Developing an Educational Intervention for Nursing Students Who Care for People Experiencing Homelessness and Mental Ill-Health

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Abstract

Background: Undergraduate street nursing programs enlist students in the provision of care to people experiencing homelessness (PEH). Lack of experience and low confidence contribute to feelings of anxiety, fear, and overwhelm in students who work with PEH and mental ill-health. The aim of this study was to create, evaluate, and implement an educational intervention and evaluate its impact on students' knowledge and confidence. The study took place at a nursing school in a small west coast town of 20,000. Study participants included seven undergraduate students.

Methods: The intervention was developed collaboratively with the Street Nursing Team (SNT) and piloted among SNT staff prior to implementation. Therapeutic communication (TC), Mental Health First Aid (MHFA), and Trauma and Violence Informed Care (TVIC) provided the theoretical foundation. A quasi-experimental one group pretest-posttest design was utilized to evaluate the intervention's effects on seven students in advance of clinical rotations. The aim of the intervention was to improve students' knowledge of mental disorders and increase their confidence. Data from anonymous surveys were statistically analyzed using dependent groups *t*-tests to compare scores across six participants. P-values were calculated using mean standard deviations to determine statistical significance at the conventional alpha level of 0.05.

Results: Mean differences (with standard deviation means in parentheses) and 95% confidence intervals (CI) for the confidence and knowledge blocks were 0.85 (0.47), CI [0.58, 1.12] and 0.13 (0.09), CI [0.04, 0.14], respectively; paired t-tests and p values were (t= 0.85, p< 0.05) and (t= 0.13, p< 0.05), respectively.

Conclusions: Improvements in both study domains were statistically significant and suggest that an educational intervention focused on evidence-based practices for PEH improves knowledge and confidence in students and may improve quality of care to PEH with mental disorders.

Introduction

Problem

The prevalence of serious mental illness (SMI) and substance use disorder (SUD) among people experiencing homelessness (PEH) is 21% and 16% respectively, rates that are significantly higher than the general population (Saldua, 2023). In the Oregon county where this study took place, the homeless population is 1,143, a 60% increase over a four-year period (Greene et al., 2024; Oregon Health Authority, 2019; Rothborn, 2024). Healthcare inequities arise from complex, intersecting factors involving structural, cultural and legal barriers among others (Koh, 2020; Lui et al., 2021; Richmond et al., 2024; Saldua, 2023). Healthcare worker bias and lack of care coordination contribute to avoidance of services, lower quality of care, and poorer health outcomes (Barry et al., 2024; Satiani et al., 2018). Among nurses, poor communication, low confidence, and negative attitudes are correlated with negative experiences and attitudes in nurses and patients, and poorer health outcomes (Baker et al., 2019; Richmond et al., 2024; Taghizadeh et al., 2018; Yoo & Park, 2015).

Street medicine and street nursing have emerged in recent years as practical and high-value services that enable the provision of healthcare services to this historically marginalized population however, compared to other populations, the evidence base surrounding best nursing practices for PEH with mental illness is lagging, highlighting a need for further research (Allen & Vottero, 2020; Hart, 2023; Richmond et al., 2024; Su et al., 2024). The Street Nursing Team (SNT) leverages student nurses to provide wound care, patient education and advocacy to PEH, but students often experience negative emotions and lack confidence when interacting with PEH and mental illness (Richmond et al., 2024; Walker et al., 2022). The purpose of this quality improvement project was to create an educational module for nursing students engaging with PEH utilizing adapted evidence-based practices (EBPs) and evaluate its effects on students' knowledge and confidence.

Search Strategy

Discussions with the SNT and volunteers from the Street Medicine Institute guided the initial search queries on Google Scholar and PubMed. Search terms included combinations of “behavioral health,” “evidence-based practices,” “homeless,” “homelessness,” “mental health first aid,” “nursing interventions,” “nursing students,” “people experiencing homelessness,” “psychiatric nursing,” “randomized controlled trial,” “street medicine,” “street nursing,” “systematic review,” “therapeutic communication,” and “therapeutic relationship.” A pragmatic approach was utilized to select a variety of articles to support and guide the intervention’s development. Findings from the literature review include one systematic review and meta-analysis, one systematic review, one qualitative systematic review, one literature review, two quasi experimental studies, one pilot trial, one quality improvement study, and one practice guideline. (Allen & Vottero, 2020; Baker et al., 2019; Kubo et al., 2018; Morgan et al., 2018; Richmond et al., 2024; Taghizadeh et al, 2018; Walker et al., 2022; Wathen, 2023; Yoo & Park, 2015)

Available Knowledge

Research shows that negative attitudes and stigma, as well as deficits in therapeutic communication, skill, and confidence negatively impact both nurse and patient (Allen & Vottero, 2020; Baker et al., 2019; Morgan et al., 2018; Richmond et al., 2024; Taghizadeh et al, 2018; Walker et al., 2022; Yoo & Park, 2015). Regarding therapeutic communication (TC), inadequate training in school, failure to deliver patient-centered communication, difficult conversations, and negative attitudes about PEH contribute to feelings of fear, avoidance, and unpreparedness in nurses and nursing students (Baker et al., 2019; Gutierrez-Puertas et al., 2020). Studies examining the effects of communication skills training (CST) included a systematic review of a sample of nurses (n = 1,295) and a quasi-experimental study of first year nurses (n = 66). Both found significant improvements in TC following CST; in addition, Taghizadeh et al. (2018) found a positive correlation between TC and patient outcomes (Gutierrez-Puertas et al., 2020; Taghizadeh et al, 2018). The two studies’ findings differed regarding the efficacy of case-based education compared to other modalities like simulation, role play and lecture. Researchers

Gutierrez-Puertas et al. (2020) could not determine which modality was more efficacious based on their systematic review (Gutierrez-Puertas et al., 2020). In contrast, Yoo et al. (2019) found that case-based education led to significantly greater improvements in TC than lecture alone; while Kubo et al. (2018) found similarly significant improvements in skill, confidence, and knowledge with a combination of role-play and lecture (Kubo et al., 2018; Yoo et al., 2019).

Societal stigma around mental illness, and nurses' negative beliefs, uncaring attitudes and stigma toward PEH, are barriers to effective, quality healthcare (Richmond et al., 2024; Walker et al., 2022). Of the three studies that examined the effects of education on stigma and negative beliefs, only Walker et al. (2022) evaluated change in nurses' attitudes specifically towards PEH (Kubo et al., 2018; Morgan et al., 2018; Walker et al., 2022). Morgan et al. (2018) found small significant reductions in stigma (n = 5936), Kubo et al. (2018) similarly found small reductions (n = 83), and Walker found small improvements in nurses' attitudes (n = 23); the two larger studies utilized Mental Health First Aid (MHFA), and the third utilized case studies (Kubo et al.,2018; Morgan et al., 2018; Walker et al., 2022).

Lack of familiarity with psychiatric disorders, inability to accurately identify symptoms, and uncertainty about how to respond impede quality care (Morgan et al., 2018). Two studies examined the effects of education on knowledge and skill; MHFA training resulted in small, non-significant improvements in accurate identification of mental health problems and significant improvements about effective treatments post intervention (Morgan et al., 2018). In contrast, Kubo et al. (2018) found significant improvements on 6 out of 10 questions assessing skill (Kubo et al., 2018).

Cultural considerations important in the care of PEH include barriers, such as high rates of trauma and discrimination, including those experienced during interactions with the healthcare system (Allen & Vottero, 2020; Richmond et al., 2024; Walker et al., 2022). Three articles describe strategies for reducing barriers and are distinct from one another. Research by Walker et al. (2022) and Richmond et

al. (2024) describe improvements in nurses' attitudes towards PEH resulting from an educational intervention and personal interactions, respectively (Richmond et al., 2024; Walker et al., 2022).

Rationale

The Kirkpatrick Model, used to evaluate healthcare training programs, was the framework chosen for this study because it can be expanded upon in the future (Heydari et al., 2019). Only the first two levels of evaluation were utilized: participants' response to the training and the degree to which their knowledge and confidence increased because of the training (Abdulghani et al., 2014; Heydari et al., 2019). The literature illustrates how CST, MHFA, and TVIC can be used to improve nursing students' knowledge, confidence, and attitudes towards PEH.

