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## Editor's Perspective

### Building Scholarship Capacity: JNPARR Publications

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As an official international, peer-reviewed academic journal, JNPARR's mission is to publish articles that focus on nursing practice, research, education, and administration. As manuscripts are received and reviewed, it is apparent to me as Editor-in-Chief, that nurses are doing impactful work and have a lot to share. The authors are clearly addressing scholarship that have the potential to impact nursing practice at all levels, scholarship of discovery, scholarship of practice (application), scholarship of teaching, and scholarship of integration.

The American Association of Colleges of Nursing defines scholarship as the generation, synthesis, translation, application, and dissemination of knowledge that aims to improve health and transform health care (AACN, 2018). Scholarship is inclusive of discovery, integration, application, and teaching (Boyer, 1990). Nurses who publish in JNPARR are research scholars, who regardless of settings use similar designs and methods in understanding phenomena, examining relationships, or testing interventions with their different populations of interest (AACN, 2018). Nurses who publish in JNPARR are practice scholars, applying and integrating evidence to and from clinical practice and conducting quality improvement using methodologies to improve care processes (AACN, 2018). Several nurses who publish in JNPARR are engaged in scholarship of teaching, focusing on understanding, describing, explaining teaching-learning strategies, assessing their impact on learner outcomes, and disseminating results (AACN, 2018).

Scholarship in these areas is integral to the development of nursing knowledge and in advancing the profession. Publications serve as a vehicle to disseminate important findings to change and/or improve nursing practice, research, education, and administration. However, many nurses who are engaged in scholarship benefit from guidance and mentorship to develop their writing ability so they may effectively communicate the knowledge gained from their work. As Editor-in-Chief, this is seen as a necessity for successful publication.

The fundamental purpose of publication of scientific information is to move science forward (National Academy of Science, 2003). "It is through publications that nurses contribute to the greater good of the entire professional community. Nurses often have a lot more to offer, in print, than they realize" (Lambert & Lambert, 2011, p. 80). Nurses are doing incredible work to contribute to the nursing profession but unfortunately may lack the writing skills and knowledge to prepare scholarly manuscripts for publication. Therefore, it is heartening to see that many of the manuscripts that are submitted to JNPARR issue, including this January issue, have author teams with nurses at all educational levels, including nursing students, baccalaureate nurse clinicians to newly graduated DNPs and doctoral-prepared academicians. We encourage nurse clinicians, researchers, educators, and administrators at all levels of expertise to work in writing teams and feel confident in submitting their work for JNPARR review. As a journal, JNPARR has adopted a supportive approach to encourage more nurses to contribute their expertise to the world of writing. For example, the Editorial Board and the PNAA Research Committee collaborate on the Writing for Publication Masterclass Series that provides participants to work with mentors in the PNAA to elevate their writing skills to the next level. We hope that more nurses at all levels seek the guidance and mentorship through research and writing teams to successfully disseminate their important work through publication in scholarly peer-reviewed journals, including JNPARR.

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**Cynthia Ayres, PhD., RN, FNAP**  
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**President's Message**  
**OUR UNITED VOICES: WE CARE**  
**PNAА 2022-2024**

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Greetings! The PNAА members are the core of the Philippine Nurses Association of America, Inc. (PNAА). When I took my Oath of Office as the 22nd President of PNAА on July 9, 2022, I surrendered myself to our Lord God to serve the PNAА and its constituent members. My mantra is crystal clear “Our United Voices: WE CARE.” It resonates in our hearts and lives as Filipino American nurses in the United States. When I was planning and reflecting on my mantra, I thought of the relevance and significant impact of our united voices as minority nurses in a country that offers a wide range of rich opportunities. Collectively with visionary PNAА leaders, the mantra, “Our United Voices: WE CARE” became a passion and purpose in advancing the PNAА and its constituent members for the next two years and beyond.

What does **‘WE CARE’** stands for? **W- Wisdom, E- Excellence, C-Collaboration, A-Advocacy, R-Respect, E- Equity.** Why is it important for us Filipino American nurses to embrace this mantra? Fundamentally, every nurse is a leader whether one is working at the bedside or the board room. Hence, these values and virtues are core principles that nurses live by when leading by example. **Wisdom** to make the right choices and sound judgment, as guided by evidence-best practice and one’s values. For example, in nursing practice, the nurse gathers patient’s pertinent information, uses the nursing process to provide quality, safe, and excellent care to patients in a holistic approach (physical, emotional, social, and spiritual well-being). **Excellence** is in everything that nurses do for patients and for communities they serve. Nurses strive to excel in clinical practice, education, research, leadership, management, community services, and legislative policy to mention a few are top priorities to all of us. **Collaboration** is always at the top of every nurse’s purpose-driven work. Whether taking care of patients through interdisciplinary team approach or leading an organization, nurses should always collaborate with individuals or other organizations to build alliances and stronger impactful outcomes. **Advocacy** is every nurse’s responsibility for oneself, patients, and society. Nurses are the voice of patients and families when they are unable to speak for themselves, especially when patients are uninformed about health policies and their own rights. **Respect** is a fundamental right of every person to be treated with respect and dignity. Nurses do respect every person as a unique individual and more than ever, they respect and value equity, diversity, and inclusion. **Equity** minded nurses are champions in ensuring that every person has a fair and just opportunity to be healthy. Nurses’ play a vital role in charting a path to achieve health equity.

The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity is every nurse’s duty and responsibility to make it a reality through multisectoral collaboration. It calls for nurses’ partnership with government agencies, non- profit organizations, private individuals, schools, churches, professional associations, and other agencies. Health Equity is the right of every person to have a just and fair opportunity to be healthy as possible. The PNAА Executive Board created a Task Force the Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity Through Diversity, Equity, Inclusion, Belongingness, and Social Justice (DEIBSJ). Dr. Sasha Rarang, Chairperson, Dr. Mila Sprouse, Assistant Chairperson, and Dr. Marlon Saria, Ex-Officio, Chairperson. The purpose of the DEIBSJ Task Force is to develop strategies and action plans in promoting health equity, reduction of health disparities, systemic racism, ageism, and barriers to health equity as experienced my members, patients, and communities they serve. The Task Force will work in collaboration with other PNAА Standing Committees, PNAА chapters, and National Coalition of Ethic Minority Nurse Associations (NCEMNA) through community service, education, practice, and research.

We have lived experiences on the effects of climate change to the health of people throughout the world. The PNAА is an organization signatory to a Joint Commitment Letter on Climate Change and Health. The PNAА Executive Board responded to this important health agenda by creating a Task Force on Climate Change and its Effects on Healthcare. The purpose is to raise awareness and understanding of the many causes of climate change affecting not only the physical but emotional, mental, social, and spiritual well-being of people across the globe.

Our United Voices: WE CARE is realized through many PNAА programs such as: Leadership Boot Camp “Camp Aruga” with the purpose of strengthening the leadership and interpersonal relations among chapter leaders and to their external constituents; the “Patnubay sa Pagtatagumpay” (Guidance for Success) Mentoring Program (P3) focuses on mentees suc-

successful career path, whereby a mentee is matched to a mentor who will guide along the mentee's professional journey; the "Kabalikat Emotional Wellness Program" was developed to enrich the resiliency skills of chapter members; and last but not the least, the Online Leadership Development Program (iLDP) is now on its 6th year in enhancing the leadership skills of the "movers and shakers" of PNAA and its chapters.

I am deeply honored and privileged to lead PNAA and all its constituent members.

**Gloria Lamela Beriones, PhD, RN, NEA-BC**

President 2022-2024

Philippine Nurses Association of America, Inc



# Exploring Type 2 Diabetes Management in Adult Chinese American Immigrants: A Qualitative Study

Paige Yang, Sydney Yang, Elizabeth Aquino, Kashica J. Webber-Ritchey, & Young-Me Lee

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## Conflict of Interest

The authors declare no conflict of interest.

## Abstract

**Introduction:** Diabetes is widely prevalent in the United States and is rising steadily. Diabetes self-management regimens are deemed effective. However, there are limited qualitative studies to explore the experience of diabetes mellitus type 2 (T2DM) self-management for adult Chinese American immigrants (CAIs). A better understanding of the needs of CAI patients with diabetes is necessary to reduce barriers to self-management and support their self-management needs.

**Objective:** To describe the perceived barriers and strategies used to effectively self-manage diabetes mellitus type 2 (T2DM) among adult CAIs.

**Methods:** A qualitative exploratory design was used. From October 2019 to March 2020, five adult CAIs with T2DM were interviewed using a semi-structured interview guide.

**Results:** Content analysis revealed four major themes on barriers to effective self-management of T2DM: 1) lack of exercise including two subthemes of family obligation and work conflict, 2) knowledge deficit, 3) language barrier, and 4) lack of self-motivation, and four major themes on strategies for effective self-management of T2DM: 1) improving diabetes knowledge including three subthemes of exercise, diet modification, and disease process, 2) self-acceptance of diagnosis, 3) social support, and 4) cultural and linguistic provider for culturally competent care.

**Conclusion:** Findings shed light on how to promote the facilitators of effective self-management strategies currently employed among CAIs. Healthcare providers must identify ways to mitigate barriers to effective diabetes self-management education.

**Keywords:** *Chinese immigrant, diabetes mellitus, barriers, strategies, self-management*



## Introduction

Diabetes mellitus type 2 (T2DM) has become widely prevalent, in the United States (US) and globally. It is a chronic disease that affects more than 23 million people and is the seventh leading cause of death in the US (Centers for Disease Control and Prevention [CDC], 2020a). According to the American Diabetes Association (2021), unmanaged diabetes can lead to numerous health complications, including but not limited to diabetic neuropathy, kidney disease, and cardiovascular disease (CVD) such as hypertension and stroke. The incidence of diabetes is 452,000 in adults aged 18-44 years and 706,000 in adults aged 45-64 years (CDC, 2022a). While 1 in 5 American people have undiagnosed diabetes, that number is higher for Asian Americans at 1 in 3 (CDC, 2022b). Moreover, diabetes increases the likelihood of CVD which is one of the leading causes of death in the Asian American population (CDC, 2022c; 2022d).

Asian Americans are the fastest-growing population of any ethnic or racial group (a growth of 72% between 2000 and 2015), with Chinese Americans as the largest Asian origin group in the US dominating at 24% of the total Asian American population (Budiman & Ruiz, 2021).

According to the US Census Bureau, the population of Asian Americans is projected to grow more than double (a growth of 100.8% from 2016) by the year 2060, making this racial group one of the fastest-growing populations, preceded only by people who belong to two or more races (Vespa et al., 2018). While Asian Americans are 20% less likely to die from diabetes compared to European Whites, in comparison they have additional risk factors that increase their disease risk that include 10% more likely to be diagnosed with diabetes, 60% more likely to be diagnosed with kidney failure than European Whites, and 10% less likely to receive retinal eye examination (CDC, 2021). In addition, the disproportionate impact of diabetes on Asian Americans has been linked to acculturation (Yoshida & Finseca, 2021). Chinese Americans with less acculturation level or attitudes and behaviors from the original culture that is not modified because of contact with Western culture influencing health behaviors (Xu et al., 2011) possibly face more challenges in managing their diseases. These challenges among less acculturated Chinese Americans are due to less access to quality of care and different health beliefs from their health care providers (HCPs) compared to those with higher acculturation level (Xu et al., 2011).

CAIs have various levels of traditional Chinese lifestyles, cultural expressions, and health practices (He, 2017). Traditional Chinese culture includes Confucianism principles for social interactions that influence health behavior, Taoism focused on being in harmony with nature (Tao), Yin and Yang belief that expands Taoism on health where health is viewed as a harmony between the body and its environ-

ment, and Buddhism consisting of Fate, Inn, and Kao as main factors determining health (Chen, 2001). They also have strong beliefs and values in family, and value in traditional Chinese medicine including herbal treatments/remedies, diet therapy, exercises, and folk beliefs as well as Western medicine (Chen, 2001). Moreover, education is highly valued. HCPs must be cognizant of the complex Chinese culture that influences their health behaviors as well as responses to care (Chen, 2001).

Based on projections from 2019 US Census data, language and cultural barriers and lack of health insurance threatens the health of Asian Americans (US Department of Health and Human Services Office of Minority Health, 2021). While Chinese Americans are the largest group of Asian Americans in the US (He, 2017), it is important to note that 52% are fluent in English (US Department of Health and Human Services Office of Minority Health, 2021) but still have difficulty with understanding HCPs that speak English too fast or if they are not provided enough time to respond (He, 2017) and 12% are living in poverty (Budiman, 2021). This finding emphasizes the need to improve access to care and prioritize strategies that meet the language and literacy needs of Asian Americans which is one of the Healthy People 2030 priority areas (Office of Disease Prevention and Health Promotion, n.d.). Evidence indicates the significant role self-management plays in the care of patients with T2DM (Captieux et al., 2018; Carpenter et al., 2019).

Previous studies have identified the common barriers to effective T2DM self-management for adult Chinese American immigrants (CAIs) (Chesla et al., 2009; Chesla et al., 2013; Chun et al., 2011; Wang et al., 2012). Common barriers include individual barriers, cognitive-behavioral factors, poor acculturation, cultural and structural barriers, and poor health literacy. Current existing diabetes education interventions to overcome barriers have focused on cognitive-behavioral interventions and psychosocial interventions. Diabetes education aimed at improving not only the cognitive domain but also positively influencing social, behavioral, and attitudinal changes in CAIs can significantly improve their confidence in all aspects of diabetes mellitus (DM) self-management (Chesla et al., 2013). Similarly, psychosocial interventions for diabetes self-management have also been shown to be effective in improving the health outcome of CAIs (Chesla, et al., 2014). Additional strategies for effective DM self-management for CAIs include involving family members and incorporating traditional Chinese medicine into the plan of care (Chesla et al., 2013; Tseng et al., 2013).

The US is the top destination country for Chinese immigrants, accounting for nearly 22% of the 11 million Chinese people residing outside of China; the combination of the rapidly growing Asian population and the rising diabetes

epidemic calls for effective self-management interventions that are tailored for the Chinese American population (Echeverria-Estrada & Batalova, 2020). California, New York, Texas, Illinois, Washington, Hawaii, and Massachusetts are among the top 10 US metropolitan areas with the largest Chinese population (Budiman, 2021). Despite this evidence, there is a paucity of qualitative research studies focusing on the experience of T2DM self-management for adult CAIs living in US metropolitan areas in the Midwest, and this finding necessitates additional research.

### Objectives

The purpose of this qualitative exploratory study is to describe the perceived barriers and strategies used to effectively self-manage T2DM among adult CAIs in the Midwest. The study findings from this research will provide key insights regarding the barriers that may help to develop a culturally grounded intervention to enhance T2DM self-care, improve clinical outcomes of T2DM among CAIs, as well as improve their overall health and quality of life.

The following questions are addressed in this study: 1. What barriers do adult CAIs experience in managing their T2DM? 2. How do adult CAIs overcome the identified barriers to effectively self-manage their T2DM?

## Methods

### Design

A qualitative exploratory research design was utilized to describe barriers and strategic interventions to self-manage T2DM in the CAI patient population. Semi-structured one-on-one interviews were conducted. Individual face-to-face interviews were chosen over focus groups because Asians tend to be very private and may be reluctant to share in-depth and sensitive information when in front of a group of strangers for fear of embarrassment and losing face (Kwan et al., 2011). Therefore, personal interviews increase the quality of information collected by providing participants with privacy and time to express in greater detail their personal experiences (Polit & Beck, 2017). The University Institutional Review Board reviewed the study protocol and approved it.

### Setting and Recruitment

Upon receiving University Institutional Review Board approval, a sample of adult CAIs living in the Chinatown neighborhood of Chicago, IL completed an individual face-to-face interview. In 2019, Chicago's Chinese population was 135,000, with 38% US-born and 57% foreign-born. Additionally, the educational attainment of the Chinese population consists of 29% with a high school education or less, 14% with some college, 28% holding a Bachelors degree, and 29% holding a postgraduate degree (Budiman, 2021).

Study participants were recruited utilizing the snowball sampling method from October 2019 to March 2020. The

snowball sampling method is used to generate participants through referrals from within the individual's social network such as family or friends (Frey, 2018). Two doctoral students completed participant recruitment, data collection, data cleaning, and data analysis. In addition, the study team included three PhD-prepared nurse scientists with expertise in qualitative methods that served in nursing education roles at the time of data collection and data analysis. Participants were unknown to the researchers. Data saturation was achieved after the fifth interview.

### Sample

Inclusion criteria for participants included: 1) first-generation Chinese American, 2) diagnosed with T2DM for at least 1 year, 3) adults between the ages of 18 and 64 years old, and 4) ability to speak Mandarin. Exclusion criteria included individuals who are incapacitated and have multiple health comorbidities. Each semi-structured individual interview lasted approximately one hour and was conducted by two doctoral students in public locations (public library's conference room and at local coffee shops within the convenient location of choice). Informed consent was obtained before the interview. The study was explained to all participants and participants consented to participation in the interviews. Additionally, participants were aware of the right to withdraw at any time. No harm was anticipated. Participants were informed that the data collected were coded to maintain confidentiality. Participants were compensated with a \$20 gift card at the end of the interview.

### Data Collection

Each participant completed an individual face-to-face interview using the interview guide developed by primary investigators through an extensive literature review. The interview guide was reviewed and approved by all research team members. The interview guide consists of three sections that include Section 1: demographic questions, Section 2: questions on the number of years living in the US and English proficiency to provide data on acculturation, and Section 3: main key open-ended questions about barriers, strategies to overcome barriers to managing diabetes, and resources and support the individual received with diabetes management which is presented in Table 1. The information collected included the participants' responses to the interview guide questions (Table 1) and any of the participants' observed emotional responses and body language. Interviews conducted in Mandarin Chinese were audio-recorded, and the interviewers took notes by hand to avoid distractions. All data were digitally recorded and transcribed verbatim and the quotes from participants were directly translated from Mandarin Chinese to English.

