extending the research scope to cover additional independent variables is recommended to increase the findings' generalizability level. From the undertaken secondary analysis, the stigma associated with reporting was only compared to three variables, i.e., needlestick injury, splash exposure, and other sharp injuries in health units. This restriction limits the scope of issues that can be examined. For example, according to Cooke and Stephens (2017), needlestick and sharp injuries are affected and vary based on multiple factors, such as respective countries, existing safety policies and devices, and pre-existing methodologies adopted in managing injuries and exposures. Hence, expanding the research to include other variables is essential in creating better healthcare settings and improving healthcare workers' processes. Similarly, for future research, there is a need to use a large sample size for quantitative analysis for improved findings.

Implications for Social Change

The improvement of HCWs efficiency and public health forms some of the core aims of this study, given the risks associated with NSSIs and the adverse effects of stigma among HCWs. The community's quality of life is pegged on public health and the effectiveness of the healthcare system (CDC, 2020; Khan et al., 2020). The study findings show NSSI cases still exist, and there is underreporting based on participant responses (Tables 4 and 5). The study advocates for better practices and policy changes to improve HCWs' safety, individual patients care, and general societal wellness. With a healthy, efficient, less error-prone, and less affected by stigma and NSSI cases workforce, it sets a roadmap for delivering quality care to the public. On an individual professional level, the HCWs remain healthy and can work without the dangers attributed to NSSIs and health complications. These outcomes have positive long-term implications.

The findings also showed reporting differences based on varying know-how of reporting systems. The realization of efficiency in health institutions thus needs constant HCW training, the establishment of proper reporting guidelines and policies. Likewise, the research findings can be applied to improve health institutions, especially in financial management and cost control linked to NSSI cases. According to Stojic et al. (2021) and Gurria et al. (2019), NSSIs expose HCWs to bloodborne pathogens and infectious, e.g., HIV/AIDS, HCV, and HBV. These cases result in an unhealthy workforce and more healthcare costs, as they interrupt the care process and require budgetary allocations for management. As a positive social change outcome, promoting timely reporting helps

health institutions minimize preventable expenses and improve care delivery. All these measures positively contribute to public health.

Lastly, the findings are the foundation for informing future researchers and how their research can build on the current one as a tool for improving community wellness. Given the attribution of NSSIs cases to multiple factors, e.g., HCWs experience, devices in health units, existing health policies, and country-specific influences (Cooke & Stephens, 2017; Hasak et al., 2018), additional research in these areas is core in adding research evidence that is core for public health. Improving sharp injury reporting avoids risk cases, leading to HCWs' efficiency, family's wellness, and the general public's healthy goals realization.

Summary

Section 4 provides a detailed interpretation of the descriptive and inferential statistics results documented in chapter three, with the examination based on the research objectives. As a quantitative study, the completion of the research is highly dependent on analyzing numerical data, with the provided descriptive statistics as the basis for supporting subsequent inferential statistics completed using regression analysis. From the descriptive statistics, a more significant proportion of the sampled healthcare workers understood the reporting system in their workplaces (82.8%), and 11.1% reported experiencing injuries within the past year. Moreover, of those who noted having had an injury or exposure incidences, those who reported the cases were 63.6%, with the rest not reporting or having no reason to make the report. The proportion still depicts underreporting in health facilities, which shows the issue as problematic. Inferential

regression results showed no significant effect for participants with no knowledge of reporting, indicating no evidence injury cases are correlated to stigma reporting. Those who know more about reporting injuries tend to report stigma as the reason, as the hypothesis showed statistical significance.

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