The use of CST to improve therapeutic communication skill in nurses is supported by the evidence, as it has been shown to increase confidence, skill, motivation, self-efficacy, reduce stigma, and improve patient outcomes (Gutierrez-Puertas et al., 2020; Kubo et al., 2018; Morgan et al., 2018; Taghizadeh et al., 2018). Taghizadeh et al. (2018) focused on four key aspects of TC: General aspects of the relationship (presence), therapeutic relationship (patient-led, needs-focused), psychological support (empathic listening), and non-verbal communication (maintaining appropriate distance, body language). These concepts were synthesized with what is known about TVIC and incorporated into the TC portion of the intervention.

The MHFA framework, and the disorder-specific guidelines downloaded from the Mental Health First Aid International website (2024), were similarly used as a scaffold for PEH-specific mental health problems. As a program designed for the layperson, its impact was expected to strengthen inexperienced students' ability to identify and respond appropriately to various mental health problems. Based on the success of Kubo et al. (2108) two-hour adapted MHFA intervention, a multi-modal intervention design was chosen for this quality improvement initiative (Gutierrez-Puertas et al., 2020; Taghizadeh et al., 2018; Yoo et al., 2015).

Trauma and Violence Informed Care (TVIC), an EBP identified as crucial in the provision of care to PEH by Richmond et al. (2024), was used as a framework to adapt EBPs to the setting of street nursing since PEH have relatively high rates of trauma (Richmond, et al., 2024). Examples of TVIC include giving clients choice and control over their decisions, focusing on strengths rather than deficits, and promoting clients' self-efficacy as these may improve outcomes in the setting of street nursing (Browne et al., 2018; Mental Health First Aid International, 2024; Richmond et al., 2024).

Specific Aims

This project's overarching aim is to create, facilitate, and evaluate an educational module for undergraduate nursing students. The study's specific aim is to improve knowledge of mental disorders in PEH and increase students' confidence utilizing TC, TVIC, and MHFA each by at least 25%.

Methods

Context

The Street Nursing Team (SNT) is a grant-funded, four-year-old organization comprised of one education coordinator, one clinical instructor, four clinical faculty in residence (field team), one research associate and evaluator who assists with grants, reporting, and data analysis, and one part-time psychiatric mental health nurse practitioner who provides consulting services once weekly directly to PEH. Annually, dozens of undergraduate and graduate nursing students complete practicum hours with the SNT. Engagement with PEH occurs at the Foot Clinic, and during street rounds primarily by undergraduate students. The SNT is an organization within the nursing school; it is self-organizing, innovative and collaborative. In this complex system, educational materials and street practices are developed collaboratively by educators, SNT staff and the wider community with which it engages.

The SNT addresses healthcare inequities by connecting PEH with local agencies to provide healthcare, housing, and community supports. Community partners include outpatient clinics, local hospitals, shelters, housing assistance programs, local law enforcement, and others. SNT staff members

take an active role in fostering partnership relationships through ongoing in-person, online, and telephone engagement. The number of patients seen weekly by the SNT varies but is estimated to be between 60 and 100 individuals. The dynamic and innovative nature of the SNT provides opportunities for creative projects but also presents challenges as the team itself is quite small, and its employees have multiple roles and responsibilities. The university provides office and lecture space and needed technology. Participation in this study was facilitated by nursing instructor involvement. The intervention was created, implemented, and analyzed by the author with the help of a biostatistician. This project was overseen by the SNT director, SNT manager, and clinical site preceptor.

Intervention

The intervention for this project was a two-hour educational module (see Appendix B) that was delivered onsite to undergraduate nursing students on December 6, 2024, by the author. Titled “Mental Health on the Street: Evidence Based Strategies for the Student Nurse,” the module aimed to increase participant knowledge and confidence related to PEH with mental disorders using adapted EBPs. Developmental research involved an analysis of the literature and collaborative discussions with SNT leadership. The intervention was piloted on October 24, 2024, to eight employees of the SNT. Feedback was gathered from pre- and post-intervention surveys and an informal discussion. Suggestions were then used to improve the intervention. Data from the pilot was not incorporated into the statistical analysis.

The two-hour module included three main segments: Part one included background information specific to PEH including the prevalence of various mental disorders, the prevalence and impact of trauma and chronic stress, and interventions that regulate the nervous system like mindfulness and breathing. Part two included information related to TC, collaborative care, and psychiatric medications. Part three focused on signs and symptoms of mood, anxiety, and psychotic disorders and strategies for working with these. SNT staff provided case examples exemplifying the types of encounters students can expect. A PowerPoint presentation was used to guide the class; following part one, and at the end of the

presentation, students participated in a role play activity which enabled them to build confidence, practice, and apply the skills they learned.

Quantitative and qualitative data were collected using anonymous identifiers so data could be paired later; quantitative data included knowledge and confidence assessment questions, while qualitative data included each participant's role on the SNT, and written feedback on their response to the training. To view the survey, see Appendix C.

Study of the Intervention

Surveys created using Qualtrics software were made available to participants via QR codes. Ten questions assessed confidence using a 5-point Likert scale; eight questions assessed knowledge utilizing a select all-that-apply format. Data from the pre- and post-intervention surveys were exported in Excel format and saved electronically on the author's computer. Responses from the open-ended questions were downloaded from Qualtrics, as were Qualtrics-generated reports containing data on the percentage change in knowledge and confidence scores. A biostatistician conducted two-tailed, paired *t*-Tests for both outcome measures and p-values of 0.05 or less were considered statistically significant.

Measures

Primary outcome measures for this project were knowledge and confidence. They were selected based on previous research presented in this paper, and because both were identified by members of the SNT faculty as barriers to equitable care (Richmond et al., 2024). The balancing measure was current engagement with PEH. No validated tools were to assess knowledge and confidence because the curricular themes were highly specific, and the study setting was novel. However, the following validated tools were utilized for reference: The Self-Efficacy in Interprofessional Experiential Learning Scale (SEIEL) measures nursing students' self-efficacy in the areas of teamwork, communication skills, and patient centered care (Mann et al., 2012); the Healthcare Provider Attitudes Toward the Homeless Inventory (HPATHI) assesses attitudes and biases toward PEH in the domains of personal advocacy, social advocacy

and cynicism (Buck et al., 2005); and the Mental Health Knowledge Schedule (MAKS) assesses knowledge of mental disorders, symptoms, treatment options, and recovery potential (Evans-Lacko et al., 2010).

Analysis

The analysis compares pre- and post-intervention student scores across six participants, focusing on improvements in knowledge and confidence. The mean difference (post-pre) was used to calculate standard deviations and confidence intervals; upper and lower bands were defined and p-values calculated. To visually compare pre- vs post scores for the confidence data, mean scores for each question were plotted onto a bar graph (see Figure 1). To visually compare pre- vs post intervention scores for the knowledge data, individual scores for each question were plotted onto a bar graph (see Figure 2). Some data was generated using Qualtrics software.

Ethical Considerations

Ethical considerations important in this study included participant anonymity and study site de-identification. To address these, anonymous identifiers were used to ensure pre-and post-intervention scores could be linked, and generic terms were used instead of real names and places. The intervention utilized anecdotal case studies and reports from current members of the street team. Aliases were used to protect client identities. This research project did not directly involve PEH, however, as a vulnerable population, additional safeguards were considered (Levine et al., 2004). A letter of support for the project was obtained from the SNT clinical site preceptor (see Appendix D), and the project proposal was submitted to the institutional review board for approval where it met exemption criteria for nonhuman research (see Appendix E).

Results

On October 24, 2024, a pilot of the educational intervention was delivered to seven SNT staff members. Feedback was gathered using pre-and post-intervention surveys, and an informal conversation

at the session's conclusion provided additional feedback. Data from the pilot study was not statistically analyzed; instead, it was used to assess participant response to, and overall usability of the intervention. Improvements, based on feedback, were then used to refine the intervention. On January 6, 2025, the two-hour intervention was delivered live on-campus to a group of seven undergraduate nursing students. Seven students completed the pre-intervention survey; just six completed the and post-intervention survey. Data can be viewed in Appendix F and G.

Among participants, 100% showed increases in levels of confidence and knowledge. Improvements in student confidence ranged from 7.5% to 40%, and in knowledge from 2% to 27%. The average improvement across participants was 23.35% (confidence) and 12.6% (knowledge). Table 1 shows pre- and post-intervention means, standard deviations, and confidence intervals used to calculate the p-values for each of the outcome measures. P-values of 0.018 for confidence and 0.007 for knowledge demonstrate that improvements in scores across both outcome measures were statistically significant. Raw data is available in Appendix F (confidence) and Appendix G (knowledge).