### Data Analysis

Descriptive statistics were performed on the demographic characteristics. Content analysis methods were employed



**Table 1***Interview Guide Developed Through Extensive Literature Review*

Interview Guide Section	Description	Number of Questions
Section I	Demographic characteristics: <ul style="list-style-type: none"> <li>• age</li> <li>• gender</li> <li>• employment status</li> <li>• years with type 2 diabetes</li> <li>• marital status</li> <li>• level of education</li> <li>• preferred language</li> </ul>	Seven questions
Section II	Acculturation questions: <ul style="list-style-type: none"> <li>• years of stay in the United States</li> <li>• self-reported English proficiency</li> </ul>	Two questions
Section III	Information about the individual's diabetes: <ul style="list-style-type: none"> <li>• typical day living with diabetes,</li> <li>• describing the barriers of living with type 2 diabetes,</li> <li>• strategies to overcome these barriers,</li> <li>• the type of resources or support the individual received with diabetes management, and</li> <li>• any additional comments and or experiences that the participant wanted to share.</li> </ul>	Eight open-ended questions

by two researchers for the qualitative data to identify common themes then data were coded based on barriers and strategies identified by the participants. The researchers organized the data independently by identifying and labeling the key ideas as well as matching the content of the categories with the major themes and subthemes. After the common themes emerged, the researchers discussed their coding process, compared the extracted themes, and then categorized them under either barriers or interventions and strategies.

### Methodological Rigor

Methodological rigor in qualitative data was achieved through the translation of identified themes, subthemes, and quotes from participants. The themes, subthemes, and quotes were translated from Chinese to English by two bilingual Chinese-English speakers, one with a master's education and another with a bachelor's education. Two researchers verified the accurate translation of the data

through the comparison of the themes, subthemes, and quotes in both Chinese and English. Trustworthiness and credibility were achieved through the work experience of one of the researchers with CAIs living in Chicago Chinatown, USA. Furthermore, both researchers are Chinese Americans and were able to build rapport with the volunteers by understanding cultural values and by speaking the same language. Transferability was established through a thorough description of the data collection and data analysis processes as well as the recruitment process.

### Results

#### Demographic Characteristics of Study Participants

A total of five participants participated in this study consisting of two male and three female participants with age ranges from 46–64 years. All participants were first-generation Chinese immigrants living in Chicago's Chinatown and preferred Mandarin Chinese over English. Two of the participants had been diagnosed with T2DM between 2-5 years;

one between 5-10 years; and two between 10-15 years. One participant reported being in the US for 10-15 years, two participants reported being in the US for 15-20 years, and another two participants reported being in the US for over 20 years. One participant did not speak English well at all while the remaining participants did not speak English very well showing English proficiency levels is limited.

### **Barriers to Effective Self-Management of T2DM**

We found four major themes for barriers to effective self-management of T2DM among the adult CAIs living in the Midwest and two subthemes. These barriers included: 1) lack of exercise along with the two subthemes of family obligation and work conflict, 2) knowledge deficit, 3) language barrier, and 4) lack of self-motivation.

#### ***Lack of Exercise***

All participants reported that the lack of exercise was one of the main barriers to diabetes self-management. Two contributing factors were found as subthemes: family obligation and work conflict.

***Family obligation.*** One of the participants described her daily activities as revolving around taking care of her grandchild.

“Now my main job is to take care of my granddaughter, so I don’t plan to do other work. I stay at home all day long; my daily life revolves around my granddaughter.”

***Work conflict.*** Participants reported that they were unable to engage in exercise due to work environment, responsibilities, or schedule conflicts.

“My job is with a trucking company working as a dispatcher...During work, I have been sitting, and rarely exercise.”

#### ***Knowledge Deficit***

Majority of the participants reported not checking their glucose level regularly because they feel that the glucose level is within an acceptable range. Two of the participants did not think of themselves as patients and did not see having diabetes as a big problem.

“Also, no modifications in my diet. Because I feel that it’s all mental, I don’t see myself as a sick patient... If I can’t do this and I can’t do that then maybe, I’ll develop other illnesses.”

#### ***Language Barrier***

All participants had American doctors as their primary care providers at some point, but they realized that not speaking the same language was an issue for effective diabetes care.

Soon, they all switched to Chinese doctors who spoke the same language.

“I used to have an American doctor, but he does not explain to me what the test result is and just tells me it’s okay. I switched to a Chinese doctor in Chinatown and I think it is better because he would explain to me whether the test result is good or bad. I think it is better to have a doctor whom I can communicate with.”

#### ***Lack of Self-Motivation***

Many participants admitted to the lack of self-motivation to properly manage their T2DM.

“But I keep hoping to control [my diabetes] through food, so I don’t need to take medicine. But you know, I love to eat food and barely do any exercise so [my A1C] level never comes down.”

### **Strategies for Effective Self-Management of T2DM**

We found four major themes related to strategies for effective self-management of T2DM. These included: 1) improving diabetes knowledge along with the three subthemes of exercise, diet modification, and disease process, 2) social support, 3) self-acceptance of diagnosis and 4) cultural and linguistic provider for culturally competent care.

#### ***Improving Diabetes Knowledge***

All participants were aware of the need for more diabetes knowledge to help them more effectively manage their T2DM. Specifically, they expressed wanting to learn more about exercise, diet modification, and the disease process that was found as subthemes.

***Exercise.*** All participants reported engaging in some form of physical activity to effectively manage their diabetes condition. Many would dedicate a certain time to going to the gym, playing sports, or simply going outside for a walk during the day.

“I go to the gym. I insist on going every day even if it’s for 5 minutes. But I did not go because I did not feel well yesterday.”

***Diet modification.*** All participants reported that they understand the importance of diet change to help more effectively manage their diabetes. Some participants controlled their food portions and reduced the consumption of sweets and rice.

“I just reduce rice for dinner or simply don’t have dinner...I eat very little meat now. I like pork belly, we used to stew pork belly. Now I eat fish and vegetables more...I used to love sweets. I still eat now but there will be a bit of control.”

**Disease process.** Many participants mentioned that understanding the disease process can help them more effectively manage T2DM. One of the participants had a background in nursing, so she understood diabetes and its proper care. Another participant wished that he was more informed about diabetes and the danger of having uncontrolled diabetes.

“HCPs should be more patient in explaining the disease process and treatment plan with diabetes patients. Because it will affect their treatment adherence. Educate them about check-ups and early prevention and take medication as prescribed. The most important thing is to try to persuade, say, or let your patients recognize the danger of this disease. So, the medical staff needs to make this powerful point clear, patients will understand early prevention and early control.”

### **Self-Acceptance of Diagnosis**

A few of the participants expressed that understanding their diabetes condition and accepting it helped them to better manage the condition. That while they may not have control over every aspect of their conditions, they do, however, have control over taking their medications and making changes to their lifestyles.

“Oh, it’s not that I am not worried, it’s just that medicine can help control [diabetes] and in my family, my mom has it too so it’s inevitable...yes. I just have to make sure that I take the medicine on time and be careful about what I eat.”

### **Social Support**

Many participants reported that having support from family and friends has helped them better manage their diabetes conditions.

“Sometimes when I go out to eat, my wife [a nurse practitioner] will remind me that if I eat too much and she will try to avoid dessert...If there is a doctor in the family, who has medical knowledge, it will help a lot. If you don’t have someone [like that] in the family, you will miss or ignore some things. Especially in situations where Chinese people don’t know English.”

### **Cultural and Linguistic Provider for Culturally Competent Care**

Many participants expressed that having a healthcare provider that speaks the same language, Mandarin Chinese, helps them understand better in managing diabetes conditions.

“Having primary care providers and nursing/healthcare staff that speak the same language and care about patients would make a difference in diabetes care. My family doctor used to be an American doctor, but I had to switch to a different hospital...The first doctor was

from Malaysia, speaks Mandarin and Cantonese, and cared more about me.”

### **Discussion**

Self-management of T2DM can prevent complications of T2DM and facilitate adherence to treatment regimens such as adopting healthy lifestyles to control diabetes complications. Therefore, it is important to understand both the barriers and strategies to the effective self-management of T2DM in CAIs. Our interviews with CAIs about the self-management of T2DM identified four barriers to the effective self-management of T2DM which provide insights into the various challenges that they continue to face when self-managing T2DM and the strategies that they have been able to implement to overcome these barriers. Although some participants reported engaging in some form of physical activity to manage their T2DM, some participants identified a lack of exercise due to family obligations or work conflicts as a barrier to the self-management of T2DM. Consistent with previous research indicating the need for cultural competence care, our study demonstrates that knowledge deficit and language barriers should be addressed in the effective self-management of T2DM and the need to improve diabetes knowledge for CAIs.

Diabetes self-management education has been incorporated into interdisciplinary care to educate patients on the disease and its treatment (Powers et al., 2015). Additionally, a recent systematic review found diabetes self-management education as an effective intervention for T2DM patients (Ernawati et al., 2021). However, the participants in this study revealed that they have not received sufficient education on proper diet, blood sugar control, and medication use to effectively manage their diabetes condition. With nurse practitioners (NPs) being in a unique position to implement evidence-based interventions to treat, educate, and improve patients’ health (Jessee & Rutledge, 2012), diabetes self-management education should be provided during clinical visits with T2DM patients and periodic refresher diabetes education is recommended to address suboptimal self-management (Despins & Wakefield, 2020). HCPs such as NPs, physicians, physician assistants, and health systems should also advocate for a plan in place to provide access to diabetes self-management education (Powers et al., 2020).

Previous studies have shown that knowledge deficits are attributed to health literacy issues in the care of CAIs with diabetes. Leung and colleagues (2014) highlighted how first-generation CAIs ages 45 years and older with diabetes have difficulty obtaining, processing, and understanding diabetes-related information. Hsu et al. (2006) found linguistic barriers to diabetes education and care in Chinese Americans aged 18–70 years. Deng and Chan (2019) found a lack of culturally relevant, practical information as a main barrier for CAIs with diabetes aged 35 years and older.

HCPs can create health education materials for CAIs that are more culturally appropriate to increase health literacy through a nuanced assessment of both surfaces and deeper levels of culture (Ho et al., 2015). Additionally, HCPs should incorporate the use of plain language, the Teach-Back method, and evidence-based treatment approaches to promote patient engagement in the provision of diabetes education (American Association of Diabetes Educators, 2019). Many of the participants voiced that they do not ask questions during their visits with their HCPs largely due to the language barrier.

Even though the CAIs participated in our study have been living in the US for more than 10 years, they identified the language barrier as a significant factor in effective self-management of T2DM indicating a lower level of acculturation. One study found limited English language proficiencies among first-generation Chinese immigrants are an added stress to the acculturation and health management of CAIs (Chun et al., 2017). National Health and Nutrition Examination Survey data revealed as acculturation increased in Asian Americans, the likelihood of achieving the recommended glycemic goals (Yoshida & Fonseca, 2020). This finding indicates the need for culturally tailored efforts that promote awareness and self-efficacy of diabetes management in Asian Americans (Yoshida & Fonseca, 2020). Nation-wide efforts are deployed to make it a federal requirement to provide interpreter services for patients who are non-English-speakers (Jacobs et al., 2018). The participants expressed that language barriers had prevented them from communicating their concerns and receiving information regarding diabetes care. HCPs should develop a health communication plan that includes context-specific and community-based assessments of the targeted CAI population (Ho et al., 2012).

In our study, lack of self-motivation in the self-management of T2DM served as another factor that was associated with the attitude and perceptions about self-care among CAIs. This result is consistent with previous findings that health beliefs, including attitudes, lifestyles, and health practices can affect how CAIs maintain and improve health (Wang et al., 2012; Washington & Wang, 2009). While studies suggest changing CAIs' attitudes and behaviors toward self-management (Wang et al. 2012; Washington & Wang, 2009), sole reliance on this assumption might not be as effective. Culturally and linguistically tailored efforts promoting awareness and self-efficacy in diabetes management are warranted (Yoshida & Fonseca, 2020). These efforts should include providing cultural competence training, providing care in different languages, developing written material in different languages, involving families in care, and collaborating with communities (Handtke et al., 2019). Moreover, healthcare teams with bicultural/bilingual HCPs should be developed that include the integration of community health

workers to facilitate communication and referral to health-care services (Handtke et al., 2019).

Understanding both the barriers that the CAIs face and the strategies they used to overcome those barriers can help HCPs develop individualized diabetes care. Participants in this study reported that increased knowledge of disease processes, diet, blood sugar control, and medication use can help them more effectively self-manage diabetes. Studies have shown that patients who have received diabetes self-management education have better outcomes in greater knowledge, better self-efficacy, and improved glycemic control and HbA1c levels (Captieux et al., 2018; Jessee & Rutledge, 2012). These findings emphasize the importance of providing information on appropriate exercise and diabetes diet to help patients improve diabetes conditions. Education on physical activity and exercise should be tailored to meet the need of the individual patient with diabetes (Colberg et al., 2016). HCPs should use brief counseling to recommend and prescribe physical activity and encourage patients to decrease the total amount of daily sedentary time and to break up sitting time with frequent bouts of activity (Colberg et al. 2016; Jones et al., 2019).

Acceptance of the diabetes condition and family support are identified strategies to help patients effectively manage their conditions. Studies have shown that negative attitudes and perceptions about self-care can potentially impact diabetes management and the overall health of CAIs (Wang et al., 2012; Washington & Wang-Letzkus, 2009). Family values and social relationships are central to CAIs; therefore, family support is a vital aspect of contributing to the well-being of the individual (Chesla et al., 2009). Family roles and closeness of relationship can lead to high adherence to diabetes management routine, in turn, improved health outcomes for CAIs (Chesla et al., 2009). Lastly, consistent with previous studies (Chesla et al., 2009; Chesla et al., 2013; Chun et al., 2011), participants in this current study also identified the importance of having culturally and linguistically competent care from HCPs as another effective management strategy. They felt much more comfortable with HCPs who have the same racial/ethnic background and who speak their language, resulting in enhanced communication and adherence to their treatment plans.

The strengths of this current study include the following. To our knowledge, this is the first study conducted among adult CAIs living in the Midwest. The use of qualitative methodology enabled us to obtain their perspectives on barriers to and the strategies for effective self-management of T2DM in a small population of CAIs living in the Midwest. Given the dearth of qualitative research studies focusing on adult CAIs, this study contributes to evidence and can guide future research. Future work in controlling rising diabetes and hidden prediabetes epidemics in underrepresented groups



must include the voices of Asian Americans to better understand their diabetes self-management patterns.

### Limitations

While this evidence contributes to the growing body of evidence on understanding self-management practices in CAIs, there are some limitations, foremost is the small sample size. It is not the intention of this paper to generalize all CAIs, not even CAIs living in the US Midwestern region. Future work should prioritize the recruitment of representative numbers to inform culturally competent strategies that aid self-management (Carpenter et al 2019). As mentioned earlier, the Chinese American population is very conservative and is reluctant to speak to individuals with whom they have no prior established relationship. Despite the initial challenges, the study was able to recruit five participants through the snowball sampling method. Snowball sampling is advantageous in accessing hard-to-reach populations (Kirchherr & Charles, 2018). Snowball sampling typically continues until data saturation is reached (Naderifar et al., 2017) which is the point at which new data begins to be redundant with what has already been collected (Gray & Grove, 2021). It is possible that data saturation was reached prematurely due to using snowball sampling. Second, the participants were solely from one US Midwestern state. Their experiences may not reflect other CAIs who live in other parts of the country where there may be differences in the resources that are available to CAIs.

### Conclusion

Our findings can help increase the HCPs' understanding of the factors that may influence CAIs' diabetes management and provide insights on ways to help improve their management. Some of the possible issues with diabetes management for CAIs include language and cultural barriers and additional new findings from this study are the lack of knowledge, exercise, and self-motivation. Being cognizant of the traditional Chinese culture is the key to improving diabetes control (Yoshiba & Fonseca, 2020). HCPs need to consider these potential barriers when providing care to this population to provide care that is linguistically and culturally appropriate. Furthermore, understanding the facilitators of diabetes self-management for CAIs will allow the HCPs to reinforce these potential facilitators. Additionally, our findings can help HCPs understand that effective diabetes self-management is associated with all aspects of the patient's life. Therefore, culturally appropriate diabetes interventions should be developed to meet the specific needs of the population. These interventions should be multidisciplinary to maintain consistency and to ensure that appropriate care is provided to patients every step of the way. Health policies addressing the barriers to healthcare access faced by immigrants and providing additional resources with special attention to funding to improve the quality of life for this demographic should be developed.

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# Designing, Developing, & Evaluating an Innovative Community Health Nursing Virtual Reality Experience

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The authors declare no conflict of interest.

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## Abstract

**Background:** Virtual reality simulation in nursing education is in the early stages of development and is becoming increasingly valuable for transforming and uniquely augmenting nursing education.

**Objective:** The purpose of this study was to apply the community-based participatory approach to design and develop virtual reality simulation for a community health nursing course and describe the results of beta-testing to evaluate and improve the overall product and experience.

**Methods:** This mixed-methods study ( $N = 15$ ) describes the process of designing, developing, and evaluating high-fidelity virtual reality simulation for community health nursing.

**Results:** Quantitative and qualitative data received from participants were used to develop and improve the final virtual reality product.

**Conclusions:** This article provides information for nursing faculty who are interested in incorporating virtual reality in their nursing program curriculum.

**Keywords:** *faculty; nursing; virtual reality; education, nursing; curriculum; community health nursing*

## Background

Virtual reality (VR) is a type of high-fidelity simulation that uses cutting-edge equipment, which was initially used in video games, then military, flight, and astronaut instruction (Bayram & Caliskan, 2020). VR simulations demonstrate a real-world clinical situation for nursing students, help them gain knowledge, critical thinking and communication skills, confidence, and be better prepared for clinical practice (Bayram & Caliskan, 2020).

Technology is an important element in transforming education (Kavanagh & Sharpnack, 2021). According to the National Council of State Boards of Nursing (2015), simulation can replace up to 50% of traditional clinical hours in prelicensure programs. VR simulation can enrich knowledge and be used with other simulation approaches to increase the quality and safety of clinical practice (Chen et al., 2020). A study conducted by Courteille et al. (2018) found that there was comparable knowledge retention with a virtual patient-based training session or a video-recorded lecture, though participants were more engaged with the virtual patient format, and the study supports the use of virtual patients as a complement to traditional teaching formats in health professionals' education. However, currently there is a limited amount of existing research on VR in nursing education and more is needed (Chen et al., 2020; Thompson et al., 2020). Moreover, there is a limited amount of literature on the design and development of VR in nursing education (Rim & Shin, 2021). It is important that nursing educators share their experiences with each other for designing and developing VR simulations, to promote participation in this emerging form of nursing education (Verkuyl et al., 2019).