Of the six participants who completed the post-intervention survey, 100% were satisfied with the training overall and 100% said the training was applicable to their role. Just one participant provided feedback to the qualitative question "What would you change or improve for future training?" They suggested making it shorter and including more activities/dialogue throughout and adding an instructor-led demonstration of de-escalation.

Participation in the study was facilitated by a nursing school instructor's involvement who made attendance for the seven students a mandatory, pre-clinical requirement. The classroom setting provided the necessary technology at no cost, and nearby support staff helped ensure timely delivery of the intervention.

Discussion

Summary

A two-hour, multi-modal educational intervention, focused on improving evidence-based care to PEH using TC, MHFA, and TVIC in PEH with mental health problems, significantly increased nursing student knowledge and confidence. Study participants were unanimously satisfied with the training and found it to be helpful and applicable. Creating an intervention specific to PEH and the student nurses caring for them may be an effective model for adapting current best practices to meet the healthcare needs of PEH, improve the quality of care they receive, and address healthcare inequities in this population.

Interpretation

Improvement in confidence ranged from 7.5% to 40% while improvement in knowledge ranged from 2% - 27%, demonstrating a generally positive effect. The wide range in improvements 7.5% to 40% (confidence) and 2% - 27% (knowledge), indicates varying degrees of effectiveness across individuals and suggests that the intervention did not affect participants, which could be due to individual factors such as baseline confidence, baseline knowledge, learning styles, or external factors such as prior experience OpenAI, 2025). Statistical analysis in both domains were significant ($p < 0.05$), indicating the results were not due to chance (see Table 1). Improvements in neither confidence (23.4%) nor knowledge (12.6%) met the specific aim of 25%. The smaller improvement in knowledge suggests that students might benefit from more opportunities to practice and apply newly their skills.

This study's findings are like previous research. Gutierrez-Puertas et al. (2020), Taghizedh et al. (2018), and Yoo (2019) similarly found significant improvements in communication; and Kubo et al. (2018) and Morgan et al. (2018) similarly found significant improvements in knowledge and skill. Study participants' preferences for more activities, dialogue, and demonstrations align with Gutierrez-Puertas et al. (2020) suggestion that "the new generation of students prefer self-directed, immediate, exciting and immersive experiences" (Gutierrez-Puertas et al., 2020, p. 2241). Taghizadeh et al. (2018) also found significant improvements in communication skills, but their study included a second variable, quality of

care. Future research should aim to measure changes in participants' behavior as a result of the intervention, add one- and six-month follow-up assessments on knowledge and confidence, and assess the intervention's impact on quality of care, stigmatizing beliefs, and PEH attitudes (Gutierrez-Puertas et al., 2020; Morgan et al., Kubo et al., Richmond et al., 2024; Taghizadeh et al., 2018; Yoo et al., 2015). .

Limitations

This study had several limitations. First, adapting EBP to the street setting for PEH has been understudied, therefore utilizing validated tools to assess student knowledge or confidence was beyond the scope of this study. As a result, quantitative findings may lack validity and reliability. With regards to the survey, important omissions in the survey were discovered in the post-implementation period. Questions assessing changes in stigma were omitted, as were additional balancing measure questions. Contextual challenges included the absence of a doctorly prepared PMHNP with experience in quality improvement initiatives. The intervention was highly specific to the needs of SNT student nurses and focused on provision of care to PEH with mood, anxiety, and psychotic disorders, thus this study may be generalizable in similar settings such as school-affiliated SNTs, but perhaps less relevant in other settings.

Conclusions

This study demonstrates that an evidence-informed educational intervention improves nursing students' confidence and knowledge around mental healthcare delivery to PEH and may therefore improve quality of care and reduce health inequities in PEH. The intervention created for this study will be added to both the nursing school's undergraduate curriculum where it will be used to prepare students for clinical rotations, and the SNT's Toolkit which is being developed for national dissemination. This project 's nominal costs combined with the urgent need for innovative solutions that address health inequities in PEH suggest that research in this field will be sustainable.

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Table 1

Paired t-Test Analysis for Confidence and Knowledge Survey Blocks

Measure	Pre-Int. [a]		Post-Int. [b]		MD (SDD)	95% CI		***p***
	M	SD	M	SD		*LL*	*UL*	
Confidence	2.60	0.79	4.00	0.63	0.85 (0.47)	0.58	1.12	**0.007**
Knowledge	0.76	0.08	0.89	0.08	0.13 (0.09)	0.08	0.18	**0.018**

Note.

[a]Pre-Int = pre-intervention; [b]Post-Int = post-intervention; M = mean score; SD = standard deviation; MD = mean difference (post-pre); SDD = standard deviation of the mean differences; LL = lower limit; UL= upper limit; *p*= *p*-value. Paired t-tests yielded p-values of 0.007 (confidence) and 0.018 (knowledge), demonstrating that the improvements in both scores were statistically significant at the conventional alpha level of 0.05.

Figure 1.

Mean Pre- vs. Post-Intervention Confidence

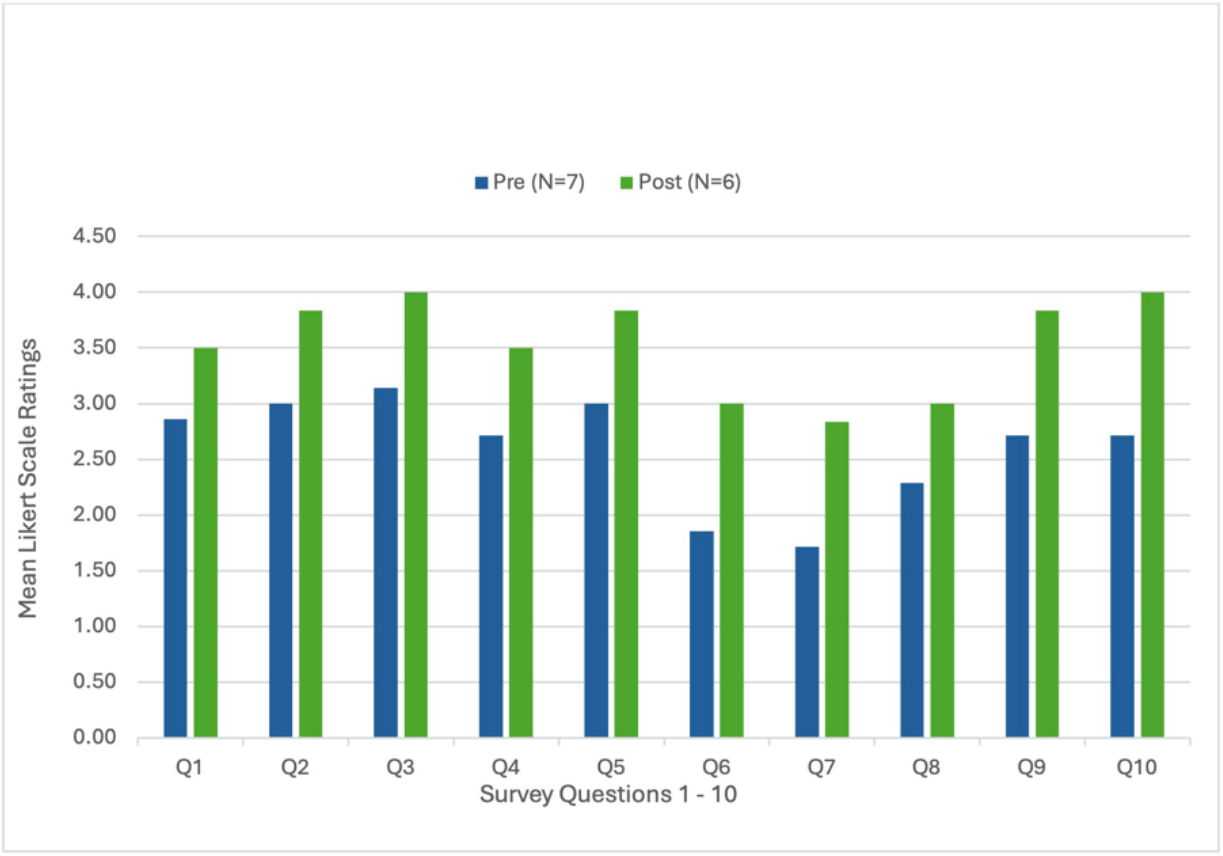
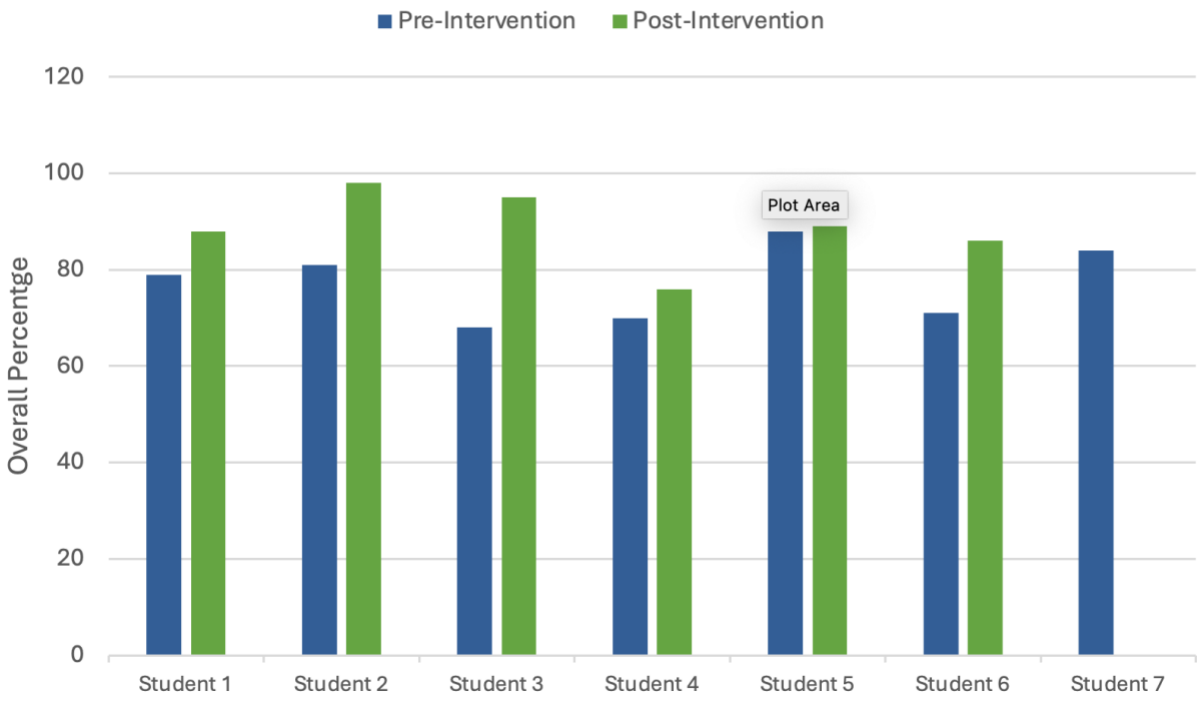


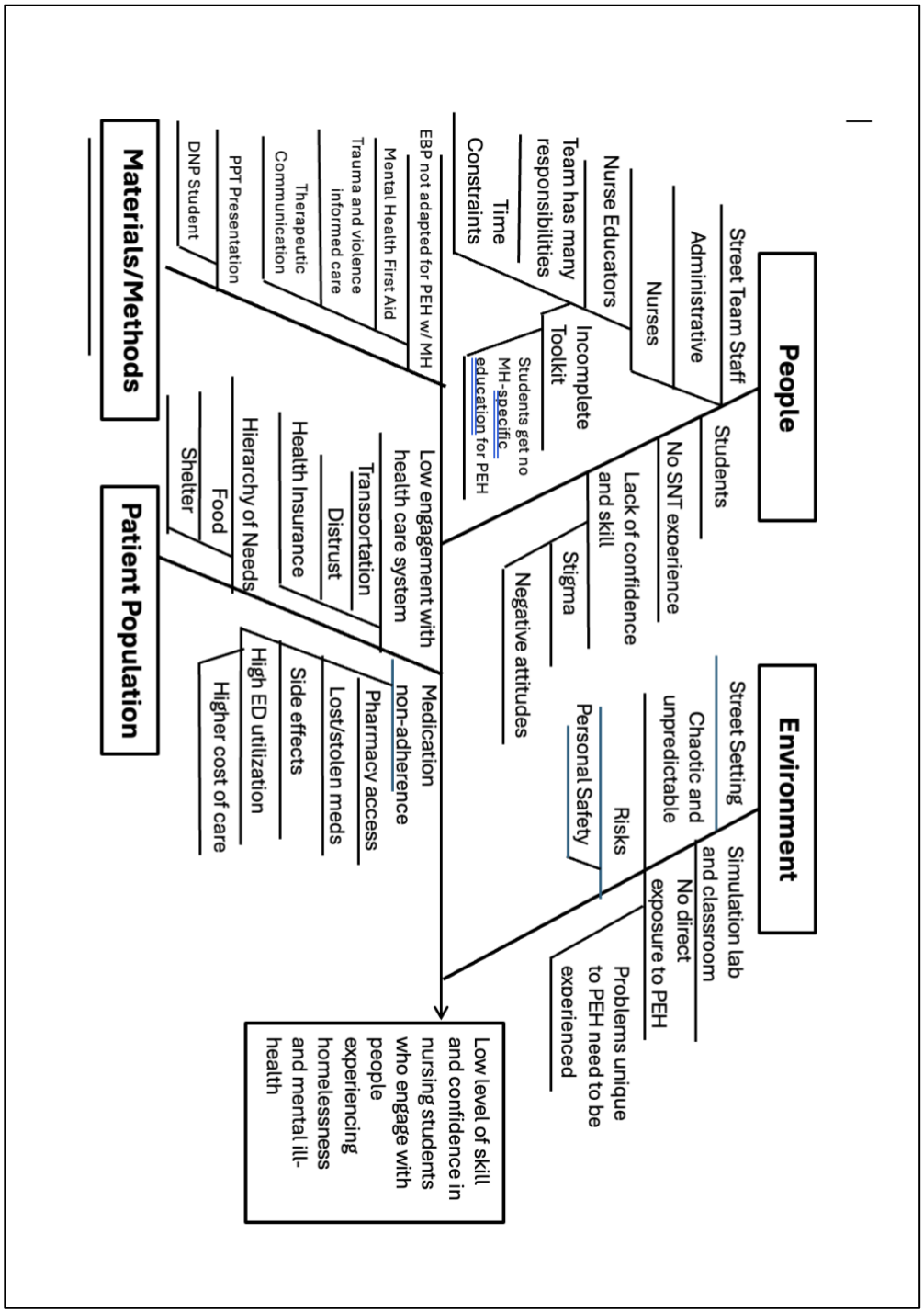
Figure 2.

Individual Pre- vs. Post-Intervention Knowledge



Appendix A: Cause and Effect Diagram

Team: Talah Alem, Street Nursing Team **Project:** MH Education for Student RNs on the Street



Appendix B: Intervention

Breathing Exercises

Description

Form of breathing where we bring conscious attention to the inhalations and exhalations, and the movements of the lungs and diaphragm.

Benefits

Reduces stress, regulates autonomic NS by stimulating parasympathetic response (rest and digest) to counteract sympathetic NS (fight or flight). Can improve executive function, reduce anxiety.

How to practice/teach

Basic technique: Sit or lie down and close the eyes. Breathe in deeply through your nose, exhale slowly through the mouth or nose. Fill the lungs completely. Focus on moving the belly more than the chest

Techniques

Box breathing, belly breathing; more advanced try making exhalations longer than inhalations (calming)

II. Therapeutic Communication & Collaborative Care

The Therapeutic Relationship (TR)

Carl Rogers

- Congruence (the most important attribute) - being authentic / internal = external
- Empathic Understanding – stand in their shoes, different than sympathy
- Unconditional Positive Regard – Attitude of "I accept you as you are"

The TR is a key intervention!

- Most readily accessible EBP intervention street RNs have

How the TR helps people

- Improves Self-Efficacy, Solve problems, learn coping skills, be engaged in their own care

Building the TR on the Street: Trauma and Violence-Informed Approaches

Verbal Communication

- Patient -led care: Allow person to lead conversation about their needs – ask open-ended Q's.
- Be curious, seek to understand their lived experience. Don't push, instead, explore their goals, supports, barriers at their pace
- Be honest and realistic about what they can expect

Nonverbal Communication

- Facial expression (most important), eye contact, head movements, gestures – use mirroring. Be positive.
- Body language – get on same level, keep open body stance, understand that when people are cognitively impaired, or psychotic, body language (and less talk) can provide reassurance, care.