This VR simulation addressed social determinants of health (SDOH) with interactive strategies to improve nursing students' understanding of the impact of SDOH on underserved populations, and identification of strategies to deliver culturally competent nursing care. This study was guided by the Exploratory Learning Model, derived from constructivist learning theory, which allows students greater autonomy and facilitates more engaging educational experiences in immersive VR simulation environments (deFreitas & Neumann, 2009). The VR scenario provides a real-world simulation where the students learn by exploring their virtual environment with tutorial support from the faculty acting as the moderator; the VR scenario supports educational aims through prompts and debriefing and allows for errors to be made in a safe environment (deFreitas & Neumann, 2009). The Exploratory Learning Model includes the following steps: experience, exploration, reflection, forming abstract concepts, testing (and experimentation or reinforcement) (deFreitas & Neumann, 2009). The students get experience interacting with the simulated patient in the virtual environment. They get to explore via their communications and interactions. The students reflect upon their own knowledge

during the VR scenario, and they further learn from reflecting on the experience during the debrief. They then take what they have learned and apply it in the clinical setting.

Information presented in this study offers insights on the process of using a community-based participatory approach in creating, implementing, and evaluating an innovative community health nursing (CHN) VR simulation. As a result, the information bridges the gap and strengthens the literature regarding how to incorporate VR in nursing education.

## Objectives

The purpose of this mixed-methods study was to use a systematic approach to design and develop VR simulation for a CHN course, and present evaluation with qualitative and quantitative data to enhance the quality of the educational intervention in an effort to improve the quality of nursing education. The objectives of this study were to: 1) describe the process of using a community-based participatory approach to design and develop VR simulation, and 2) present both evaluation results including beta-testing to evaluate and improve the overall deliverable and nursing students' experiences. The following research questions were examined: 1) How does feedback received using a community-based participatory approach indicate and strengthen effectiveness of an innovative VR simulation? and 2) Do nursing students' scores improve from pretest to posttest indicating an increase in knowledge, skills, and confidence as a result of the VR simulation?

## Methods

Prior to the conduct of the study, the study protocol was reviewed and approved by the University Institutional Review Board. The CHN faculty member of the project team drafted the scenario and case specification form, which included the case overview, scenario objectives, case progression including phases with critical actions and prompts, and a simulated script between CHN student and simulated patient. Learning objectives focused on students developing an increased knowledge and understanding of culturally appropriate care and the impacts of SDOH. The VR scenario involves a Bangladeshi senior virtual patient who attends a wellness and flu clinic inside a mosque where a nursing student interacts with him via a headset and hand controllers, obtaining a brief health history, conducting various health screenings, providing education and counseling based on his health history and health screening results, and determining his eligibility to receive the influenza vaccine.

Feedback from community advisory board (CAB) members, including Asian and Arab Americans representing nonprofit organizations for Asian and Arab American communities, was incorporated into the revision of the case specification form, e.g., integrating even more aspects of health literacy and cultural competence into the case. Once the form was



revised, the CHN faculty worked with a VR medical simulation company, SimX, Inc., to create the custom VR case. Oculus Quest 2™ business VR headsets and hand controllers were purchased through a vendor, CDW-G®, that provides information technology products. The project team created a pretest and posttest as well as pre-brief and debrief forms to accompany the VR simulation, all of which would be used for beta-testing with students.

After the custom VR case prototype was created, the beta-testing utilized an iterative approach with various stakeholders ( $N = 15$ ) which included CAB members ( $n = 5$ ), CHN content faculty experts ( $n = 7$ ), and nursing students ( $n = 3$ ) to improve the final product. Nursing students completed the online consent form, viewed an online pre-brief of the VR simulation, and completed the online pretest. Then, they were oriented to the VR environment and participated in the VR simulation individually, in-person on the university's campus, where they interacted with the patient in a virtual environment, and moderation of simulated patient responses and student prompts were conducted by the CHN faculty. Afterwards, while debriefing with students altogether via Zoom, they discussed their overall VR simulation experience. Finally, students completed the online posttest. Separate online Zoom meetings were held with CAB members and content faculty experts, who were shown a recorded VR experience and shared their feedback. The content validity index (CVI) tool was developed and administered via e-mail to content faculty experts to evaluate the VR case. This process provided input on improving its relevance to the objectives of the VR simulation.

The surveys used with nursing students consisted of quantitative components that incorporate items from the Simulation Effectiveness Tool-Modified for which validity and reliability have been established, that consists of 19 items using a 3-point response scale (3-strongly agree, 2-some-what agree, 1-do not agree) (Leighton et al., 2018), and the Student Satisfaction and Self-Confidence in Learning Scale for which validity and reliability have been established, that consists of 13 items using a 5-point response scale (1-strongly disagree, 2-disagree, 3-undecided, 4-agree, 5-strongly agree) (National League for Nursing, 2005), and assessed knowledge, skills, and confidence of nursing students before and after the VR simulation. The pretest included 20 Likert-scale items that assessed students' pre-brief valuation (2 items using a 5-point response scale {1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree}), knowledge and skills (10 items using a 10-point response scale from 1-lowest to 10-highest), and confidence (8 items using a 5-point response scale from 1-no confidence to 5-full/100% confidence). The pre-brief valuation items assessed for whether the pre-brief increased preparation for the simulation and was beneficial to learning. Knowledge and skills items assessed comfort with vulnerable populations,

identifying SDOH impacting patients, applying SDOH to patients' needs, cultural awareness, identifying multi-level barriers, analyzing environmental impacts, developing nursing interventions, finding positive patient factors, locating services for patients, and providing culturally competent care. Confidence items assessed timely clinical decisions, clinical decision-making skills, prioritizing care, communication with diverse patients, locating resources for patients, effective teaching, patient safety, and using evidence-based practice. The posttest included 37 Likert-scale items that assessed students' debrief valuation (5 items using a 5-point response scale {1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree}), knowledge and skills (10 items using a 10-point response scale from 1-lowest to 10-highest), confidence (8 items using a 5-point response scale from 1-no confidence to 5-full/100% confidence), and usability (14 items using a 5-point response scale 1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree). The debrief valuation items assessed for whether the debrief contributed to learning, allowed verbalization of feelings, impacted clinical judgement, provided opportunities for self-reflection, and was a constructive evaluation of the simulation. Quantitative questions that assessed students' knowledge, skills, and confidence were the same on the pre- and posttest. The usability items assessed for whether the VR was easy to use and operate, encouraged continued learning with related content, contained clarity of progression, had good quality, pace, and audio, appropriate cultural communication, contained content that was easily understood, helpful, and consistent, enhanced clinical skills, improved overall clinical experience, and provided new information.

The qualitative component on the posttest included an item to query students as to whether they felt the VR simulation could replace, enhance, or do nothing with one of their clinicals and provide explanation. Qualitative data were also obtained from Zoom meetings with nursing students, CAB members, and content faculty experts, as well as from the comments provided by content faculty experts on the CVI tool. The quantitative data were analyzed using SPSS v.25. Descriptive frequencies were used to analyze quantitative data. Content analysis was used to examine the qualitative data.

## Results

All students (100%) strongly agreed that the pre-brief increased their preparation for the VR simulation and was beneficial to their learning. Means for knowledge and skills, and confidence were calculated for pre- and posttests, and results showed that all increased at posttest (knowledge and skills pretest- $M = 81.33$ ,  $SD = 6.35$ ; posttest- $M = 94.00$ ,  $SD = 10.39$  and confidence pretest- $M = 32.33$ ,  $SD = 5.13$ ; posttest- $M = 37.30$ ,  $SD = 4.62$ ). The results showed that all students (100%) strongly agreed that the debrief contributed to their learning, allowed them to verbalize their feelings, improved their clinical judgement, provided opportunity to self-reflect



on their performance, and was a constructive evaluation of the simulation. In terms of usability, all students (100%) strongly agreed that the VR was easy to use. The students also wanted to continue learning related content with VR and considered the pace and audio quality of the VR simulation good. All students (100%) strongly agreed that the content was appropriate, easy to understand and helpful, enhances their clinical skills, improves the overall clinical experience, and gave them information they did not have before. Students agreed (66.7%) or strongly agreed (33.3%) that it was clear what to do next in each phase/scene, and that the VR had good quality with high resolution. Students agreed (33.3%) or strongly agreed (66.7%) that the VR content was consistent throughout the simulation. With regards to feedback on whether they felt the VR simulation could replace, enhance, or do nothing with one of their clinicals, two students indicated VR could enhance clinical, e.g., "Enhance. I think there is a place for VR simulation learning, and a place for in-person/hands-on learning. They both have their values." One student indicated VR could enhance or replace clinical, i.e., "Replace: more efficient and better learning environment. Enhance: some necessity for tactile skill practice." Students commented during the debrief via Zoom that VR is immersive, engaging, realistic, and an effective way to learn. Feedback was incorporated for improvement of the VR which included: additional virtual patient dialogue options built into the VR case and an addition to an existing patient resource brochure.

CAB members commented during a Zoom meeting on how realistic the VR simulation was, and that they could see the value in it for students, providing them with an engaging way to learn. Feedback was incorporated for improvement of the VR experience which included: the addition of another brochure to provide to the patient as a resource in the VR scenario; notation on the debrief guide indicating where objectives are met; and listing possible answers to analytical questions on the debrief guide to help clinical faculty, especially novice faculty, as they evaluate student responses.

Content faculty experts commented during a Zoom meeting and via CVI tool on how reflective the VR simulation was of real-life, similar to a scenario they would actually encounter in CHN practice. They also commented on how it addressed the objectives with appropriate depth, and that they felt it would be a valuable experience for students, possibly more fun and engaging than a regular/non-VR simulation, and especially helpful during the COVID-19 pandemic when access to clinical sites/agencies may be limited. For calculating CVI, the CHN faculty researcher used the average approach to determine the scale-level-CVI which was 0.89 and should be 0.80 or higher (Zamanzadeh et al., 2015), showing the overall content elements were important/necessary for the simulation scenario. Feedback was incorporated for improvement of the VR experience which included: more

in-depth analysis in the debrief script of patient and environmental strengths and challenges, strategies for assessing health literacy, and culturally competent care strategies.

## Discussion

This study described the process of using the community-based participatory approach in developing VR simulation for a CHN course. The quantitative and qualitative data received from beta-testing with CAB members, content faculty experts, and nursing students further improved the final VR simulation, by making it more inclusive of health literacy and cultural competence aspects, incorporating additional virtual patient dialogue options and patient resource brochures, and resulting in a more detailed and comprehensive debrief guide. The existing literature identifies a need for studies on the design and development of VR for nursing education (Rim & Shin, 2021), as well as a need overall for research on VR in nursing education (Chen et al., 2020, & Thompson et al., 2020), and this study helps to fill the gap. The results of this study can provide guidance for other faculty on designing and developing VR for nursing education, and can improve the education given to nursing students and increase their preparedness for practice.

VR has applicability to clinical practice as well as implications for nursing education. VR in nursing education provides a simulated, realistic clinical experience and can be an important component of acquiring nursing care competency. This VR is especially significant during times when traditional clinical practicum experiences may be limited due to competitiveness of clinical sites and/or as seen most recently with the COVID-19 pandemic, when clinical sites restricted access.

The Exploratory Learning Model was evident in the role of the faculty moderator orienting students to the virtual environment and prompting students to consider additional actions prior to moving into subsequent phases of the virtual encounter; it was also evident in the reflection that occurred in the debrief (deFreitas & Neumann, 2009). The students were able to apply what they previously learned when interacting with the virtual patient, and build upon that learning during the virtual encounter, as well as in their reflections of the experience.

A limitation includes the small sample size; however, the mixed-methods approach is more comprehensive than a single-method approach, which helps counteract this limitation. Another limitation includes the impact of the COVID-19 pandemic. Since students needed to beta-test the VR equipment in-person, there may have been more students willing to participate without the threat of COVID-19. While the student sample size was small, which limits generalizability of the findings, the focus of this study was on describing the process of designing and developing a VR simulation for a CHN course.

Based upon feedback received, the next steps are to incorporate this VR simulation experience in the CHN clinical course to augment the clinical education provided to students and increase their preparation for practice. Future plans include large-scale implementation and evaluation with multiple student groups over multiple semesters to fully evaluate the effectiveness of the VR simulation experience.

### Conclusions

The results of this study provide information for nursing faculty who are interested in creating a VR experience and who may be novice at incorporating VR simulation into nursing curriculum. The results also suggest that students' education may be improved by incorporating VR, which can increase their preparedness for nursing practice. The findings contribute to the literature on developing VR-based simulation in nursing education, especially CHN education.

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# Peripheral Intravenous Infiltration and Extravasation Prevention

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## Abstract

**Background:** Infiltration related to peripheral intravenous (PIV) therapy is a common complication in the pediatric population. At the project site, despite current practices to prevent pediatric PIV infiltration, PIV infiltrations persisted.

**Objective:** The purpose of this quantitative quasi-experimental quality improvement project was to determine if or to what degree the implementation of the Children's Hospitals' Solution for Patient Safety (CHSPS) Peripheral Intravenous Infiltration and Extravasation (PIVIE) Prevention Bundle 1.0 would impact moderate to severe infiltrations when compared to current practice among Neonatal Intensive Care Unit (NICU) patients in a pediatric hospital in central California over 4 weeks.

**Methods:** Data on moderate to severe infiltration rates were obtained from the electronic health record. The total sample size was  $N = 276$ ;  $n = 115$  in the comparative group and  $n = 161$  in the implementation group.

**Results:** A chi-square test showed a clinical and statistically significant difference in reducing moderate infiltration incident rates,  $\chi^2(1, N = 276) = 5.73, p = .017$ . No patients in either group had severe infiltrations during the project timeline but were organizationally required for the project.

**Conclusions:** Therefore, the implementation of the CHSPS's PIVIE Bundle 1.0 may reduce moderate to severe infiltrations in this population and setting. Recommendations are to sustain the bundle and disseminate the findings to other units to decrease infiltration rates.

**Keywords:** CHSPS PIVIE Prevention Bundle 1.0, PIV, moderate to severe peripheral intravenous infiltration, best practices in pediatric IV, neonatal IV access

### Introduction

The most common invasive procedure/therapy in the hospital setting has been peripheral intravenous or PIV therapy (Hakim et al., 2020; Martin, 2018; Nickel, 2019; O'Neil et al., 2018; Welyczko, 2020). Despite its established use, complications associated with the clinical practice, such as phlebitis, infiltration, extravasation, and infection, persist (Hugill, 2017; Jackson-Rose et al., 2017; Kim et al., 2020; Neocleous et al., 2017). These complications cause pain and discomfort, prolonged hospitalizations, and increased costs (Atay et al., 2018). Of PIV therapy complications, infiltration has been among the ones most commonly reported (Amjad et al., 2011). However, the incidence rate of infiltration problems has been recorded only within hospital organizations, as studies have shown varying infiltration incidence percentages from 16% to 78% (Atay et al., 2018; Carr et al., 2018; Tewfik, 2020). According to Pop (2012), PIV complications can occur in up to 80% of patients, but the actual complication rate may be difficult to determine due to variations in definition and reporting methodology.

In the pediatric hospital setting, initiating and monitoring intravenous therapy can be challenging, as patients have a higher risk of developing PIV-related complications (McCollum et al., 2017; O'Neil et al., 2018). According to Legemaat et al. (2016) and Calikusu-Incekar et al. (2019), the most common complication in the pediatric population, particularly in the Neonatal Intensive Care Unit (NICU), has been infiltration. Infiltration can cause minor self-healing complications, but some may result in amputation or loss of muscle, skin, and tendon, which can require reconstructive surgery (Atay et al., 2018; Bicen et al., 2018). The infiltration problem was true among the NICU patients with PIV therapy in the chosen project site in a pediatric hospital in central California. Hence, the problem identification prompted the development of this Peripheral Intravenous Infiltration and Extravasation (PIVIE) Prevention project to introduce an evidence-based practice to reduce infiltrations among pediatric patients with PIV therapy.

The pediatric hospital in central California participated in the Children's Hospitals' Solutions for Patient Safety, or CHSPS (2020), as a pioneer cohort hospital to implement strategies to prevent PIVIE. Among various PIVIE preventive practices, the pediatric hospital in central California has been using the Peripheral Intravenous (PIV) Bundle Card, initiated in 2016. It included using the Touch/Look/Compare visibility site check, hourly IV site assessment, assessment at shift change, and review of responses or interventions once an infiltration is identified. The responses or interventions included three actions: (a) Assess (description, measure, and grading of the infiltration), (b) Notify the charge nurse or the PIV Task Force member, and (c) Document the infiltration. Despite these strategies, infiltration problems have persisted.

From July to October 2020, the pediatric hospital in central California reported an average of 46% of moderate infiltrations (108 moderate infiltrations out of 237 total infiltrations) and zero severe infiltrations. Most of the PIVIE incidents occurred in the NICU, with an average of 44% moderate infiltrations. PIVIE incidents can start as a mild site irritation and discomfort and advance to serious harm, such as permanent skin loss, impaired limb function, compartment syndrome, distal vascular compromise, and potential loss of fingers or other parts of a limb (CHSPS, 2020). Since moderate infiltrations can lead to severe infiltrations and injury, there was an urgency to the issue. PIVIE was an outstanding clinical problem, which led to implementing the CHSPS PIVIE Prevention Bundle 1.0 to improve clinical practice and patient outcomes by reducing and preventing moderate infiltration and severe infiltrations in the NICU population.

### Objective

The objective of this quantitative quasi-experimental quality improvement project was to determine if the implementation of the CHSPS PIVIE Prevention Bundle 1.0 would impact moderate to severe infiltrations when compared to the current practice among NICU patients with PIV therapy in a pediatric hospital in central California over 4 weeks. The independent variable was the CHSPS PIVIE Prevention Bundle 1.0, which had three standard elements and a recommended element. The CHSPS PIVIE Prevention Bundle 1.0 elements could be retrieved using chart audits from the Quality Department, as these elements have been established sections in the patients' electronic medical records. The dependent variable was the number of moderate to severe infiltrations among NICU patients with PIV therapy. Data for moderate to severe infiltrations were accessible from the Quality Department, which audits the infiltrations on a monthly basis.

Infiltrations among NICU patients with PIV have been a problem in the pediatric hospital in central California. The identified problem needed an effective intervention. The CHSPS PIVIE Prevention Bundle 1.0 offered an aggregate plan to decrease moderate infiltrations in the NICU.

### Literature Review

An extensive literature review was conducted to provide substantive information about infiltration problems associated with intravenous therapy and the chosen intervention, the CHSPS PIVIE Prevention Bundle 1.0. Various online academic databases provided relevant articles to support the project. Literature was collected using the following inclusion criteria: published between 2005 to 2021, English format or translated in English, full-text format, qualitative or quantitative methodology studies, and quality improvement studies. Articles 15 years and older, in abstract format only, and articles in languages other than English were



excluded. Approximately 3,000 academic articles were reviewed for significance to the project topic. The following search engines were used: CINAHL, ProQuest, EBSCO, Ovid, Research Gate, and ProMed. The literature was further reviewed for relevance using the following key terms: neonates, peripheral intravenous infiltration, infiltration incidence, PIVIE prevention strategies, CHSPS PIVIE Prevention Bundle 1.0, infiltration assessment, patient education, and different combinations of the keywords. Finally, the articles were narrowed to three major themes. A total of 50 articles were included in the literature review of this project.

### **PIV Infiltration and Extravasation**

PIVIE incidents as a clinical problem in the healthcare system have been well investigated, but not resolved. The studies conducted by Carr et al. (2018), Fonzo-Christe et al. (2018), Martin (2018), and McCollum et al. (2017) revealed the discomforts of PIV procedures; the complications of PIV therapy, such as infiltration; and strategies to prevent infiltration occurrence. Martin (2018) and McCollum et al. (2017) highlighted the impact of PIV insertion among pediatric patients needing medical interventions, such as administration of medications to ease the procedure process and prevent any PIV-related complications. Particularly, in Fonzo-Christe et al. (2018), the researchers identified a population group affected by PIVIE, which were the neonates. This statement from the study supported the need for the PIVIE Prevention project to focus on NICU patients. Factors related to PIVIE incidents ranged from the age and weight of patients (Hakim et al., 2020), examination of the vascular anatomy of patients (Gagne & Sharma, 2017; Gerceker et al., 2018), to use of PIV dressings (Larsen et al., 2020) and medications infused in the PIV (Patregnani et al., 2017). These factors can be present in every patient, making every patient at risk for PIVIE when treated with an IV therapy, which suggests further improvement is needed. A common factor identified in these studies was the involvement of the healthcare staff from different disciplines. Thus, the healthcare staff's involvement in improving PIVIE incidents offers a more comprehensive approach to prevent or decrease PIVIE problems. Maly et al. (2018), Neocleous et al. (2017), and Tuffaha et al. (2019) identified the effects of PIVIE from the physical tissue injury on patients to the financial impact of PIV therapy and complication treatment. Focusing on the PIVIE problem affects the patients, the clinical staff, and the organization, especially when finances are involved.

Studies have sufficiently demonstrated the need to address PIVIE incidents with an evidence-based and comprehensive approach. The PIVIE Prevention project was a suitable intervention to help prevent and reduce PIVIE incidents. The next section will examine the different strategies to prevent PIVIE.

### **Strategies to Prevent PIVIE**

The discussion of PIVIE prevention strategies identified various interventions supporting the elements in the CHSPS PIVIE Prevention Bundle 1.0. The prevention strategies examined in this section were (a) PIV site assessment, (b) involvement of hospital-acquired condition champion/unit-based leaders/vascular access team, (c) patient/family education on PIVIE prevention, and (d) use of PIVIE prevention bundle/program. Davis et al. (2020) stated that clinical practice competence and guidelines using proper documentation supported the implementation of the PIVIE strategies. The authors also mentioned the importance of bundled PIV care interventions in making decisions surrounding patient care, thus improving outcomes.

Routine IV assessment is a PIVIE preventive strategy. Jeong et al. (2017), Ray-Barruel (2017), Ray-Barruel et al. (2020), Schmutz et al. (2020), and Tofani et al. (2012) noted that direct IV site assessment could help identify potential IV-related problems, which can prompt clinicians to proceed to the next intervention. Moreover, Jeong et al. (2017) and Tofani et al. (2012) concluded that implementing hourly IV site assessment decreased IV complication incidents, thereby supporting the first element in the CHSPS PIVIE Prevention Bundle 1.0.

The following intervention pertains to the involvement of hospital-acquired condition champion/unit-based leaders/vascular access team members to improve PIVIE. Luton et al. (2018) and Stelter and Graham (2019) studied the roles of champions and unit-based leaders as peers in the patient care setting. The authors indicated that champions and unit-based leaders provide resources and mentorship to other clinicians regarding the clinical practice. Hence, the champions' and unit-based leaders' roles were to educate and train staff on PIV care and management, promote compliance to intervention implementation and improve patient outcomes. Favot et al. (2019) and Weber et al. (2019) identified the relevance of education and training to clinical staff to strengthen performance and competence as clinicians and leaders. Hence, each member of the PIVIE Prevention project helps reduce PIVIE incidents among NICU patients with PIV therapy.

The following strategy is on patient and family education on PIVIE Prevention. Park et al. (2016) and Watterson et al. (2018) implemented a program to reduce pediatric intravenous infiltration incidents. The studies included patient and family education as interventions, resulting in decreased PIV infiltration occurrences. Despite the argument for patient/family education, the CHSPS (2020) considered this strategy a recommended element in the CHSPS PIVIE Prevention because of the strong support from the clinical experts.



The last strategy is the use of a preventive PIVIE preventive bundle. Amatya and Sadasivam (2019), CHSPS (2020), Kleidon et al. (2019), Ray-Barruel et al. (2019), Sangam (2019), Tasdelen and Caglar (2020), and Taylor (2015) implemented a collection of PIVIE preventive interventions, forming a bundle or a management program. All studies reported a decrease in infiltrations. Hence, PIVIE preventive interventions as a bundle more comprehensively approached infiltration problems, thus producing better patient outcomes. However, in Sangam's (2019) study, despite decreased infiltration rates, lack of data during the postintervention phase meant that the researcher could not determine if the implementation of the interventions, or mere coincidence, had caused the improvement. Mulemba et al. (2021) and Nickel (2019) highlighted the importance of complying with the strategies set in the bundle, which includes continuous monitoring and recording of data when implementing strategies to reduce PIVIE incidents. The ability to gather accurate data throughout the implementation of the PIVIE Prevention project could provide information on whether the implementation of the CHSPS PIVIE Prevention Bundle 1.0 impacted moderate to severe infiltrations among NICU patients with PIV therapy.

### **Tools to Assess PIVIE**

Infiltration and extravasation as common complications of IV therapy have been evaluated in different ways, yet no tool has consistently measured PIVIE injuries. Chanes et al. (2012) investigated the INS Infiltration tool use. Despite the assessment tool's availability, Chanes et al. (2012) stated that unfamiliarity with and non-use of the score obtained using the INS tool remained. This finding contributed to the current issue of PIVIE among patients. Another aspect of using an infiltration scale, as Rodrigues et al. (2020) pointed out, was the lack of percentage measurement to gauge the extent of the infiltration injury, which influences the tool's applicability to different patient populations with varying degrees of body sizes/measurements. However, Calikusu-Incekar et al. (2019) reported that the INS infiltration scale and additional criteria to assess the edema size could be used for the NICU patients. Although the initial literature review on PIVIE assessment tools offered unclear data on which tool to use, further literature review examined various tools used to assess site infiltration and swelling available in the clinical practice.

Atay et al. (2018) identified the importance of site assessment and documentation of any infiltrations among newborns by using a facility-approved assessment tool. Gautam et al. (2017) examined ultrasound to determine PIV location and infiltrations and indicated its effectiveness for detecting an infiltration occurrence using ultrasound technology. However, the study could not generalize the results due to the small sample size, the absence of a robust understanding regarding training on ultrasound technology, and staff

limitations and competence. In Kahraman et al. (2020), the researchers highlighted the importance of nursing education on infiltration and extravasation assessment tools. Amjad et al. (2011) and Pop (2012) examined the pediatric population's need for an infiltration assessment tool to evaluate the severity of the injury rather than grading the injury. Both studies mentioned the size difference between an adult and a pediatric patient and that an assessment tool with a criterion of measuring the injury by inches may not reflect the extent of the patient's actual injury. The studies suggested the use of measurement by percentage to assess infiltration injury. Kottner et al. (2020) noted the inconsistencies surrounding the use of assessment tools. However, Kottner et al. (2020) recommended the consistent use of a structured facility-approved assessment tool to prevent any misclassification of injuries and proper identification of tissue injuries needing intervention.

The CHSPS PIVIE Prevention Bundle 1.0 included a standardized percentage measurement-based assessment tool, with Amjad et al. (2011) and Pop (2012) providing supporting data. Both studies highlighted the relevance of the assessment tool in the pediatric population, as the researchers considered the difference in using an assessment scale versus a percentage measurement-based tool to measure the extent of the infiltration injury. Also, consistency of use and proper documentation of infiltration data was recommended to identify infiltrations and implement necessary interventions accurately.

Infiltration in the pediatric population, particularly in the NICU, demands attention. Studies have demonstrated the effectiveness of the elements included in the CHSPS PIVIE Prevention Bundle 1.0 in addressing infiltration problems. Therefore, implementing the CHSPS PIVIE Prevention Bundle 1.0 and the established documenting and monitoring procedures could impact moderate to severe infiltrations among patients in the NICU with PIV therapy.

### **Method**

The PIVIE Prevention project received a Quality Improvement Project Determination from the practice site. The PIVIE Prevention project was determined to be a quality improvement project to evaluate the implementation of the CHSPS PIVIE Prevention Bundle 1.0. Hence, the PIVIE Prevention project was not considered "research" under the Office for Human Research Protections (2021). Following approval, the primary investigator commenced working with the Clinical Education Department for the CHSPS PIVIE Prevention Bundle 1.0 education dissemination, data collection and analysis.

### **Project Methodology and Design**

This quality improvement project chose a quantitative methodology with a quasi-experimental design. According

to Jaccard and Jacoby (2020) and Muijs (2004), quantitative research attempts to explain a phenomenon using numerical data. The quality improvement project focused on the infiltrations among NICU patients with PIV therapy, and the question guiding the project could be answered using numerical data. Both the independent and the dependent variables could be numerically represented. Also, the quantitative methodology supported the project's intention of testing an intervention to address a given problem (Henson et al., 2020; Kleinpell, 2013). The project focused on testing the chosen intervention and not determining the reason for the problem, which was the focus of a qualitative methodology (Kleinpell, 2013; Lefevre et al., 2019). Hence, the appropriateness of the quantitative methodology to test the use of the CHSPS PIVIE Prevention Bundle 1.0 as an intervention to reduce infiltrations in the NICU.

Using the quantitative approach in research also helped establish a relationship between the independent and dependent variables (Haig, 2018). This quality improvement project aimed to determine if the CHSPS PIVIE Prevention Bundle 1.0's (independent variable) implementation would impact moderate to severe infiltrations (dependent variable) over 4 weeks. The dissemination of the nursing education and a review of the bundle elements reflected the CHSPS PIVIE Prevention Bundle 1.0 implementation. Then, relating the bundle implementation to the number of moderate to severe infiltrations over 4 weeks provided the answer on whether there was a change in moderate to severe infiltrations among NICU patients with PIV therapy.

For this quantitative project, the bundle element using a standardized percentage measurement-based assessment tool distinguished moderate from severe infiltration. This tool could indicate any change in the number of moderate to severe infiltrations after implementing the project. A non-parametric chi-square test determined if the implementation of the CHSPS PIVIE Prevention Bundle 1.0 reduced moderate to severe infiltrations among NICU patients with PIV therapy over 4 weeks. The non-parametric chi-square was chosen because this statistical analysis shows the association between the intervention (independent) and patient outcome (moderate to severe infiltrations) (Verma & Abdel-Salam, 2019).

The quasi-experimental design allowed the primary investigator to identify the intervention and the target population in a non-random manner (Consuegra & Engels, 2016). The quasi-experimental design allowed the primary investigator to select the intervention to address the identified PIVIE problem in the pediatric hospital in central California. The chosen project design allowed the primary investigator to identify the target population without randomly selecting the participants in the project (Consuegra & Engels, 2016). The use of the quasi-experimental design limited any ethi-

cal issues and fitted into the logistical activities needed to implement the project (Kleinpell, 2013).

### **Population and Sample Selection**

The population selected for this quality improvement project was NICU patients with PIV therapy admitted to the pediatric hospital in central California. Patients in the NICU came as direct admits to the hospital or transferred in from other satellite NICUs during the 4-week project implementation. A convenience sample was conducted to include NICU patients with at least one peripherally inserted intravenous catheter for IV therapy. The NICU has an 88-bed capacity, but there were approximately 50 staffed beds during the project timeframe due to a fluctuating patient census.

### **Instrumentation and Sources of Data**

The project used two data sources. The first was the standardized percentage measurement-based assessment tool to assess infiltration severity among the NICU patients with PIV therapy. The second was the electronic medical record or EMR to gather PIVIE-related data. The following section examines each of the tools.

#### ***Standardized Percentage Measurement-based Assessment Tool***

A CHSPS PIVIE Prevention Bundle 1.0 standard element (standardized percentage measurement-based assessment tool) determined the level of infiltration (moderate or severe) in this project. The percentage measurement-based assessment tool's use came about to fulfill the need to assess infiltrations among neonatal and pediatric patients accurately. Amjad et al. (2011) and Pop (2012) suggested using a percent to measure the severity of infiltration among neonate and pediatric patients. The tool requires measuring the size of the infiltration in centimeters (x) and the length of the limb where the infiltration is identified in centimeters (y). Then, x will be divided by y and then multiplied by 100 to determine the infiltration percentage. Pop (2012) studied the reliability of the percentage measurement-based infiltration assessment tool with three groups of nurse assessors (staff nurses, charge nurses, and IV team nurses). The study showed an interrater coefficient, with Cronbach alpha for three assessor groups at 0.966. A Cohen kappa test was also performed to account for interrater agreement occurring by chance. Cohen k coefficients between IV team nurses and staff nurses and between IV team nurses and change nurses were 0.62 ( $P < .001$ ) and 0.60 ( $P < .001$ ), respectively; between the staff nurses and charge nurses, the interrater agreement k coefficient was 0.78 ( $P < .001$ ). The percentage measurement-based assessment tool is an existing section in the PIV assessment in the patient's EMR.

#### ***Electronic Medical Record***

The data were obtained from the EMR and an attached Excel Report on PIVIE created by the Quality Department.

The PIVIE data gathering process has been an established process in the Quality Department. The data included the patients with PIVs and patients with occurrences of PIV-IE. Also, the PIVIE Bundle elements data are hourly site assessments using the Touch/Look/Compare or Assess/Compare/Touch methods, the involvement of the hospital-acquired condition champion/unit-based leaders/vascular access team members and medical provider, use of the standardized percentage measurement-based assessment tool, and patient/education on PIVIE prevention using the Touch/Look/Compare or Assess/Compare/Touch methods. Data on patients with PIVs, PIVIEs, types of severity, and CHSPS PIVIE Prevention Bundle 1.0-related data were retrieved from the PIVIE assigned auditor and the Quality Coordinator.

Data collection occurred over 4 weeks. EMR access was password-protected, whereas only authorized hospital staff with approved credentials had access to NICU inpatient charts. Also, access to the EMR-linked Excel Report required authorization and a password provided by the Quality Department. The data entered in the EMR-linked Excel Report were reviewed within the Quality Department. The EMR-linked Excel Report on PIVIE included patients with recorded PIVIE incidents and every CHSPS PIVIE Prevention Bundle 1.0 element. Any patient identification was removed to protect their privacy and safety.

### **Validity**

Validity pertained to the appropriateness of the inferences made from the data provided by the instruments (O'Dwyer & Bernauer, 2014). The standardized percentage measurement-based assessment tool considered the severity of the infiltration and the patient size (Amjad et al., 2011; Pop, 2012). The neonatal and pediatric populations have a different body size compared to the adult population. Hence, a percentage rather than a grading scale to evaluate an infiltration's severity was more age and size appropriate for the chosen target population.

EMRs to review PIV assessment and infiltration were used in the prospective and retrospective studies reviewed for this quality improvement project. Fonzo-Christe et al. (2018), Legemaat et al. (2016), Patreggani et al. (2017), Sangam (2019), and Weber et al. (2019) used the review of electronic medical records to review records related to management and occurrences of PIV complications. Hence, previous studies utilized a review of EMR to gather PIVIE-related data. Also, the current EMRs used in the pediatric hospital reflected the CHSPS PIVIE Prevention Bundle 1.0 elements. Therefore, using the current EMRs provided the necessary data from PIVIEs and the implementation of the CHSPS PIVIE Prevention Bundle 1.0. The data from the EMRs could determine the impact of the CHSPS PIVIE Prevention Bundle 1.0 on the number of moderate to severe

infiltrations among NICU patients with PIV therapy.

### **Reliability**

Reliability pertained to the consistency of information obtained using a specific instrument (O'Dwyer & Bernauer, 2014). Pop (2012) conducted an interrater test to determine the standardized percentage measurement-based assessment tool's accuracy when used by different nurses (staff nurses, charge nurses, and IV team nurses). The inter-rater reliability measured the agreement in the scores assigned by multiple raters, and agreement levels greater than 80% were deemed ideal (O'Dwyer & Bernauer, 2014). Pop (2012) reported an interrater coefficient, Cronbach alpha of 0.966 for all assessor groups. The statistical analysis results suggested that the percentage measurement-based assessment tool was a valid and reliable method to assess PIV-related infiltration severity in the pediatric population.