Psychological Barriers to Engagement & Role of RN

Understanding Psychological Barriers

- Distrust of the healthcare system (past experience)
- Cognitive Impairment – sleep, SNS over activation…SUD impairs insight, judgement,
- Resistance – disengagement, denial, confabulation
- ANS dysregulation - strong emotional reactions – ie anger, fear & avoidance / withdrawal

Role of the RN – The goal is to connect

- Acknowledge, and if ok, explore the barrier – help them process trauma. Don't push an agenda
- Offer presence – hold space, silence ok. Communicate caring via eye contact, body language.
- Gently share your observations and ask questions directly: "you seem like you're feeling pretty energetic today … " "are you up for talking to me about…"
- Model regulated nervous system – stay calm, centered

Collaborative Care & Community Partners

Role of the RN

- Be knowledgeable about your network
- Assess client's willingness to use services including pharmacy , outpatient services, barriers
- Ask about insurance: educate, and assist with contact
- Co-create a realistic plan for accessing services (bus pass, appt setting, etc)

Community Partners

- Oregon Department of Human Services (ODHS) – OHP
- Jackson County Mental Health
- Max's Mission – harm reduction
- Rogue Retreat – shelters and community housing
- OHRA – Opportunities for Housing, Resources, and Assistance (La Clinica walk-in appointments)

Ethical Care of PEH

(A Vulnerable Population)

Confidentiality and Privacy

- **Description:** RNs have a duty to protect sensitive patient information, especially in populations at risk of discrimination or stigma.
- **Examples:**
  - Safeguarding the health records of individuals with mental illnesses, HIV, or other conditions that may carry social stigma.
  - Using discretion when discussing patient information, even in informal settings.

Discussing Psychiatric Medications on the Street

- Client attitudes and preferences about meds and healthcare system
- Use of indirect rather than direct approach can be more comfortable
- For some, can be a touchy subject. Use TVIC approach. LAIs
- Seek info that reveals info about past psych history and diagnoses

Psych Meds on the Street: Barriers

- **Practical challenges that contribute to non-adherence**
  - Secure storage
  - Stolen medications
  - Lack of transportation (pharmacy, appts)
- **Medication Side Effects**
  - GI upset (antidepressants) →limited access to bathrooms
  - Drowsiness (antipsychotics, anxiolytics) → risk/danger
  - Withdrawal (SSRIs, antipsychotics, depakote, etc)

"Low-Threshold" Psychiatric Prescribing
(Erickson et al., 2023)

- Simple medication regimens
  - Use of meds with moderate to long half-life
  - Once a day dosing
- Slow titration or avoidance of meds with GI side effects
- Medications that do not cause withdrawal are better
- Avoid meds that require lab work, secure storage, or refrigeration
- Long-Acting Injectable Antipsychotic Medications (LAIs) - helpful but often a touchy subject

Psych Meds: The Role of the RN
(Erickson et al., 2023)

- Explore Barriers: side effects, past experiences, transportation etc.
- Patient Education → discussing alternatives when barriers present
- Advocacy → within context of interdisciplinary team collaboration

Suicide

01	02	03	04
Understand your feelings, stay calm, breathe. Use verbal and nonverbal communication	Listen attentively, allow person to express any emotions. Express empathy, elicit pt's coping (ie supportive person)	Do not argue, debate whether it's right/wrong, offer glib reassurance, or use shame (How would your family feel it....)	Assess for plan and/or method. Only call EMS if client has weapon they are threatening to use

SUICIDAL THOUGHTS ROAD MAP

988 SUICIDE & CRISIS LIFELINE

Part III – Mental Health Problems on the Street

- MH Statistics in PEH
- Depression and Bipolar
- Anxiety and Panic
- Schizophrenia and Psychosis

Prevalence of Mental Disorders in PEH
(Barry et al., 2024; NAMI, 2023)

Rates of mental illness (MI) higher in PEH than gen. pop.
- Substance Use Disorder – 44% vs 17%
- Psychotic Disorder – 14% vs 3%
- Serious Mental Illness (bipolar, schizophrenia) – 31% vs 5%

MI in PEH men > women
- (67% vs 57%)

Most common MIs in PEH
- SUD (44%), antisocial personality disorder (26%), major depression (19%), schizophrenia (7%)

Antisocial personality disorder
- 8X higher than the general population (Barry et al., 2024; Padgett, 2020)

Antisocial Personality Disorder (DSM-5-TR)

- A: Pervasive pattern of disregard for, and violation of, the rights of others. The diagnosis is typically made in adulthood, though signs often emerge in adolescence or earlier. DX by thorough evaluation. 3+ traits:
- B. At least 18 years of age
- C. Evidence of conduct disorder before age 15
- D. Occurrence of APD is not exclusively during the course of schizophrenia or bipolar disorder

1. **Disregard for Social Norms and Laws**
2. **Deceitfulness**
3. **Impulsivity**
4. **Irritability and Aggressiveness**
5. **Recklessness**
6. **Irresponsibility**
7. **Lack of Remorse**

Depression Basics
(Barry et al., 2024)

Signs/Symptoms
- Depressed mood, anhedonia, feelings of worthlessness/guilt, irritability, slowed movements/speech, changes in appetite/sleep

Contributing Factors
- Stress related to housing instability
- Isolation/lack of social support
- Trauma, SUD, Medical Problems

PEH
- Interrupted sleep, irregular meals, chronic stress → changes in brain structure/mood over time

Suicide
- Ideation: 20 – 40% vs 9-11% in gen. population
- Attempts 10 – 20% vs 4.6% in general population

Bipolar Disorder Basics
(Barry et al., 2024)

Contributing Factors
- Disrupted access to mental health care, chronic stress/trauma, co-occurring conditions

Signs & Symptoms
- Expansive/elevated/irritable mood, grandiosity, increased talkativeness/fast/pressured speech, flight of ideas, distractibility, increased goal directed activity, risky behaviors, psychosis

Increased SI
- Rate 10 – 30x higher in BD; 20% of people with BD die by suicide (mostly untreated); higher in PEH

How can a street nurse help?

- **Therapeutic communication**
  - Cognitive slowing, tearfulness – assure client it's safe to fully express feelings
  - Mania - find a place that is relatively quiet to talk.
  - Create a safe container(define time/provide structure to conversation)
  - Ask client what (if any) goals they have
  - Therapeutic touch only with permission
- **Ask what has helped in the past, help facilitate this**
- **Give hope, acknowledge strengths, ie: a time they overcame a similar problem**
- **Help person identify self-help coping strategies**
  - Physical activity, talking to supportive person etc.
  - Mobile apps
  - Relaxation, mindfulness, meditation

Collaborative care with "Joe"

- 50 something year old man at the Foot Soak – I noticed he looked a bit lost and was walking tenderly
- He shared that he left his family, was now stuck as his RV had broken down, that he was feeling depressed, scared and suicidal
- He talked about more his needs, hx of severe diabetes and related neuropathy, hx of SUD, schizophrenia, childhood abuse

Collaborative Care:

- Connected him with PCP for diabetes tx, Introduced him to Street Dogs – partner that provides dog food and care to PEH. Provided a room (university sponsored) at OHRA
- SNT took care of his feet, gave him new shoes, provided assistance with scheduling, phone calls, dog watcher, weekly f/u, arranged rides and accompanied him to appt
- He is now living in supportive housing in the community

Anxiety and Panic

(Barry et al., 2024)

Signs & Symptoms

- Racing heart, sweating, trembling, shortness of breath, chest pain, nausea, vomiting, dizziness, chills, feeling feverish, fear of losing control, losing life, sense of non-reality

Ongoing stress of living on streets →

- Smaller window of tolerance, increased anxiety

How to help

- Create safe space (move, ask others to step away), reassure them they are safe, ask what's helped in the past, encourage use of coping skills (mindfulness, breathwork).
- Don't talk too much or ask what triggered it.

Obsessive Compulsive Disorder (OCD) & Hoarding

Obsessions - persistent, unwanted thoughts. Compulsions - repetitive behaviors used to reduce anxiety.

A common theme in OCD is cleanliness. On the street, maintaining hygiene is difficult. This often leads to anxiety which then results in the compulsive behaviors in people with OCD. Cyclic

Hoarding is the collecting of items in a disorganized way that interferes with daily functioning. Related to trauma, stress, and OCD. Emotional attachment to items; thoughts of discard can cause guilt, anxiety, fear

Both disorders respond to therapy. SSRIs are sometimes used. When there are barriers to these, use of No TV, and coping using mindfulness and exercise can help.