Chart auditing has been used in research to gather clinical data (Atwell et al., 2019; Mohd-Nor et al., 2019). Studies by Carr et al. (2018), Fonzo-Christe et al. (2018), Legemaat et al. (2016), Patreggani et al. (2017), Sangam (2019), and Weber et al. (2019) used EMRs to gather data related to management and occurrences of PIVC complications. Similarly, the Quality Department in the pediatric hospital in central California has been conducting PIVIE-related data chart audits from the EMR even before switching to a new EMR system. With the help of the CHSPS organization, the Quality Department incorporated PIVIE-focused chart sections, which eases data retrieval during the chart auditing process. Staff education and documentation training occurred during the transition to the new EMR system. The staff nurses then complete their documentations of PIVIE-related data with the direct supervision of the unit-based leaders. The Quality Department also conducts chart audits monthly and sends a communication to the staff to encourage chart completion if a PIVIE-related section was missed. This process supported consistency in chart documentation and reliability of PIVIE-related information retrieved from the EMR.

### **Ethical Considerations**

The ethical issue considered in this project was related to the involvement of human participants. The PIVIE Prevention project was deemed a quality improvement project as reviewed by the facility site. Hence, the implementation of the project posed no harm to the participants. This project supported the three basic ethical principles stated in the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979): (a) respect for persons, (b) beneficence or protection from harm, and (c) justice for all project participants. Also, the protection of the vulnerable participants was considered in the project by focusing on implementing the CHSPS PIVIE Prevention Bundle 1.0 to reduce infiltration incidents. The primary investigator did not directly observe the

project implementation activities, and all patient identifiers were eliminated.

**Results**

The project included a total of 276 NICU patients with PIV:  $n = 115$  in the comparative group (4 weeks pre-implementation) and  $n = 161$  in the implementation group (4 weeks post-implementation). The majority of the participants in both groups were female and white. The most common ethnicity in the comparative group was non-Hispanics, while in the implementation group, it was Hispanic. The mean age average was 36.88 days ( $SD = 46.22$ ) for the comparative group, ranging from 1.54 to 240 days. The mean age for the implementation group was 40.67 days ( $SD = 50.08$ ), ranging from .75 to 270 days (see Table 1).

**Table 1**  
*Descriptive Data for NICU Patients with PIV*

Variable	Comparative ( $n = 115$ )		Implementation ( $n = 161$ )	
	$n$	%	$n$	%
<b>Gender</b>				
Male	26	22.6	69	42.9
Female	89	77.4	92	57.1
<b>Race</b>				
American Indian or Alaskan	0	0.0	1	0.6
Asian	9	7.8	2	1.2
Black or African American	5	4.3	6	3.7
White or Caucasian	98	85.2	139	86.3
Other	3	2.6	6	3.7
Unknown	0	0.0	7	4.3
<b>Ethnicity</b>				
Non-Hispanic	63	54.8	41	25.5
Hispanic	49	42.6	108	67.1
Unknown	3	2.6	12	7.4
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (days)	36.88	46.22	40.67	50.08

The non-parametric chi-square tests compared the comparative and implementation NICU patient groups after implementing the CHSPS PIVIE Prevention Bundle 1.0 to address the infiltration problems. Results are displayed in Table 2. There were 115 comparative NICU patients with PIV therapy, and 6 (5.2%) of these patients had infiltrations. There were 161 implementation NICU patients who had PIV therapy, and 1 (0.6%) developed an infiltration. All infiltrations in both patient groups were moderate. The results showed that there was statistically significant difference between the comparative ( $n = 6$ , 5.2%) and implementation ( $n = 1$ , 0.6%) patients on moderate infiltration incident rates,  $X^2 (1, N = 276) = 5.73, p = .017$ . There were no severe infiltrations in either patient group (see Table 2).

Note. *M* = mean, *SD* = standard deviation

**Table 2**  
*Chi-Square Test Results Comparing Comparative and Implementation Patients on the Occurrence of Moderate Infiltrations*

	Comparative ( $n = 115$ )		Implementation ( $n = 161$ )		$X^2$	$p$ -value
	$n$	%	$N$	%		
Patient outcome						
Moderate infiltrations	6	5.2	1	0.6	5.73	.017

**Figure 1**  
*Moderate Infiltration Rates for Comparative and Implementation Patients*

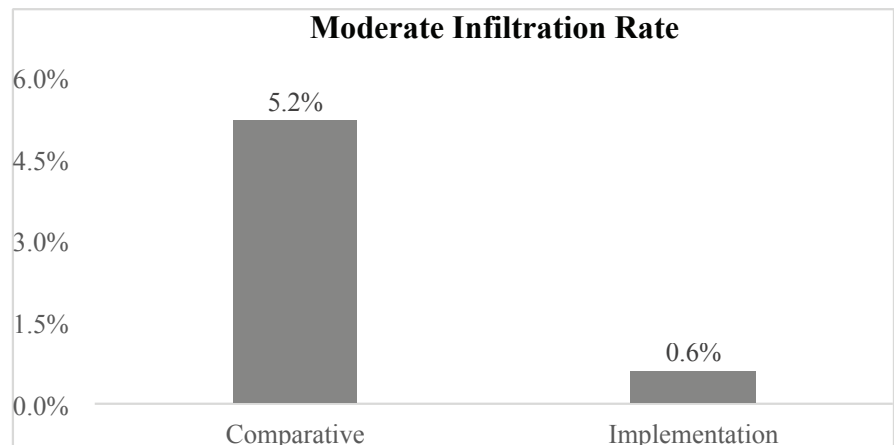


Figure 1 illustrates moderate infiltrations for the comparative and implementation groups. Moderate infiltration rates for the comparative and implementation patient group decreased by 4.6%, which improved the



patient outcome. The result showed there was no change in the severe infiltrations as both groups did not have any severe infiltrations. Thus, the current practice and the use of the CHSPS PIVIE Prevention Bundle 1.0 were effective in preventing severe infiltrations.

### Discussion

The findings supported that CHSPS PIVIE Prevention Bundle 1.0 impacted moderate infiltrations among NICU patients with PIV therapy when compared to the current practice. A non-parametric chi-square test showed a statistically significant difference between the comparative ( $n = 6$ , 5.2%) and implementation ( $n = 1$ , 0.6%) patients on moderate infiltration incident rates,  $X^2(1, N = 276) = 5.73$ ,  $p = .017$ . No patients in either group had severe infiltrations. The result showed that the CHSPS PIVIE Prevention Bundle 1.0 implementation reduced moderate infiltrations. Since there were no severe infiltrations recorded in the comparative and implementation groups, there was no statistical difference noted in the occurrence of severe infiltrations. The project results supported the implementation of the CHSPS PIVIE Prevention Bundle 1.0 in decreasing moderate infiltrations among NICU patients with PIV therapy. Clinical significance was supported as the moderate infiltration rates declined post-intervention.

The project results showed that the implementation of the CHSPS PIVIE Prevention elements decreased the infiltration incidents in the NICU, which supported the effectiveness of the use of bundled preventive strategies such as in the studies of Amatya and Sadasivam (2019), CHSPS (2020), Kleidon et al. (2019), Ray-Barruel et al. (2019), Sangam (2019), Tasdelen and Caglar (2020), and Taylor (2015). However, the other studies did not include the use of the standardized percentage measurement-based assessment tool. Hence, the CHSPS PIVIE Prevention Bundle 1.0 offered a specific criterion for identifying the type of infiltration during the pre and post-project implementation.

The following section examines the project implications. The first implication pertains to the relevance of using collective preventive interventions in addressing infiltration problems among NICU patients. Second, the standardized percentage measurement-based assessment tool effectively identified moderate to severe infiltrations, as reflected in the project's reported data. Amjad et al. (2011) and Pop (2012) conducted studies using the test and were proven reliable and valid when assessing infiltration severity. The tool can objectively provide an infiltration severity assessment when applied to pediatric and adult patient populations receiving PIV therapy. The third implication relates to the need to disseminate the CHSPS PIVIE Prevention Bundle 1.0 education. Some strategies to accomplish this goal are extending the education completion period, including education completion as part of the staff's annual competency evaluation,

and offering staff education time to complete their assigned education modules in the intranet. The last implication was collaborating with the Quality and Clinical Education Departments to identify current clinical problems and strategize clinical improvement practices and projects.

The limitations in the project were the constraints that may have hindered the primary investigator's focus on the scope of the project. The first limitation pertained to the number of project participants, as the number of admitted NICU patients with PIV therapy varied at the time of the project implementation. Second, the project aimed to obtain the number of moderate to severe infiltrations to evaluate the CHSPS PIVIE Prevention Bundle 1.0 effect on infiltration incidents. The project did not focus on mild infiltration incidents. The third limitation was that only the NICU nurses received the CHSPS PIVIE Prevention Bundle 1.0 education module. Hence, other acute care inpatient nurses did not receive the education. The last limitation pertained to the project's focus on implementing the CHSPS PIVIE Prevention Bundle 1.0 in NICU patients with PIV therapy. Hence, any associating factors, such as clinical diagnoses, type of IV solution, and other comorbidities, were not examined.

### Conclusions

In conclusion, the CHSPS PIVIE Prevention Bundle 1.0 project effectively decreased moderate infiltrations and continued to prevent severe infiltrations among NICU patients with PIV therapy. The project introduced an evidence-based practice that replaced the current practice to prevent infiltrations. The data collection process had its challenges, but it had no hindering effect on the project. Lastly, the project advanced the clinical practice by adopting the CHSPS PIVIE Prevention Bundle 1.0 and improving patient outcomes by decreasing infiltration incidents.

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# Experiences and Perceptions of Filipino American Men as Undergraduate Nursing Students

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## Abstract

**Background:** The perceptions of men in nursing education are increasingly documented and reveal common themes and challenges. However, the voices of minority men, including Filipino Americans, on these topics are not well represented in the literature.

**Objective:** This study explored the experiences and perceptions of Filipino American men as undergraduate nursing students in relation to common themes present in research with men, in general. The pre-determined coding schemes included: Impact of media portrayal and societal perceptions; nursing practice interest areas and plans for advanced practice; experiences in nursing education; and factors influencing personal motivation for a nursing career.

**Methods:** In this descriptive, phenomenological study, four Filipino American men in a BSN program participated in a guided group discussion based on the common themes and practice challenges from the literature.

**Results:** The participants reported being aware of, and often faced, the challenges experienced by other men in nursing education. They denied questioning their choices or being discouraged from achieving their career goals from any source: media, society, nurses in the clinical setting, or educators. They filtered their experiences through their Filipino and Filipino American familial and community-based cultural values.

**Conclusions:** Female, family role models and other family support provided motivation for their nursing career choice. Their Filipino and Filipino American cultural values of obligation to family, respect for elders, and caring as a gender-neutral concept provided the participants with resilience when faced with common challenges faced by men who choose a nursing career.

**Keywords:** *career choice, Filipino Americans, men in nursing, nursing education, gender minorities*



## Background

Increasing gender diversity in nursing in the U.S. has been a goal of the profession for many decades (American Association of Colleges of Nursing, 2022). There are positive indicators that more men are entering nursing programs; recent enrollment data reveal men represent 13% of pre-licensure students (Mazinga, 2021). In the workforce, men comprise 9.1% of RNs, increasing from 6.6% in 2013 (Smiley et al., 2021). The multifaceted motivations for men choosing nursing as a career are increasingly understood, but the profession's ability to influence choice or create change has been limited (Jamieson et al., 2019; Yi & Keogh, 2016).

Due to this long-standing diversity goal, there is an established body of research that focuses on men, in general, in nursing and nursing education. This knowledge provides a foundation of what is known about this population as a whole (Jamieson et al., 2019; Kronsberg et al., 2017; Yi & Keogh, 2016; Younas et al., 2019). Similar experiences and challenges emerge from this literature related to gender and nursing. Men choose a nursing career for reasons similar to women; the desire to help people, job security, flexibility, and opportunities for personal growth, and, in turn, reap the many rewards of their career choice (Blackley et al., 2019; Kronsberg et al., 2017; O'Connor, 2015; Yi & Keogh, 2016). Workforce statistics reveal that a higher percentage of men work in hospital settings than women (Auerbach et al., 2017). Additionally, approximately 42% of working nurse anesthetists in the US are men, while comprising less than 10% of the nursing workforce (U.S. Census Bureau, 2021).

As nurses, many men feel the expression of positive traits traditionally associated with women, such as caring and intuition, was used pejoratively when applied to them in practice (Blackley et al., 2019; Connor et al., 2016; Younas et al., 2019). Men may feel taken advantage of in relation to their strength and size, evidenced by being given patient assignments with larger patients or those with more difficult physical behaviors (Connor et al., 2016; Kronsberg et al., 2017). Men continue to report questioning from peers and patients regarding sexual identity and motivations for a nursing career (Jamieson et al., 2019; Kronsberg et al., 2017). They believe that the media perpetuates these perceptions, making it more difficult for men to pursue nursing careers (Jamieson et al., 2019; Yi & Keogh, 2016).

The origins of many of these experiences can be traced to nursing education. Male students report gender bias in language, materials, and the teaching of patient care behaviors (Christensen & Knight, 2014; Jordal & Heggen, 2015; Younas et al., 2019). The results of this feminized curriculum are that male nursing students often feel they must act more like women to be evaluated successfully (O'Connor, 2015; Younas et al., 2019). Regardless of their sexual identity, subtle and unsubtle questioning by faculty, peers, nurses,

and patients can create stress for men in nursing education (Christensen & Knight, 2014; Connor et al., 2016; Jordal & Heggen, 2015). Feelings of isolation and marginalization in the classroom and clinical setting influence some men to question their educational and future career choices (Younas et al., 2019). Men report entering nursing education as an individual challenge but realize the need to collaborate and form peer relationships is necessary for success (Christensen & Knight, 2014; Connor et al., 2016).

This well-established literature base heavily focuses on the minority status of men as nursing students and practicing nurses. This gender minority status in research is often included with racial or ethnic identity identification in relation to the predominantly female, White nursing workforce (Cowan et al., 2015; Englund, 2018). This research is significant because much less is known about the experiences of racial and ethnic minority men as a unique subset of all men in nursing and nursing education: Filipino American men are one of these populations. The primary aim of this study was to explore the perceptions of second-generation Filipino American men in a pre-licensure nursing program in Hawaii regarding their educational motivations and experiences as nursing students.

## Methods

A descriptive phenomenological design was purposefully chosen for the study. This approach, as related by Husserl, challenges the qualitative researcher to transcend subjectivity, standing apart during data collection and analysis (Neubauer et al., 2019). The researcher's previous knowledge and preconceived ideas about men in nursing were used solely to create dialog among the group, not to make assumptions about the lived experiences of second-generation Filipino American men in nursing education. Additionally, a descriptive phenomenological approach allows for deeper exploration of concepts where little evidence exists in the literature. Little is known about this population because Filipino American men represent a small percentage of nursing students in the US. Institutional Review Board Approval was obtained for this research.

## Sample

A convenience sample was recruited from Bachelor of Science in Nursing (BSN) students using the university learning management system. An announcement was emailed to senior-level nursing students which included the study inclusion criteria: Second-generation Filipino American men who were graduating in the current semester and willing to speak openly in a focus group interview about their experiences as nursing students. Two students replied and were encouraged to bring other students meeting the inclusion criteria to the interview. Through this snowball sampling, each student brought another student, creating a four-participant sample. There were 13 men in their graduating class. The

participants indicated that they met in the nursing program, spending the last two years together, and had become very good friends. All four were born and raised in Hawaii by a parent or parents who immigrated from the Philippines. They were unmarried and ranged in age from 22 to 30 years old.

### **Data Collection**

A classroom on campus was reserved for two hours to create a familiar and comfortable, but private, location for the group interview. When given the choice between individual interviews or as a group, the participants chose a group interview. Research procedures were explained, and informed consent obtained after explaining the confidential nature of the data collection, transcription, and reporting process. Participants sat in a circle with the researcher and audio data was collected using an Android phone placed in the center. To encourage candor and increase comfort, the participants were informed they were under no obligation to respond to every question, and they expressed comfort with this agreement, some verbally, others through nods, as the research process was discussed. The four participants and the researcher were familiar with each other due to the clinical administrative role held by the researcher in the nursing program. There was no direct teaching or supervisory relationship between the researcher and participants.

Basic demographic information regarding age, marital status, level in the BSN program, and second-generation identification were collected initially. This approach promoted rapport among the group, particularly with the marital status question. The interview guide included open-ended discussion questions derived from the international literature regarding men in nursing and nursing education. The questions reflected media stereotyping, personal motivation for nursing, interest in nursing practice areas and advanced practice, and educational experiences in the nursing program, including interactions with nursing faculty, nurses, and female students. When replying to the first question, the group spontaneously began answering in a round-robin fashion, although the researcher did not direct the question to any individual. The participants shared freely and laughed frequently. All of them responded to every question, although some with simply an affirmation and others in more detail. The interview lasted 50 minutes.

Trustworthiness of this qualitative inquiry is enhanced through established frameworks of quality criteria (Polit & Beck, 2020). Efforts were made to include paraphrasing and meaningful quotes which capture the voices of the participants (authenticity). Believability is enhanced through careful description of the design, recruitment of participants, and the data collection process (credibility). These descriptions also allow for duplication with other populations (dependability). The objective, exploratory nature of the inquiry

demonstrates that others could perform the same procedure (confirmability). Transferability, or the use of the results in other populations, is addressed through the inclusion of sample and setting details, including the careful portrayal of the participants as it emerged through the data collection (Polit & Beck, 2020).

### **Data Analysis**

The audio recording was transcribed solely by the researcher within days of the interview. The quality of the recording was excellent and the individual participant voices were distinct, making attribution of responses during transcription straight-forward except in sections when they started laughing and interjecting their comments while another was speaking. Careful attention was required in these sections to ensure proper attribution. After transcription, electronic copies of the complete interview were shared with the participants who approved the content before data analysis. Pseudonyms were chosen for each participant for reporting purposes.

Since the interview guide was derived from the literature regarding men as a general population in nursing and nursing education, content categories were generated prior to the study. The following gender-based coding scheme was identified: Impact of media portrayal and societal perceptions, nursing practice interest areas and plans for advanced practice, experiences in nursing education, and factors influencing personal motivation for a nursing career.

Microsoft Word was used by the researcher for manual data analysis. Using the comment insertion tool, the transcribed data was carefully and repetitively reviewed. Themes emerged within the predetermined coding scheme, many with a unique perspective compared to general men in nursing. These themes and corresponding data excerpts were transferred to a data analysis table. The themes and sub-themes included rejection of female bias of nursing in the media, resilience managing stereotyping, perceptions of nursing practice areas as open to men and women, nursing education issues related to gendered social role expectations, and influence of family, friends, and culture on career choice.

## **Results**

### **Impact of Media Portrayal of Nurses and Societal Perceptions**

The participants believed that popularized feminine stereotypes of nurses existed but were decreasing. All four participants brushed off these images as unimportant, did not influence their career choices nor create negative feelings about themselves. Mark commented,

You see it on TV and it's a feminine career and an ongoing joke in social media. They have a term for it, nurse, right?... I know I am enough of a man that I can

take on a job that is supposedly a women's only job.

### Interest Areas in Nursing and Advanced Practice

When discussing career goals, the participants agreed they would take any job that came available to them. However, all expressed interest in nursing practice areas more relationship-based like pediatrics, adolescent care, mental health, and hospice. Mark shared, "I'm open to the more hands-on, more people-oriented fields, like psych. I like psych nursing and end-of-life nursing things where... more caring is involved than skills." Andrew was surprised how much he enjoyed maternal-child nursing, "I wanted to be a postpartum (nurse) and give discharge planning and care like that and carry the baby to the car. And you can take care of them in the nursery. They are cute, I love them."

The participants also discussed interest in technology-based nursing areas like the operating room (OR), emergency room (ER), and acute ambulatory care environments as well as in advanced practice. Tyler had done an externship before his senior year in an OR and commented, "I like OR a lot and you see, everything is so fast-paced there, outpatient type of thing." When asked about advanced practice, three of the participants joked their only goal now was to complete their BSN, but Russell had clear plans. He was in the military and had been exposed to certified registered nurse anesthetists (CRNAs) and understood their autonomy and salary potential. When the researcher validated the higher representation of men as CRNAs, Mark replied to Russell, "You don't only want to be a nurse, you want to be the best, highest paid nurse right? Kind of like, how macho of you." All four participants laughed.

### Experiences in Nursing Education

When asked about their educational experiences, the participants judged themselves to be less "studious," "organized," and school-oriented than women students. Mark stated, "They're all time management." However, they felt strongly that it did not preclude them from being excellent nurses and they were equally prepared to provide quality patient care.

Filtering their nursing education through gender, they reported both positive and negative experiences. They viewed their physical strength and youth as very positive and felt "more depended on" and "needed" in the clinical setting. They laughed and reminisced about the attention elderly women patients paid to them in their first clinical experience. The women used adjectives like "handsome" "young" and "spry" to describe the male students and these descriptions pleased them.

Although they enjoyed and capitalized on their under-represented status in the program, they also identified negative experiences related to it. Two of the four described situations in detail where they felt mistreated by faculty because they were men; The others agreed with these accounts. The

sentiment was particularly strong that being belittled by female faculty in front of others, especially patients, was a serious blow to their pride and quite emotionally painful. Tyler stated,

And the thing is about being a guy and being put down from a professor (be)cause you don't know something. We have like, big pride. I've got pride. If a teacher is, like, 'No you're wrong' in front of a patient, our pride go way down low.

This attitude appeared linked to the desire by some not to appear vulnerable. They also believed that, as men, they were viewed as more competent by patients and families. Mark asked, "Do you think they are more confident that you are a male?" They agreed they felt that way at most clinical sites. But it also created anxiety. Russell said he felt others looked at him "...like I have all the answers, but I don't."

They all experienced negative interactions with the partners of laboring or postpartum patients, reporting being "confronted" or feeling accused of "ulterior motives" when providing personal care. "That's right, that's true. You can check but don't enjoy it," Russell stated, after which they all laughed. Mark responded, "Right, I'm here to take care of your wife, there is no enjoyment in it for me at all." Their pediatric experiences were rewarding and conflict-free. Andrew had been caring for his nieces since they were newborns and was very comfortable providing care to children. Playful interactions with pediatric patients who admired the participants' muscle strength was also a source of satisfaction.

All four participants highly valued the sense of connection the men in the nursing program experienced and turned to other men for support and company. A strong sense of comradery emerged among the men. Mark shared, "Like there are less of us in our level and we all know each other. As opposed to some girls in my class - I've been going to school with you for four semesters and I don't know your name." To which Tyler replied, "We are a pretty tight-knit group of guys in our level." This sense of comradery permeated the dialog throughout the interview and was clearly a source of strength. Russell, who is in the military, declared jokingly, "The few, the proud, the men of nursing." Another positive social aspect brought up by Andrew was "I like all the girls. I like the ratio." The participants laughed and smiled with agreement.

### Personal Motivations for a Nursing Career

The participants acknowledged steady employment, financial stability, and respected status were strong motivators for a nursing career. Their Filipino parents, family, and culture were credited with planting these seeds, encouraging their nursing career choices, and continuing to support the men during school. Tyler captured this theme by stating, "...if you come from an Asian culture, especially like Filipino cul-

ture, it is group based, family based, community based so you kind of have that sense where taking care of somebody else is second nature.”

Each had a woman who influenced their career decision, including a mother, sister, aunt, and cousin. They provided role modeling for a professional nursing career. No negatives were associated with this statement. Mark commented, “Filipino males are not so macho as, like, American males, you know what I am saying?” The others nodded in agreement. Andrew’s brother and sister were also nurses. The students believed they had a responsibility to act as role models for younger siblings and cousins. Tyler stated, “My sister, she doesn’t know where she wants to go in life so since I am the oldest I gotta set that example.”

This conversation evolved without prompting to gender roles, nursing, and the Filipino culture. They believed they were influenced by their parents who came from the Philippines and that the Filipino culture is one that places high value on family and community. Tyler asked, “Why is that in Hawaii especially, a lot of males going for nursing now?” Russell responded, “Because there are a lot of Filipinos in Hawaii.”

They expressed their belief that the caring ethic is a fundamental characteristic for both genders in the Filipino culture and may explain their representation in the nursing profession. Russell continued, “I guess Filipinos in general, not men or women, maybe we have that caring attitude.” Mark added, “I was about to say it is ingrained into the culture, like the hospitality, you care for your elders. It is a culture where you take care of each other.” Andrew added, “I mean other people...probably think specifically that nurses shouldn’t be males...For us, we know already that nursing is for everybody.” Tyler added with emphasis, “Male *and* female.”

### Discussion

In designing the interview protocol, the guiding questions were generated from common themes and topics present in research with men in nursing or nursing education. These questions included the impact of media and societal stereotyping on their perceptions of self, interest areas in nursing and advanced practice, experiences in their nursing program around gender, and personal motivations for a nursing career (Blackley et al., 2019; Connor et al., 2016; Jamieson et al., 2019; Kronsberg, et al., 2017; Yi & Keogh, 2016). While the participants responded to every question, the responses in some areas produced more robust discussion.

### Impact of Media Portrayal of Nurses and Societal Perceptions

These participants shared unequivocally that they were aware of media stereotypes but believed these biases had no impact on them. Little discussion was even generated with

this line of questioning. Questions regarding sexual orientation were not asked directly and no spontaneous conversation emerged around this stereotype. The literature, however, documents that this bias continues to be an issue for many young men who choose nursing careers. Without adequate support there is risk of them being diverted to a different career path (Jamieson et al., 2019; Kronsberg, et al., 2017). As revealed later in the interview, the support received from the participants’ Filipino American families, communities, and culture provided a model of nursing that was independent of male or female gender.

### Interest Areas in Nursing and Advanced Practice

Regarding career specialization, occupational statistics reveal men are more represented in technology-based nursing areas like OR, ER, and acute ambulatory care environments as well as in advanced practice as CRNAs (Auerbach et al., 2017; U.S. Census Bureau, 2021). The participants did express openness to ‘high-tech’ areas, such as OR and ICU, but also ‘high-touch’ fields including child and family, mental health, general medical-surgical, and hospice where men are less represented. The barriers to a maternal-child nursing career were discussed based on gender-related clinical challenges, but the men viewed this as an issue owned by the male partners of the patients, not a reflection on themselves or their ability to provide quality care. Their expression that caring is a gender-neutral concept in the Filipino culture appeared to buoy them in these situations. One participant shared his interest in advanced practice as a CRNA, including the higher salaries and higher representation of men. Since the other three did not have any post-BSN plans, there was no additional discussion of the gender and salary differences in other advanced practice roles.

### Experiences in Nursing Education

Experiences in the nursing program produced much of the discussion during the interview. Differential treatment is reported by men in nursing and nursing education in the literature, but generally depicted as a negative that must be overcome (Christensen & Knight, 2014; Jordal & Heggen, 2015; O’Connor, 2015; Younas et al., 2019). The participants described positive and negative experiences, but predominantly embraced and enjoyed their status, particularly in clinical experiences. Their physical abilities were especially embraced, with the ability to help patients, families, nurses, and student peers by performing more strenuous nursing care tasks with ease. They felt needed and appreciated, and often allowed to be playful in a way that women were not, particularly with younger and older patients.

Judgement by nursing faculty was a different matter and more aligned with literature of men in general in nursing education (Christensen & Knight, 2014; Connor et al., 2016; Jordal & Heggen, 2015; Younas et al., 2019). The participants reported almost all their faculty were women in clini-



cal and the classroom. The participants often felt judged because they did not behave like women in the program, that their caring was insufficient in comparison. Their expression of caring within their Filipino culture increased their confusion surrounding this issue.

### Personal Motivations for a Nursing Career

Regarding motivations for a nursing career, the literature shows men in general identify the value of nursing as a stable, flexible, well-paid, and fulfilling career (Blackley et al., 2019; Kronsberg et al., 2017; O'Connor, 2015; Yi & Keogh, 2016). This information is communicated to men in the US most often through career counseling, media, or personal research. For the participants in this study, however, these motivations were shared but the nursing career goal was transmitted through family and community relationships. They tied this career goal to their Filipino and Filipino American culture, which they identified as emphasizing obligation to family, respect for elders, and caring as a gender-neutral concept. Without hesitation all four participants identified female role models, including a mother, sister, aunt, and cousin, as the inspiration for their nursing career choice, a unique expression in the United States.

### Limitations

Limitations of the study include the sample size and setting. Although recommendations for phenomenological research are a minimum of 5 or 6 participants (Polit & Beck, 2020), only four men participated. The richness of data may have been enhanced with more participants, with documentation of saturation. However, the participants did represent almost 25% of the men in their graduating cohort. Regarding the setting of the educational program, Hawaii has the highest percentage of people of Filipino descent in the US (Hawaii Department of Health, 2020), which may impact transferability to other geographic areas.

### Conclusions

The perceptions and challenges of men in nursing and nursing education are increasingly documented in the literature. These themes include ongoing feminized media portrayals, questions about their motivations and sexuality, discouragement from pursuing certain practice areas, and educational challenges. In this study, the voices of four, young adult second-generation Filipino American men were captured, revealing some unique perspectives about men in nursing education and the nursing profession. Although discussion prompts were based on challenges and topics from men in nursing and nursing education, the participants' perceptions were more positive and predominantly were not aligned with negative associations in the literature.

The participants' responses reflected their stated alignment with their Filipino and Filipino American cultural values. These values included obligation to family, respect for el-

ders, and caring as a gender-neutral concept. Due to the support of family and community they expressed resiliency to common challenges faced by other men who choose a nursing career. Understanding the factors that led these men to choose nursing and supported their educational efforts may inform strategies to increase representation of men in nursing from other under-represented population groups.

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# Leveraging a Patient Portal System to Increase Adherence to Chlamydia and Gonorrhea Retesting Within a Community-Based Health Center: A Pilot Project

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## Abstract

**Background:** With exponentially rising chlamydia and gonorrhea infection rates, health-care providers are challenged with formulating strategies to ensure prompt testing, diagnosis, treatment, and retesting of individuals diagnosed with a sexually transmitted infection (STI).

**Objective:** The objective of this project was to leverage the patient portal system to improve the sexual health outcomes of persons diagnosed with a STI at a community-based health center by promoting 3-month STI retesting via retesting reminders.

**Methods:** This was a two-phased, quality improvement, pilot project that began with distribution of pamphlets serving as visual guides for patient portal registration. The second phase consisted of delivering portal retesting reminders to English-speaking patients over the age of 18 who had technological access to the organization's patient portal and were diagnosed and treated for chlamydia and/or gonorrhea within a 3-month timeframe.

**Results:** A total of 200 pamphlets were disseminated and 25 reminder messages were delivered to 19 participants. An increase of 0.02% was observed in the center's overall patient portal registration rate. Additionally, an improvement in STI retesting rate from 31.58% to 52.63% was noted, signifying a 21.05% increase following delivery of retesting reminders. However, only 3 of the 19 project participants attended retesting appointments as a result of the reminder messages, indicating the project intervention was responsible for 15.79% of the retesting increase.

**Conclusions:** Utilization of patient portal reminders are a cost-effective method of increasing patient engagement, promoting retesting guidelines, and facilitating a collaborative relationship between patients and providers.

**Keywords:** *chlamydia, gonorrhea, patient portal, retesting*

## Background

*Chlamydia trachomatis* and *Neisseria gonorrhoea* are two of the most common bacterial sexually transmitted infections (STIs) that continue to spread at alarming rates within the United States. Approximately 1.8 million cases of chlamydia and 616,000 cases of gonorrhea were reported in 2019 (Centers for Disease Control and Prevention [CDC], 2021a). However, the CDC estimates that the true prevalence is much higher, in the magnitude of 4 million and 1.6 million cases respectively (CDC, 2021b). Individuals diagnosed with one of these two STIs are at greater risk of developing detrimental health conditions that could lead to potentially irreversible damage of the urinary and reproductive systems. In addition, chlamydia and gonorrhea infections place a financial burden of \$679 million on the U.S. healthcare system (Hull et al., 2017). When observing the individual costs specifically associated with chlamydia and gonorrhea infections, there is an estimated lifetime cost of \$364 for women and \$30 for men per chlamydia case versus \$354 for women and \$79 for men per gonorrhea case (Hull et al., 2017). These costs are inclusive of the diagnostic tests conducted, the treatment prescribed, and subsequent medical consequences from untreated infections (Hull et al., 2017). These figures can increase exponentially over the next few years considering numerous state and local sexually transmitted diseases programs have received budget cuts, reducing the number of resources to the general public (CDC, 2019). Although preventable, evidence has suggested that factors such as stigmatization, poverty, limited access to preventative care, decreased number of screenings, and suboptimal patient follow-up perpetuate the spread of infection (CDC, 2019).

The guidelines influencing current practice for chlamydia and gonorrhea testing and retesting are based upon recommendations established by the U.S. Preventive Services Task Force (USPSTF) and the CDC. According to the USPSTF, sexually active females 24 years old or younger and older females who are high-risk for acquiring infections should be frequently screened for chlamydia and gonorrhea. Females considered to be high-risk have the following risk factors: previous or existing STI, inconsistent use of protection, multiple sex partners, a sex partner with a STI, a sex partner with multiple partners, and participation in sexual activity for money or drugs (American Family Physician, 2015). Contrastingly, the USPSTF does not suggest screening males, stating there is insufficient data to support the necessary screening for either infection in men. CDC guidelines promote similar screening recommendations for women in addition to annual testing for men who have sex with men, with testing performed every three to six months if considered high risk and screening for males in areas of high STI prevalence (CDC, 2021c). In reference to retesting, the CDC recommends that persons diagnosed with gonorrhea or chlamydia should be retested

three months following completion of treatment. Despite recommendations set forth by the CDC and USPSTF to encourage the prompt screening, diagnosis, treatment, and retesting of those at risk for STIs, the rising percentage of infections indicate that current practices do not align with guidelines. In fact, only one third to one half of primary care providers perform routine STI screenings on patients (CDC, 2020). Inadequate screenings and diagnostic testing lend a hand to a pronounced number of infections being undetected, further perpetuating the spread of STIs.

To effectively reduce these infections, healthcare providers are specifically challenged with the task of increasing screening for gonorrhea and chlamydia and ensuring retesting for those who test positive. Growing research has indicated the potential benefits of using patient portals to facilitate engagement. Patient portals allow for direct communication between patients and clinicians, access to educational resources, and scheduling of appointments, requesting of prescription refills, and payment of bills (Rodriguez, 2018). Thus, if leveraged appropriately, patient portal systems can be valuable in addressing the increasing rates of STIs by encouraging testing and retesting, increasing identification of high-risk patients, promoting timely treatment, and preventing future infections.

## Objective

This project focused on improving patient engagement and increasing STI retesting rates with the use of a patient portal system in a community-based health center. The overall aim was to determine whether the use of a patient portal system would improve the sexual health outcomes of those diagnosed with a STI seeking care with the two primary objectives of this project being 1) to increase the number of patients using the patient portal system within three months; 2) to increase retesting of patients diagnosed with chlamydia and/or gonorrhea following diagnosis and treatment with patient portal reminder messages within three months.

## Literature Review

Aside from detecting current and preventing transmission of future infections, promotion of STI testing and retesting can also aid in averting detrimental health consequences associated with STIs. A systematic review with meta-synthesis conducted by the Pacific Northwest Evidence-Based Practice Center (2021) corroborated chlamydia screening as being effective in decreasing the risk of pelvic inflammatory disease in women. The article did not address the effectiveness of screenings for gonorrhea infections, suggesting further research on gonorrhea screening is required. In regard to potential harms correlated with chlamydia and gonorrhea screening, false positive and negative results, false alarm rates; referring to the number of individuals who do not have an infection but test positively, and false



reassurance rates; pertaining to the number of individuals who indeed have infections but have negative test results, were acknowledged in nine of the studies examined in the systematic review (Pacific Northwest Evidence-Based Practice Center, 2021), calling into question the reliability of STI testing that could contribute to prolonged and repeated STI infections if results are inaccurate. Despite endorsement of routine STI screenings by the CDC and USPSTF guidelines, there are still barriers that deter patients from seeking STI testing and retesting. Having low self-perception of infection risk was attributed to lower levels of health literacy in relation to STIs, implying that individuals with inadequate health literacy levels are less knowledgeable of methods to prevent STIs, available treatment options, and necessary follow-up required to reduce the risk of contracting and transmitting infections (Rolland et al., 2020). This finding indicates a need for careful consideration of patients' health literacy levels as well as STI knowledge deficits.