Help clients by creating a safe space for them to talk through their fears and anxieties. Can be helpful to explain that hoarding can be a response to trauma, loss

Case Study

- Client in her 50's with a history of schizoaffective disorder and anxiety, other medical problems; homeless for several years.
- The SNT helped get her temporarily housed, but she lost her apartment and returned to rough sleeping
- During a visit, a street team nurse in a state of extreme agitation and anxiety. When asked what was happening, she stated that her bicycle tire blew out (her main transportation). She was so frustrated she screamed, "I might as well go jump off a bridge."
- Due to the stress, her delusional hallucinations were more pronounced – she "sees and hears" a black attack dog talking commanding her, she's obviously in a state of hyperarousal (Flight or flight)
- As a street RN, how would you respond?

How one Street RN responded

- The PMHNP (who had built a relationship over more than 2 years)
  - Hugged patient
  - Placed hands on her arm and shoulder (knowing this was reassuring based on previous experiences with client)
- Did not address mental health directly, at first
  - Understood that problem with the tire was causing mood disturbance
  - Helped client obtain invertube and repair bike
- Then, she checked in about her mental health after crisis was resolved
- She learned she had not been taking her meds b/c line at pharmacy line is too stressful due to PTSD/hyperarousal
- PMHNP sent scripts to a smaller pharmacy, walked into the pharmacy with the client, providing her with reassurance

Schizophrenia and Psychosis

(Barry et al., 2024)

Prevalence

- Psychotic Disorder 14% vs 0.4 - 3% in general population
- Schizophrenia 7-8% vs 1% in general population

Contributing Factors

- Low adherence to medications (sometimes due to barriers)
- Substance Use (Stimulants like meth are notorius for unducing)

Signs & Symptoms

- Schizophrenia - Negative, postive, cognitive
- Psychosis – auditory/visual hallucinations, delusions, stereotyped movements (repetitive, nonfunctional, predictable)

Stigma

- Stems from misunderstanding, fear, misrepresentations in media, false belief that schizophrenia is associated with violence.

Helping someone experiencing psychosis

- Recognize that cognitive capacity may be limited. Insight and judgement may be impaired.
- Only help if PEH accepts your help
- Offer reassurance to person – "I want you to feel safe"
- Delusions & hallucinations
  - Acknowledge that what they are hearing/thinking is real to them
  - Ask how you can help
- If de-escalation is needed
  - Use a calm, low voice
  - Short, simple sentences
  - Ask direct questions
  - Ok to end interaction if either party get overwhelmed

Reducing Stigma in Schizophrenia and Psychosis

Terminology To Avoid

Psychotic Disorder, Brain Disease or Disorder, Split Mind, Terms for a person (person suffering from…crazy, psycho, delusional)

May Be Acceptable

Clinical terms (paranoid, having delusions), Plain Language (seeing things that aren't there) – depends on client preference

Recommended Terminology

Schizophrenia, Psychosis, Person Living with Schizophrenia, Person receiving Treatment for Schizophrenia, Treatment Adherence

Challenging symptoms ...and what the RN can do

Tangential Speech – difficulty staying on topic
- Ask them if they have a specific topic they want to focus on for today's conversation or suggest one. Say - "Let's return to our topic for today " (Provide structure and guidance)

Flight of Ideas – rapidly moving from one idea to the next with little to no linear process (happens with mania)
- Stay calm and patient; be supportive "I hear you" "That sounds important"; encourage them to slow down "I'd like to understand, can we go back to that last idea?"

Clang Associations – rhyming, alliteration.
- Use body language, nodding, eye contact, focus on being present and building trust non-verbally

Command Hallucinations – Voices telling person to act
- Tell them you need to take this seriously
- Ask if they've ever acted on them – plan or intent?
- Use chain of command if unsure whether you need to report (ask leader)
- One of our nurses had a client w/history of violence, who seemed dangerous. In this case, the RN opted to alert their case mgr and parole officer sharing both the client's location and details

"Anthony"

- A street RN was doing weekly rounds to the local sleeping areas, expecting to find M (dx of schizophrenia) to follow up
- She learned from other PEH that he'd been kicked out of the the night lawn because he'd stolen stuff from another person's tent thinking that it was his (delusional)
- The RN went to weekly foot soak where he was found very psychotic with agitated behavior, disorganized speech and unclear thinking.
- What would you do?

How the RN helped

- After taking to the client, the PMHNP learned he had not been taking oral antipsychotic medication.
- In this case, the PMHNP knew he'd been taking oral aripiprazole
- Because this patient's behavior posed significant risk to self and others, she contacted his case worker, but due to severe disorganization, she learned he had been dropped from services.
- Anthony is an example of what can happen – sometimes, we are simply unable to help. Important not to blame self or feel guilty – You tried!

Practice

- Pair up. One person in role of RN, other person is PEH at foot soak. Change after 3 minutes
- Client – focus on one disorder type (even though there is often overlap!) Do your best to portray what someone might be experiencing
  - **Depression**
  - **Anxiety**
  - **Panic Attack**
  - **Psychosis**
  - **Schizophrenia**
- Role of RN – focus on communication
  - **Non-Verbal communication (body language/facial expression)**
  - **Verbal Communication**
    - **Congruence**
    - **Empathic Listening** (reflective statements, short phrases)
    - **Unconditional Positive Regard**

Takeaways

- Patient-led care: Meet patients where they are; seek to understand each person's lived experience, help them identify their goals and create realistic plans
- Use nonverbal communication – body language
- TC: Empathic listening; Unconditional positive regard; Congruence
- Engage in collaborative care, reduce barriers to care
- Practice ethically, use de-stigmatizing language
- Aim to create a positive experience of the mental healthcare system
- Teach coping skills like mindfulness and breathing exercises
- Skillful conversations based on EBP, knowledge of MH disorders

Post-Intervention QR Code

Wrap Up

Feel free to email Talah with any questions – I'm happy to be a resource for you!
Email: alemjime@ohsu.edu

Thank You!!

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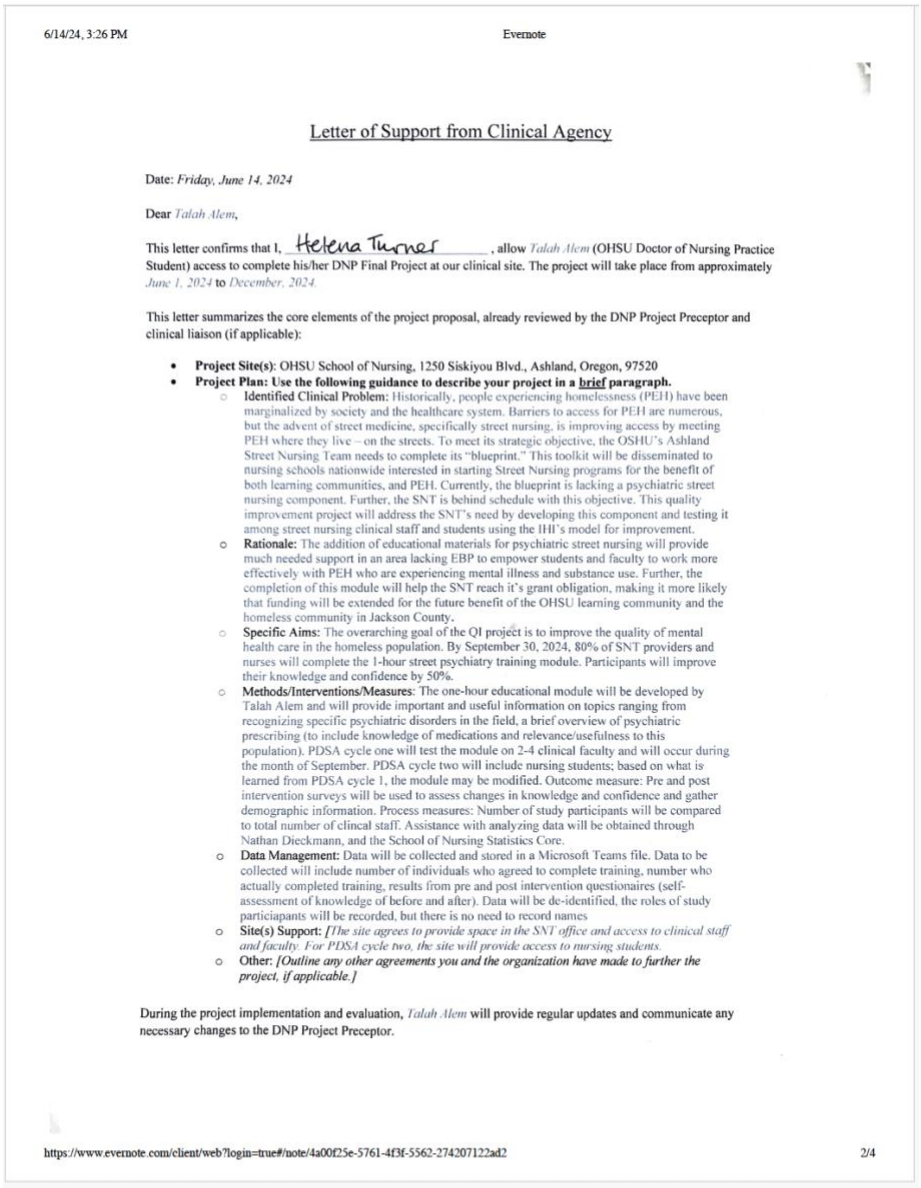
Appendix C: Pre- and Post-Intervention Survey Confidence and Knowledge Questions