The potential impact of patient portals was discussed in a systematic review by Taylor et al. (2016) in which the authors identified electronic health record (EHR) reminders, patient reminders, and specimen collections at routine visits as producing the most optimal STI testing rates at the lowest costs compared to other methods. In addition, the extensive systematic review determined that EHR reminders also improved other routine screenings aside from STIs, indicating its ability to serve multiple purposes. A literature review conducted by Coughlin et al. (2017) also outlined findings from 35 articles that support patient portals, with several studies indicating portal utilization increases screenings, adherence to treatment, attendance of appointments, and preventative behaviors. Cope et al. (2019) also found that among 143 patients at a North Carolina clinic, the portal system was used by 61.9% of patients to view information on treatment options and partner notification while 86.7% viewed chlamydia and gonorrhea testing results. A retrospective experimental study by Cohen et al. (2017) also found that the use of an online patient engagement platform called Healthvana was successful in notifying patients of STI test results quickly, leading to prompt treatment and overall better management of STIs and sexual health (Cohen et al., 2017). Contrastingly, one of the literature reviews presented several studies that found no significant difference in patient empowerment with the use of portals, with only a few studies indicating minor improvements in health were actually achieved with use (Ammenwerth et al., 2019). Several of the articles also discovered that portals are often not consistently utilized, and those using the systems are typically Caucasian, male, college educated, and insured (Ammenwerth et al., 2019).

Despite a majority of the aforementioned articles having described distinctive advantages of patient portals, several

have identified barriers that limit successful incorporation of portals in healthcare organizations. In particular, Tieu et al. (2017) examined a hospital which serves communities of predominately minority, low-income, and disadvantaged patients as they operated patient portals and found that individuals with limited health literacy skills typically encountered challenges when attempting to navigate portal systems, grasp medical terminology presented, and correctly interpret test results and treatment plans. A literature review by Lyles et al. (2020) echoes similar barriers with emphasis on limited experience with computers and technology, minimal health literacy skills, and difficulty with navigating challenging portal interfaces. Required assistance with comprehending medical information displayed on portals, concerns with protecting private information, and preference for in-person communication were also identified as significant obstacles to portal integration (Lyles et al., 2020).

Several of the articles clearly depicted the significance of assessing patients' health literacy levels and technological skills before developing a patient portal system within a healthcare organization, as well as tailoring portal interfaces to simplify usability. All of which are imperative to consider when aiming to implement portal systems in disadvantaged communities as it influences whether the system will be used and sustained. Additionally, Lyles et al. (2020) also suggests the need for healthcare institutions to provide enrollment and technical support to ensure successful implementation and continued use of a patient portal system.

## Methods

The project was a quality improvement project designed to increase chlamydia and gonorrhea retesting rates at a community health center. The project comprised of two steps centered around the utilization of the patient portal system. The first being the use of written and visual guides, the pamphlet (Figure 1) to aid in portal registration to improve the number of patients using the system. The second step involved delivering retesting reminders via the patient portal to individuals with positive diagnosis of chlamydia and/or gonorrhea to improve 3-month retesting compliance. This project received Institutional Review Board approval prior to implementation.

## Setting


The setting for this project was a community-based health center located in Newark, New Jersey. Due to the facility's location in Essex County, the patient population seen at this practice is racially and ethnically diverse, a majority being African American and Hispanic. The organization provides comprehensive health and social services to the Newark community, delivering care to over 11,000 patients a year. Considering the institution was initially established to provide research and medical care to individuals with HIV/

Figure 1

Patient Portal Pamphlet (Front)

**What is a patient portal?**

- a secure website that provides patients access to personal medical information, 24/7
- a free tool used by providers and patients to monitor and manage health outcomes



**What are the benefits of using a patient portal?**

- access health data at any given time
- schedule appointments without needing to call the office
- easily communicate with providers without having to wait for office hours
- view lab results quickly
- receive reminders of important check-ups and screenings
- keep track of health visits
- access educational health resources

**How do I message my provider?**

→ Click on “Messages” icon in top right corner of home page



→ Click on “Compose Message”



→ Select message type, provider, location, & fill out required fields.  
→ Then click “Send” to submit message to intended provider

simple solutions



at the touch of your screen

connecting you to athenahealth, a patient portal that simplifies your health needs

Patient Portal Pamphlet (Back)

**What type of patient portal does NJCRI use?**

NJCRI currently uses **athenahealth**, which provides services to 100 million patients & 160,000 providers across different healthcare systems.

**How do I register for the patient portal?**

→ Open a Google Chrome, Safari, Firefox, or Microsoft Edge tab  
→ Go to <https://19575-1.portal.athenahealth.com>




→ Click on “Sign up”


→ Fill in the required fields to create an account  
→ Under the “Verify your identity” section, select an appropriate provider & location from the menus shown  
→ A temporary passcode will be sent via email or phone call & will prompt for resetting of the password  
→ Accept the Terms and Conditions & Privacy Policy to complete portal registration

**How do I schedule an appointment?**


→ Go to <https://19575-1.portal.athenahealth.com>  
→ Log into patient portal account



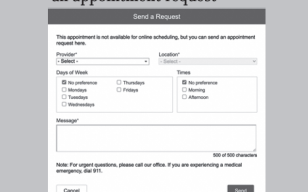
→ Click on “Schedule Now” under “Appointments”



→ Click on ▼ button next to “Find Appointments”  
→ Click on appropriate reason for appointment  
→ For new patients, click on “New Patient” & then click “Find Appointments”




→ Click on desired date & time for intended provider & then click “Schedule Now”  
→ For returning patients, click on “Other reason” & fill out required fields to send an appointment request



**How do I view my test results?**

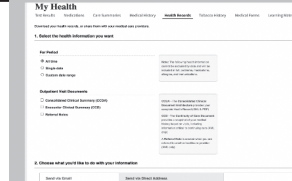
→ Click on “My health” in left column



→ Results will appear under “Test Results”

**How do I view my health records?**

→ Click on “My health” in left column  
→ Click on “Health Records”



→ Click on appropriate time period, type of document desired, & whether the records should be sent to an email or address

**How do I view my health reminders?**

→ Click on “My health” in left column  
→ Click on “Health Reminders”



AIDS, a large percentage of the organization's patients visit the facility for sexual health and primary medical care purposes along with supportive social services.

### Project Population

The project population was assembled with the use of purposeful sampling of patients who were diagnosed and treated for chlamydia and/or gonorrhea at the community-based health center. Inclusion criteria included men and women over the age of 18 who were English speaking, recently diagnosed with and treated for chlamydia and/or gonorrhea at the institution, and had technological access to the patient portal system. Exclusion criteria included non-English speaking individuals who were diagnosed and treated at an outside healthcare facility and lacked access to technology.

### Data Collection and Analysis

The interventions and data collection for this project were two phases that were completed over an 18-week timeframe. The first phase of the project consisted of distribution of physical and electronic copies of the patient portal pamphlet that occurred over a 3-month period from June to September 2021. The second phase of the project involved the recruitment of project participants and delivery of patient portal retesting reminders that emphasized the importance of retesting three months following treatment completion. This project was completed over a 3-month timeframe from September to November 2021. Data analysis was performed via Microsoft Excel and descriptive statistics were applied to summarize participant characteristics, number of paper and electronic pamphlets delivered, and retesting rates.

## Results

### Pamphlet Delivery

In total, 200 copies of the pamphlet were provided to the project site for dissemination. In addition, an electronic copy of the pamphlet was sent to 612 patients who had an email address on file with the health center. Physical and electronic distribution of the patient portal pamphlets took place from June 14, 2021 to September 20, 2021.

### Demographics of Project Participants

Due to the restrictions of the coronavirus pandemic and limitation of the overall project timeline, the project sample consisted of a total of 19 individuals. Regarding the gender of the total number of 19 participants, there were 18 males (94.74%) and one female (5.26%). The mean age of project participants was 32.11 ( $SD = 8.56$ ). In regard to race and ethnicity, 47.37% ( $n = 9$ ) were Hispanic, 31.58% ( $n = 6$ ) were African American, 10.53% ( $n = 2$ ) were Caucasian,

and 10.53% ( $n = 2$ ) identified as other. Another characteristic that was evaluated was participants' sexual risk history to which there were twelve participants (63.2%) who identified as a man that has sex with men (MSM), three (15.8%) identified as heterosexual, three (15.8%) were unknown, and one (5.35%) identified as bisexual. Table 1 presents the demographic characteristics of the 19 project participants.

**Table 1**

### *Demographics of Total Sample and Intervention Sample*

<i>Characteristics</i>	<b>Total Sample</b>	
	<i>n (total =19)</i>	<i>%</i>
<i>Gender</i>		
Female Gender	1	5.26
Male Gender	18	94.74
<i>Age</i>		
Age 20-29	9	47.37
Age 30-39	7	36.84
Age 40-49	2	10.53
Age 50-59	1	5.26
<i>Race/Ethnicity</i>		
African American	6	31.58
Hispanic	9	47.37
Caucasian	2	10.53
Asian	0	0.0
Other	2	10.53
<i>Sexual Risk History</i>		
Heterosexual	3	15.79
MSM	12	63.16
WSW	0	0.0
Bisexual	1	5.26
Unknown	3	15.79

### Baseline Evaluation of Total Project Participants

After the list of project participants was constructed, extensive chart reviews were conducted to extract relevant pre-intervention data. The specific categories that were collected and entered into the data abstraction tool included the primary diagnosis, date of diagnosis, reasoning for testing, symptoms at time of evaluation, treatment, previous history of chlamydia and/or gonorrhea, and concurrent STIs, all of which are summarized in Table 2.

Fourteen of the total 19 participants were diagnosed with chlamydia and five subjects received dual diagnosis of chlamydia and gonorrhea. When evaluating the reasoning for the initial testing of the participants, 78.95% ( $n = 15$ ) were tested as part of routine screening while 15.79% ( $n$

**Table 2***Pre-Intervention Results of Total Sample*

Variable	Total Sample	
	<i>n</i> (total =19)	%
<i>Primary Diagnosis</i>		
Chlamydia	14	73.68
Gonorrhea	0	0.0
Chlamydia/Gonorrhea	5	26.32
<i>Month of Diagnosis</i>		
Prior to June 2021 <sup>a</sup>	2	10.53
June 2021	6	31.58
July 2021	4	21.05
August 2021	4	21.05
September 2021	3	15.79
<i>Reason for Testing</i>		
Routine Screening	15	78.95
Symptomatic	3	15.79
Notified of Exposure	1	5.26
<i>Symptoms at Evaluation<sup>b</sup></i>		
Dysuria	0	-
Urethral Discharge	1	-
Cervical Discharge	1	-
Pelvic Pain	0	-
Testicular Pain	1	-
Proctitis/Rectal Pain	0	-
None	16	-
<i>Treatment of Diagnosis</i>		
Azithromycin	17	89.47
Ceftriaxone	0	0.0
Doxycycline	0	0.0
Azithromycin/Ceftriaxone	2	10.53
<i>Previous History of CT or GC</i>		
Yes	3	15.79
No	16	84.21
<i>Concurrent STIs</i>		
HIV	4	21.05
Syphilis	0	0.0
None	15	78.95

Note. <sup>a</sup> – Two of the project participants had their primary diagnosis date prior to the retrospective chart review timeframe but were included and treated as special cases.

Note. <sup>b</sup> – Several of the participants had multiple symptoms so percentile of each were not calculated as the total would not be equivalent to 100%.

As a result, 17 of the project participants received azithromycin for treatment while two received combination therapy of azithromycin and ceftriaxone. In regard to past STI history, 84.21% ( $n = 16$ ) of the participants did not have a previous history of chlamydia or gonorrhea. In addition to their current chlamydia and/or gonorrhea infections, four of the participants also had a diagnosis of HIV. Fifteen of the project participants did not have any concurrent STIs.

### Post-Intervention Evaluation of Patient Portal Reminder Messages

Following the delivery of patient portal reminder messages to promote retesting adherence, several key factors were focused upon during the chart review and documented in the data abstraction tool accordingly (Table 3). These factors included the dates the reminder messages were read by participants, whether retesting appointments were scheduled and attended, whether symptoms were still present at the appointment, and results of the retesting. Taking into consideration that six of the 19 project participants had attended retesting prior to the intervention, the first reminder message was sent to the 13 project participants who had not yet retested on October 20, 2021. Second reminder messages were delivered to 12 of the remaining participants on November 5, 2021 after a chart review indicated that only one individual had retested following receipt of the initial message. Of the 13 participants, four participants attended retesting with only three having read the patient portal reminder message during the intervention phase.

= 3) were tested due to being symptomatic and 5.26% ( $n = 1$ ) were evaluated after being notified of exposure. Regarding the symptoms experienced at the time of initial evaluation, sixteen of the participants had no symptoms.

A total of ten participants (52.63%) of the nineteen scheduled and attended retesting appointments, had no com-



**Table 3***Post-Intervention Results of Total Sample*

Variable	Total Sample	
	<i>n</i> (total =19)	%
<i>Delivery of Reminder Messages*</i>		
1 <sup>st</sup> message on 10/20/21	13	-
2 <sup>nd</sup> message on 11/5//21	12	-
<i>Date Reminder Message Was Read</i>		
10/20/21- 10/27/21	3	-
10/28/21- 11/4/21	0	-
11/5/21-11/12/21	0	-
11/13/21-11/20/21	0	-
<i>Appointment Scheduled</i>		
Yes	10	52.63
No	9	47.37
<i>Appointment Attended</i>		
Yes	10	52.63
No	9	47.37
<i>Symptoms at Appointment</i>		
Yes	0	0.0
No	10	52.63
Not Applicable <sup>b</sup>	9	47.37
<i>Results of Retest</i>		
Positive	0	0.0
Negative	10	52.63
Not Applicable <sup>c</sup>	9	47.37

*Note.*<sup>a</sup> – Number accounts for the amount of reminder messages were delivered via the patient portal on the specific days listed.

*Note.*<sup>b</sup> – Number accounts for participants who were not adherent to 3-month retesting following treatment so evaluation of symptoms was not applicable.

*Note.*<sup>c</sup> – Number accounts for participants who were not compliant with 3-month retesting following treatment so evaluation of retesting results was not applicable.

plaints of symptoms, and had retests that yielded negative results for chlamydia and gonorrhea. Of the 10 project participants, seven of the participants identified as MSM, two were unknown, and one was bisexual. On the other hand, nine participants (47.37%) did not attend retesting therefore evaluation of symptoms and retesting results for this group were not applicable. Of these nine project participants, five identified as MSM, three were heterosexual, and one had unknown sexual risk history. When specifically assessing the post-intervention data of the sub-group of 13 individuals who received the reminder messages, four participants (30.77%) scheduled and attended retesting appointments, reported no symptoms at their follow-up, and had negative retesting results. 63.16% ( $n = 12$ ) of the total project participants was individuals who were MSM, contributing to the 55.56% ( $n = 5$ ) of the nine participants who did not schedule or attend retesting appointments.

**Effectiveness of Project Interventions**

To assess the effectiveness of the patient portal pamphlets on the overall number of patients utilizing the portal system, the pre-intervention registration rate was compared to the post-intervention rate to determine if there was any significant improvement. The baseline rate that was collected denoted only 0.06% ( $n = 292$ ) of the patient population seen by the health care facility was registered for the patient portal. Following the distribution of physical and electronic copies of the pamphlets and the Co-Investigator helping with patient portal registration in person, the facility's registration rate increased to 0.08% ( $n = 372$ ). Although the rate only increased by 0.02%, the intervention was still successful in moderately improving the overall registration rate during the short intervention period.

Regarding the effectiveness of the reminder messages delivered via the patient portal system, the chlamydia and gonorrhea retesting rate prior to project implementation was compared to the retesting rate post-intervention. The results revealed that only 31.58% ( $n = 6$ ) of the patients were compliant with STI retesting at baseline. The post-intervention retesting rate included the six participants who had completed retesting prior to the intervention, as well as the four individuals who attended retesting appointments following the

delivery of the reminder messages. Therefore, the post-intervention retesting rate was 52.63% ( $n = 10$ ). As a result, there was a 21.05% increase in STI retesting following the implementation of the patient portal reminder messages. The analysis of the retesting rates throughout the implementation phase is provided in Table 4, and the overall breakdown of the retesting results is depicted in Figure 2.