Survey Questions

Confidence Block[a]
How confident are you…
Building a therapeutic alliance with PEH and using therapeutic communication?
Teaching mindfulness and breathing exercise to clients?
Collaborating with community partners?
Talking with someone experiencing anxiety?
Remaining calm and centered when working with patient experiencing mania?
Using non-stigmatizing language?
Recognizing signs and symptoms of common mental health disorders?
Talking with someone experiencing mania?
Talking with someone experiencing psychosis?
Discussing psychiatric medications on the street?
Knowledge Block[b]
What are the attributes of the Therapeutic Relationship according to Carl Rogers?
What is the best course of action when a PEH tells you they have suicidal thoughts?
What are some strategies for building the therapeutic alliance?
How can you help a person who is experiencing anxiety/panic?
What strategies help when approaching a PEH believed to be experiencing psychosis?
What are some considerations regarding psychiatric medications for PEH?
What are some potential benefits of practicing mindfulness?
How can a street nurse effectively engage in collaborative care?

Note. This table lists survey questions for the two primary outcome measures. [a] Confidence block questions were scored using 5-point Likert scale. [b]To analyze the results of the knowledge block, student responses were scored according to the following rule: For each select all question, students were given one point for a correct selection while incorrect selections were assigned no value. This value was then divided by the total number of correct selections possible for each of the eight questions.

Appendix D: Letter of Support from Clinical Agency



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Letter of Support from Clinical Agency

Date: *Friday, June 14, 2024*

Dear *Talah Alem*,

This letter confirms that I, Helena Turner, allow *Talah Alem* (OHSU Doctor of Nursing Practice Student) access to complete his/her DNP Final Project at our clinical site. The project will take place from approximately *June 1, 2024* to *December, 2024*.

This letter summarizes the core elements of the project proposal, already reviewed by the DNP Project Preceptor and clinical liaison (if applicable):

- **Project Site(s)**: OHSU School of Nursing, 1250 Siskiyou Blvd., Ashland, Oregon, 97520
- **Project Plan: Use the following guidance to describe your project in a brief paragraph.**
  - **Identified Clinical Problem:** Historically, people experiencing homelessness (PEH) have been marginalized by society and the healthcare system. Barriers to access for PEH are numerous, but the advent of street medicine, specifically street nursing, is improving access by meeting PEH where they live – on the streets. To meet its strategic objective, the OSHU's Ashland Street Nursing Team needs to complete its "blueprint." This toolkit will be disseminated to nursing schools nationwide interested in starting Street Nursing programs for the benefit of both learning communities, and PEH. Currently, the blueprint is lacking a psychiatric street nursing component. Further, the SNT is behind schedule with this objective. This quality improvement project will address the SNT's need by developing this component and testing it among street nursing clinical staff and students using the IHI's model for improvement.
  - **Rationale:** The addition of educational materials for psychiatric street nursing will provide much needed support in an area lacking EBP to empower students and faculty to work more effectively with PEH who are experiencing mental illness and substance use. Further, the completion of this module will help the SNT reach it's grant obligation, making it more likely that funding will be extended for the future benefit of the OHSU learning community and the homeless community in Jackson County.
  - **Specific Aims:** The overarching goal of the QI project is to improve the quality of mental health care in the homeless population. By September 30, 2024, 80% of SNT providers and nurses will complete the 1-hour street psychiatry training module. Participants will improve their knowledge and confidence by 50%.
  - **Methods/Interventions/Measures**: The one-hour educational module will be developed by Talah Alem and will provide important and useful information on topics ranging from recognizing specific psychiatric disorders in the field, a brief overview of psychiatric prescribing (to include knowledge of medications and relevance/usefulness to this population). PDSA cycle one will test the module on 2-4 clinical faculty and will occur during the month of September. PDSA cycle two will include nursing students; based on what is learned from PDSA cycle 1, the module may be modified. Outcome measure: Pre and post intervention surveys will be used to assess changes in knowledge and confidence and gather demographic information. Process measures: Number of study participants will be compared to total number of clincal staff. Assistance with analyzing data will be obtained through Nathan Dieckmann, and the School of Nursing Statistics Core.
  - **Data Management:** Data will be collected and stored in a Microsoft Teams file. Data to be collected will include number of individuals who agreed to complete training, number who actually completed training, results from pre and post intervention questionaires (self-assessment of knowledge of before and after). Data will be de-identified, the roles of study particiapants will be recorded, but there is no need to record names
  - **Site(s) Support:** *[The site agrees to provide space in the SNT office and access to clinical staff and faculty. For PDSA cycle two, the site will provide access to nursing students.*
  - **Other:** *[Outline any other agreements you and the organization have made to further the project, if applicable.]*

During the project implementation and evaluation, *Talah Alem* will provide regular updates and communicate any necessary changes to the DNP Project Preceptor.

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Our organization looks forward to working with this student to complete their DNP project. If we have any concerns related to this project, we will contact *Talah Alem* and *Virginia Elder* (student's DNP Project Chairperson).

Regards,

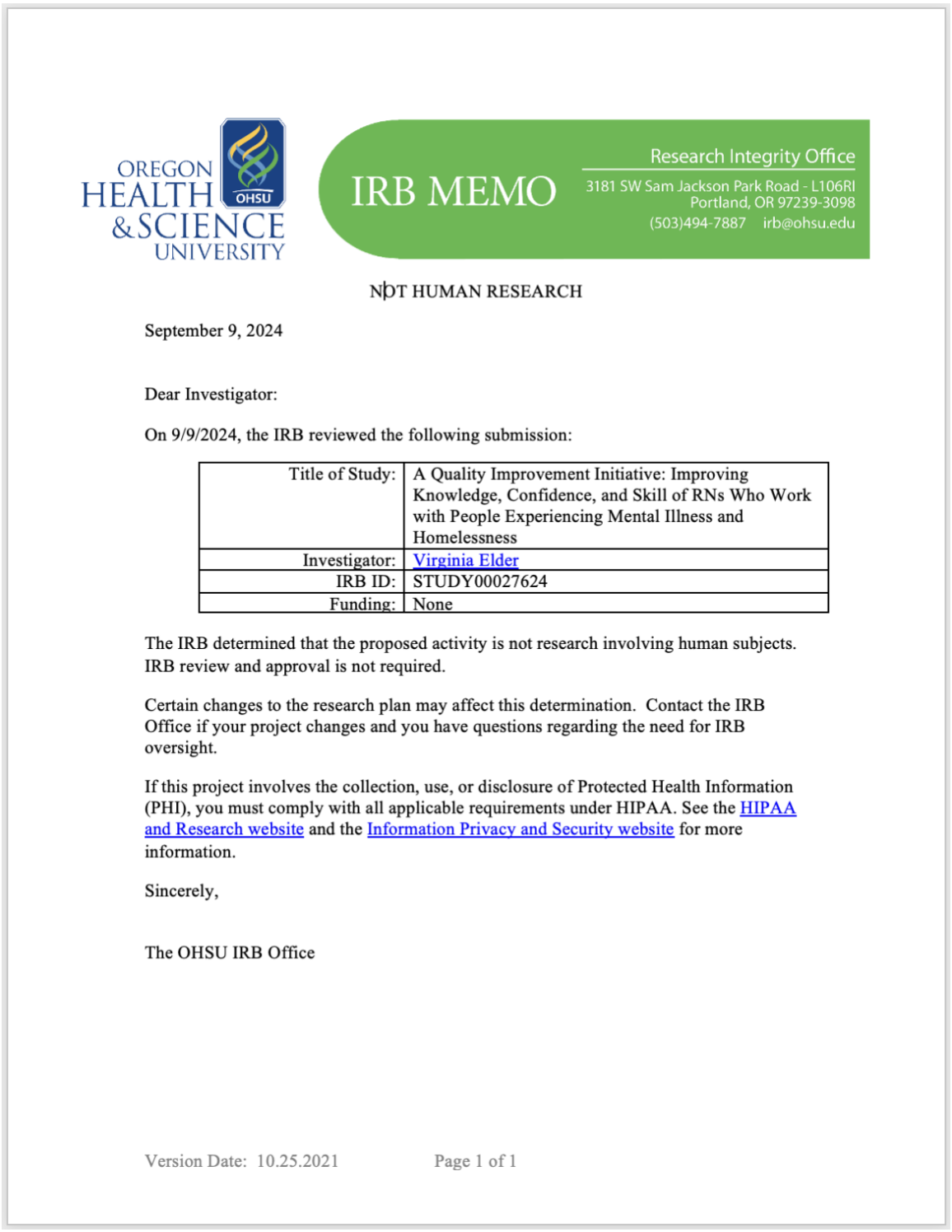
Helena Turner, PMHNP, faculty Street Nursing Team
DNP Project Preceptor (Name, Job Title, Email, Phone):

turnehel@ohsu.edu (603)686-6971

Signature

6/14/2024
Date Signed

Appendix E: IRB Letter of Determination



OREGON HEALTH & SCIENCE UNIVERSITY

IRB MEMO

Research Integrity Office
3181 SW Sam Jackson Park Road - L106RI
Portland, OR 97239-3098
(503)494-7887 irb@ohsu.edu

NOT HUMAN RESEARCH

September 9, 2024

Dear Investigator:

On 9/9/2024, the IRB reviewed the following submission:

Title of Study:	A Quality Improvement Initiative: Improving Knowledge, Confidence, and Skill of RNs Who Work with People Experiencing Mental Illness and Homelessness
Investigator:	Virginia Elder
IRB ID:	STUDY00027624
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the HIPAA and Research website and the Information Privacy and Security website for more information.

Sincerely,

The OHSU IRB Office

Appendix F: Confidence Data

	Pre											Post										
	Q4_1	Q4_2	Q4_3	Q4_4	Q4_5	Q4_6	Q4_7	Q4_8	Q4_9	Q4_10	Overall	Q4_1	Q4_2	Q4_3	Q4_4	Q4_5	Q4_6	Q4_7	Q4_8	Q4_9	Q4_10	Overall	Difference
9313E	1	2	3	2	3	1	1	2	4	3	2.2											
4486I	3	3	4	4	3	2	1	2	3	3	2.8	4	3	4	3	4	3	2	3	4	4	3.4	1.2
7948S	4	4	4	4	4	4	3	4	3	3	3.7	3	4	5	4	4	4	3	4	5	4	3.6	0.8
4383g	3	1	2	2	2	1	1	2	3	3	2	4	4	5	5	4	4	3	4	5	5	4.3	0.8
9029N	3	4	2	2	2	1	1	2	1	2	2	3	3	3	4	4	3	4	4	3	4	3.6	1.6
2924	3	5	4	3	4	2	3	3	3	4	3.4	4	5	4	3	4	3	3	3	4	4	3.7	0.3
1012d	3	2	3	2	3	2	2	1	2	1	2.1											
Mean	2.86	3.00	3.14	2.71	3.00	1.86	1.71	2.29	2.71	2.71	2.80	3.50	3.83	4.00	3.50	3.83	3.00	2.83	3.00	3.83	4.00	3.53	
STD.Dev	0.90	1.41	0.90	0.95	0.82	1.07	0.95	0.95	0.95	0.95	0.71	0.55	0.98	0.63	1.05	0.41	0.63	0.75	0.89	0.75	0.63	0.55	

	Q4_1	Q4_2	Q4_3	Q4_4	Q4_5	Q4_6	Q4_7	Q4_8	Q4_9	Q4_10
Pre (N=7)	2.86	3.00	3.14	2.71	3.00	1.86	1.71	2.29	2.71	2.71
Post (N=6)	3.50	3.83	4.00	3.50	3.83	3.00	2.83	3.00	3.83	4.00

Paired ttest 0.007 (p < 0.05, therefore stat. sig.)
Independent ttest 0.022 (p < 0.05, therefore stat. sig.)

Mean Difference (paired) 0.85
std 0.472229
conf 0.267184

lower band 0.582816
upper band 1.117184

The mean difference (post-pre) was 0.85 (95% CI: [0.58, 1.12])

Appendix G: Knowledge Data

	What are the attributes of the th	What is the best course of action when a P		What are some strategie		How can you help a per		What strategies help wh		What are some conside		What are some potentia		How can a street RN effectively enga		Overall
9313 E	1,3	0.67	1,3	1.00	2,4,5	0.50	1,2,3	0.67	2,5	1.00	1,4	0.67	2,3,5	0.67	1,2,4,5	1.00	0.79
4466I	1,2,3,4	0.83	1,3	1.00	1,2,4,5	0.83	1,2,3,5	0.50	2,5	1.00	2,4	0.67	2,3,5	0.67	1,2,4,5	1.00	0.81
7948S	1,2,3,4	0.83	1,3	1.00	2,4,5	0.50	3,5	0.17	4,5	0.25	1,4	0.67	2,4,3,5	1.00	1,2,4,5	1.00	0.68
4363g	2,3,4	0.50	1,3,5	0.75	2,4,5	0.50	1,2,3	0.67	2,4,5	0.75	1,2,4	1.00	2,3,5	0.67	1,4,5	0.75	0.70
9029N	2,3	0.67	1,3	1.00	4,5	0.67	1,2,3	0.67	2,5	1.00	1,2,4	1.00	2,4,3,5	1.00	1,2,4,5	1.00	0.88
2924	3	0.34	1,3	1.00	2,4,5	0.50	1,2,3	0.67	2,5	1.00	1,4	0.67	2,5	0.50	1,2,4,5	1.00	0.71
1012d	1,2,3,4	0.83	1,3	1.00	1,4,5	1.00	1,3	1.00	2,4,5	0.75	1,2	0.67	3,5	0.50	1,2,4,5	1.00	0.84
		0.67		0.96		0.64		0.62		0.82		0.76		0.72		0.96	
	Post test knowledge																
9313E	1,2,3	1	1,3	1.00	2,4,5	0.50	1,3	1.00	2,5	1.00	1,2,4	1.00	2,3,5	0.67	1,2,4,5	1.00	0.88
4363g	1,2,4	0.75	1,3	1.00	2,4,5	0.50	1,2,3	0.64	2,4,5	0.75	1,2,4	1.00	2,3,5	0.67	1,2,5	0.75	0.76
7948S	1,2,3	1.00	1,3	1.00	1,2,4,5	0.83	1,3	1.00	2,4,5	0.75	1,2,4	1.00	2,4,3,5	1.00	1,2,4,5	1.00	0.95
4466I	1,2,3	1.00	1,3	1.00	1,2,4,5	0.83	1,3	1.00	2,5	1.00	1,2,4	1.00	2,4,3,5	1.00	1,2,4,5	1.00	0.98
2924	1,2,3	1.00	1,3	1.00	4,5	0.67	1,3	1.00	2,5	1.00	1,2,4	1.00	2,3,5	0.67	1,2	0.50	0.86
9029N	1,2,3	1.00	1,3	1.00	2,4,5	0.50	1,2,3	0.67	2,5	1.00	1,2,4	1.00	2,4,3,5	1.00	1,2,4,5	1.00	0.90

	pre-score	post-score	improvement
9313 E	0.79	0.88	9.4%
4466I	0.81	0.98	16.6%
7948S	0.68	0.95	27.0%
4363g	0.70	0.76	5.8%
9029N	0.88	0.90	2.0%
2924	0.71	0.86	14.5%
1012d	0.84		
			12.6%
TTEST		0.018014058	

This analysis compares pre- and post-scores across six participants, focusing on improvements and their statistical significance. The findings are summarized as follows:

Participants showed varying levels of improvement, ranging from 2.0% to 27.0%.
The average improvement across participants was 12.6%.
A paired t-test yielded a p-value of 0.018, demonstrating that the improvement in scores is statistically significant at the conventional alpha level of 0.05.