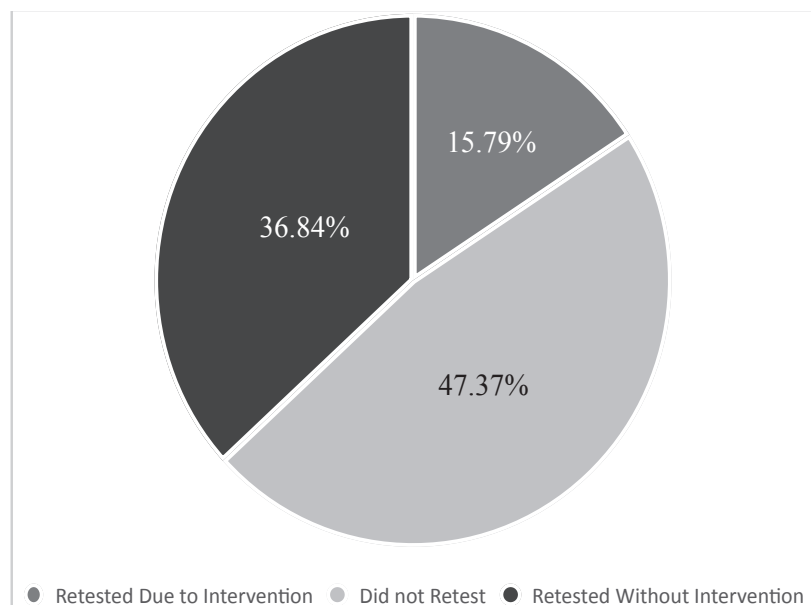
**Discussion**

Ensuring adequate STI screening and retesting has been a longstanding challenge within the United States but has become an imposing obstacle amid the coronavirus pandemic. According to a study that assessed the impact of the pandemic on STI testing, there was a 63% and 59% decrease in chlamydia and gonorrhea testing within male and female patients aged 14-49 years old, respectively (Pinto

**Table 4***Chlamydia and Gonorrhea Retesting Rate*

Intervention	# of Messages Sent	# of Patients Retested <sup>a</sup>	Retesting Rate
Pre-Intervention	0	6	31.58
1 <sup>st</sup> reminder (10/20)	13	7	36.84
2 <sup>nd</sup> reminder (11/5)	12	9	47.37
Post-Intervention	-	10	52.63

Note. <sup>a</sup> – Accounts for number of patients who attended retesting out of the total sample of nineteen patients

**Figure 2***Retest Results*

et al., 2021). As a result, there were approximately 5,577 gonorrhea and 27,659 chlamydia cases that were potentially undetected from March to June 2020 (Pinto et al., 2021). This finding substantiates the need to increase STI testing, especially in areas of high STI prevalence. Considering Essex County in New Jersey has the most reported cases of chlamydia and gonorrhea within the state, it is imperative that healthcare facilities in this region, such as the community-based health center where this project was conducted, find strategies to promote STI testing and retesting.

The increase in patient portal registration indicates that the intervention of pamphlets was an effective approach in increasing patient awareness of the health center's patient portal and utilization of the system. However, the modest increase also indicates that further modifications to the current strategy of visual and written guides or implementation

of other methods are necessary to promote the use of the patient portal moving forward. Similarly, the intervention of retesting reminders delivered through the patient portal influenced the retesting of three individuals, a small portion of the total sample of 19 participants. Nonetheless, the delivered reminder messages increased the health center's chlamydia and gonorrhea retesting rate within the 3-month timeframe, validating the intervention's usefulness in improving health outcomes. These results coincide with such findings by Nyatanza et al. (2016) and Badarane et al. (2019) that substantiate the efficacy of reminder messages in increasing retesting rates. To better promote STI retesting, modifications to the reminder message and increased frequency of message delivery could be alternative options considered for future research.

Another aspect of the results worth noting was the proportion of project participants who were part of a sexual and gender minority group, specifically those who identified as MSM. The project results indicates that there was a significant disparity in retesting in individuals of the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community, which could be a result of limited access to healthcare resources, knowledge deficits, and/or discomfort in seeking care from providers due to fear of stigmatization (Mann-Jackson et al., 2021). Further research could be conducted to determine the extent of these factors on STI retesting of those in the LGBTQ community to better determine what measures would be effective in overcoming this challenge.

**Implications**

The implementation of this quality improvement project correlates with several notable implications, the first being an improvement in overall clinical practice. A significant

number of lifestyle choices and medical decisions made that impact patients' health outcomes occur when patients are at home or participating in their daily routines. Utilization of patient portals provide a solution to this quandary by granting patients access to their health information from home, providing an opportunity to continuously monitor and manage their health progress. In doing so, patients are able to take more of a proactive role in their health, leading to increased preventative behavior, such as recommended screenings and vaccinations, and adherence to established treatment plans.

This project also impacts the quality of healthcare offered by the community-based health center. Reminder messages delivered through the patient portal help to increase STI retesting rates, allowing for identification of any recurrent or persistent infections requiring treatment. Safety is another aspect of care that is positively influenced by the integration of patient portals and reminder interventions. Considering patient portals are secure online platforms that require a patient-designated username and password to gain entry, sensitive patient data is properly protected and not accessible by unauthorized users. Additionally, messages delivered to and received from patients in the system are encrypted to further safeguard content of communications. This approach ensures complete confidentiality of transactions between clients and clinicians, providing safety of privileged information and patient records.

As previously discussed, the current guideline set forth by the CDC suggests retesting individuals diagnosed with bacterial STIs three months following treatment. However, the nation's leading health agencies have not established any formal guidelines or recommendations regarding the best methods to encourage patient attendance of retesting. As a result, each healthcare organization is tasked with devising retesting strategies to comply with CDC guidelines. There signifies a need for a change in the healthcare facility's current policies and procedures regarding testing and retesting.

In reference to the pamphlets implemented in this project, the use of visual and written guides was shown to be instrumental in teaching patients on how to register for the patient portal and operate its numerous functions. With increased knowledge of the portal system, patients have the ability to perform tasks that could save the patient and healthcare facility valuable time and resources. Educating patients on how to utilize patient portal systems also encourages active participation in care management. With increased patient engagement, individuals are more likely to be proactive by engaging in behaviors that are effective in achieving optimal health outcomes.

Another important element is the financial implications a project imposes on the site of implementation. In this

particular case, the patient portal is already a functional component of the organization's daily operations with no additional fees or costs required with its use. This system feature indicates that sending follow-up reminders through the portal system is a cost-effective method of endorsing STI retesting, thereby aiding the compliance of guidelines set forth by the CDC. Adherence to the recommendation of retesting three months following treatment completion would assist in early detection of recurrent infections that would otherwise go untreated, reducing the development of health complications that would incur significant medical costs to treat.

### **Project Limitations**

Despite the effectiveness of the respective interventions, there were several limitations to note. First, the requirement of having access to the patient portal may have significantly reduced the number of eligible participants considering only 0.06% of the facility's patients were registered to use the portal at the time. The low registration rate could be due to the novelty of the system, as well as the patient population consisting primarily of racial and ethnic minorities, whom recent studies have affirmed is associated with lower rates of patient portal usage (Graetz et al., 2016). This finding further substantiates the notion that the racial and ethnic backgrounds of the facility's patient population may have been a contributing factor to the portal's suboptimal utilization rate.

Another limitation is inconsistent patient portal usage by the project participants led to many of the retesting reminders being unread. Although the first phase of the project aided in increasing the overall number of patients registered to use the portal, it did not ensure that patients would in fact utilize the system after initial registration. Throughout the data collection process, it was noted that many of the project participants had not logged into their portal accounts over the past several months, despite their records indicating that they had visited the facility for appointments since their last portal login. Consequently, several of the participants missed the retesting reminders delivered to their patient portal inboxes and did not schedule an appointment to appropriately follow-up on their chlamydia and/or gonorrhea infections. This finding calls into question whether further efforts should be made to not only increase patient portal registration rates but to encourage frequent portal usage to ensure patients are up to date on their health management.

### **Conclusions**

The exponentially growing rate of STIs continue to be a challenge for healthcare providers nationwide and across the globe. To date, the encouragement of retesting at initial evaluations has been a standard method employed by most organizations to detect and treat recurrent infections. How-

ever, the magnitude of reported cases continues to surpass the effectiveness of this standard intervention, indicating a need for a new strategy to be implemented. Considering technology has been integrated into nearly all facets of daily living, the use of systems, such as patient portals, provide a practical solution to this ongoing obstacle. Patient portals provide secure access to health data and educational resources as well as encourage patient engagement and self-management of healthcare. The findings of this pilot quality improvement project confirm that patient portals could be leveraged to effectively promote STI retesting three months following treatment completion, which helps mitigate the spread of bacterial infections, reduce the expenditure of healthcare costs on STIs, and prevent development of adverse medical complications. This strategy in turn aids in the improvement of sexual health management and overall quality of life and well-being.

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# The Value of Early Screening in Pregnant Women Who Consume Alcohol: An Integrative Review

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## Conflict of Interest

The authors declare no conflict of interest.

## Abstract

**Background:** Fetal alcohol syndrome (FAS) is a health problem that affects 2.3% of the global population and can lead to lifelong issues with growth and development. Early screening of mothers for prenatal alcohol exposure (PAE) can help promote abstinence as well as prevent FAS and other complications. As frontline healthcare professionals, nurses play a significant role in disease prevention and patient education. With appropriate early screening tools, nurses can intervene and educate mothers to help reduce the occurrence of FAS.

**Objectives:** The purpose of this integrative review was to identify and examine quantitative and qualitative studies that focused on the benefits of early screening in pregnant mothers who consumed alcohol. This review aimed to determine if early screening decreased the prevalence of FAS and how these tools were best applied.

**Methods:** A search of relevant records between September and December 2022 was performed to conduct an integrative review of FAS and PAE. The following databases were used in the literature search: MEDLINE, MEDLINE with Full Text, Academic Search Complete, CINAHL Complete, eBook Collection (EBSCOhost), Health Source: Nursing/Academic Edition, Social Sciences Full Text (H.W. Wilson), and OneSearch.

**Results:** The majority of the 11 articles examined in this integrative review indicated that early screening for alcohol consumption in pregnant women indirectly led to reduced prevalence of FAS when paired with other targeted interventions. However, no single screening tool was universally used for pregnant women.

**Conclusions:** This integrative review shows that most screening tools can be used effectively to detect PAE, foster more awareness in pregnant women, and reduce the incidence of FAS. Screening tools, blood biomarkers, and interventions can be used collectively to reduce the consumption of alcohol during pregnancy and the risk of FAS.

**Keywords:** fetal alcohol syndrome, fetal alcohol spectrum disorders, FAS prevalence, alcohol screening during pregnancy, TWEAK screening

## Background

Fetal Alcohol Syndrome (FAS) causes neurocognitive and physical deformities in affected infants and children (Moise et al., 2019, p. 2). Denny et al. (2019, p. 365) claim that these deformities can lead to lifelong issues with growth, development, and sensory processing. It is estimated that FAS affects 2.3% of the global population (Breunis et al., 2021, p. 2). FAS is an entirely preventable condition that only occurs with Prenatal Alcohol Exposure (PAE). Research shows that pregnant women cannot safely consume any amount of alcohol (Finanger et al., 2021, p. 1). There is evidence in the literature that supports early screening of pregnant mothers and its potential to decrease the prevalence of FAS. Early screening allows for early intervention and proper patient education, which can prevent the fetus from suffering complications associated with the consumption of alcohol during pregnancy (Chiodo et al., 2019, p. 1748). While FAS profoundly impacts a child's lifespan and overall health, this review did not focus on mortality rates. In this integrative review, the researchers identified and examined quantitative and qualitative studies that focused on the benefits of early screening in pregnant mothers who consumed alcohol. This review aimed to determine if early screening decreased the prevalence of FAS and how these tools were best applied.

## Significance to Nursing

Nurses serve on the frontline of disease prevention and patient education. Alcohol use and abuse are rampant across the United States (US). Alcohol is easily accessible, consumable, and addictive. Mothers should not consume harmful substances such as alcohol at any point during pregnancy. Moreover, any pattern, timing, or amount of alcohol consumed can adversely affect a developing embryo or fetus (Chiodo et al., 2019, p. 1748). Although pregnant mothers are in direct control of their drinking habits, some mothers may lack insight into the long-term and harmful effects that alcohol has on their newborn. Additionally, these mothers might have a knowledge deficit in the pathophysiology of FAS and other complications of alcohol misuse, such as miscarriages and stillbirths. Despite efforts to raise public awareness about the dangers of alcohol use, nearly 1 out of 9 pregnant women reported consuming alcohol between 2015 and 2017 (Denny et al., 2019, p. 365). Nurses need to provide patient education and implement proper screening tools to prevent complications among this vulnerable population.

Many healthcare providers do not emphasize the risks of PAE, miss opportunities to screen pregnant women for alcohol consumption, or fail to recommend abstinence from alcohol use during pregnancy (Chiodo et al., 2019, p. 1755). Screening tools that detect PAE are paramount in disease prevention and can help decrease the prevalence of FAS (Poole et al., 2019, p. 9). Early screening can help the healthcare team to recognize alcohol drinking patterns in mothers and implement targeted interventions (Chiodo et al., 2019,

p. 1756). Early screening tools can also help patients receive the proper guidance and education they need to abstain from alcohol and prevent FAS. Nurses are positioned to provide guidance on the harmful effects of alcohol consumption during pregnancy and thereby provide better quality of care to patients and their families. Research and implementation of all potential disease prevention tools should be conducted to provide appropriate and holistic care to expecting mothers. Nurses can administer these screening tools to pregnant mothers and protect future generations from life-changing physical, cognitive, and psychosocial complications.

## Problem Statement

The prevalence of FAS can be decreased through early screening, patient teaching, and guidance among pregnant women who consume alcohol.

## Methods

An integrative review of relevant literature was used to support the problem statement. Between September and December 2022, relevant records were found using a keyword search of the following databases: MEDLINE, MEDLINE with Full Text, Academic Search Complete, CINAHL Complete, eBook Collection (EBSCOhost), Health Source: Nursing/Academic Edition, and Social Sciences Full Text. Search criteria included only peer-reviewed and academic journal articles published between 2017 and 2022. Keywords consisted of fetal alcohol syndrome, fetal alcohol spectrum disorders, prevalence, pregnancy, screening, assess\*, and TWEAK (Tolerance, Worries, Eye opener, Amnesia, and Cut down) screening (using the Boolean operators OR/AND). In total, the researchers of the current review initially identified initial 207 records.

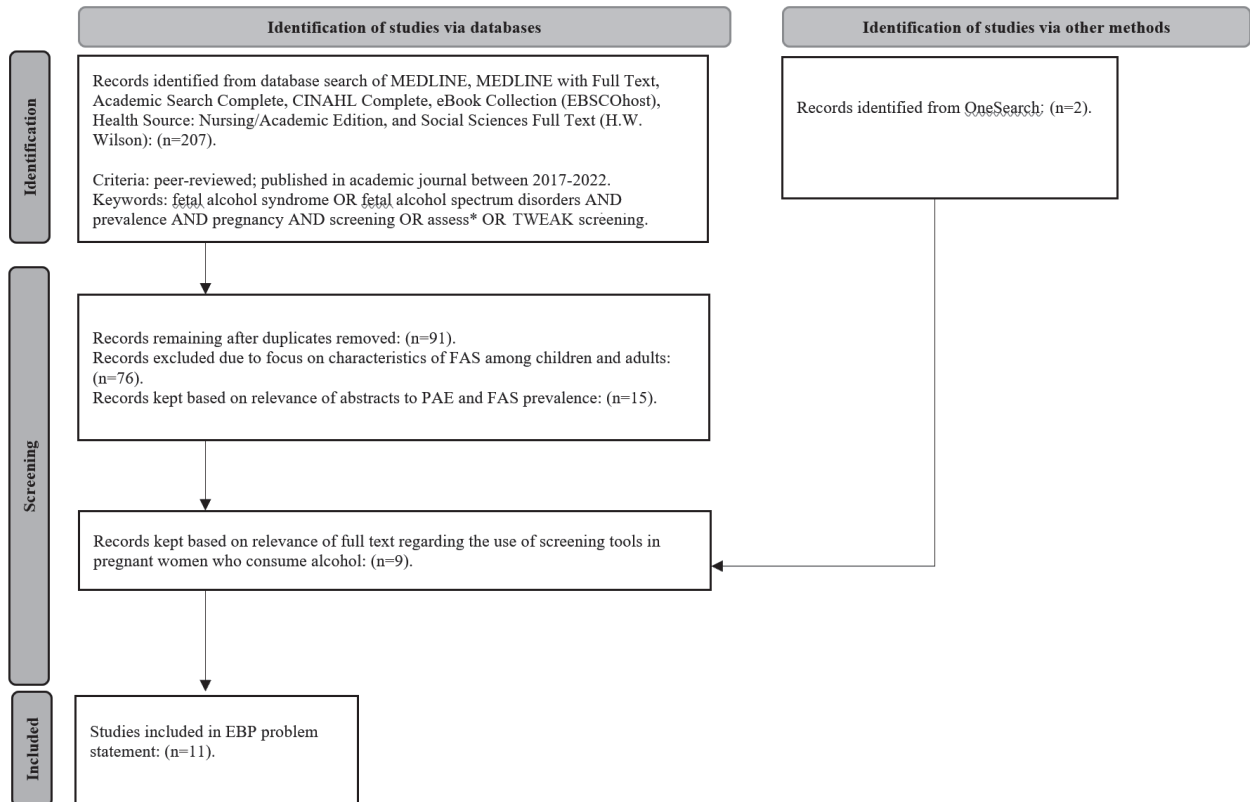
After duplicates were removed, 91 records remained. Following further screening of articles that focused on FAS among children and adults, the researchers excluded 76 additional records. Fifteen records were retained based on their relevance to PAE and FAS. Researchers of this current review examined the remaining 15 using full-text records for relevance to the use of screening tools in pregnant women who consumed alcohol. With this step, nine studies were determined to be useful and included in this integrative review.

In addition to the aforementioned database search, two records were added, identified through a search of the OneSearch database. Keywords used to conduct this search consisted of **pregnancy**, **alcohol**, and **prevention**. With the addition of these two studies, a total of 11 research studies were deemed relevant and appropriate for review. Figure 1 illustrates the search strategy used in this integrative review and how peer-reviewed articles were screened and pared down accordingly.

A conceptual classification was used in the integrative re-

Figure 1

## Search Strategy Diagram



Note: Adopted from Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLoS Medicine*, 18(3), e1003583-e1003583.

view to divide the articles into three subgroups: (1) articles that examined the efficacy of screening tools to identify at-risk and binge drinking (Carter et al., 2018; Cil, 2017; Denny et al., 2019; Moise, 2019; Præstegaard et al., 2018); (2) articles that suggested a structured approach to screening (Chiodo et al., 2019; Dozet et al., 2021; Hur et al., 2022; Poole et al., 2019); and, (3) articles that examined laboratory screenings (Breunis et al., 2021; Finanger et al., 2021).

The 11 research articles examined are summarized in Table 1 and organized according to the conceptual classification identified in the preceding paragraph. This table shows how each article relates to the problem statement. The summary of each research includes its design, sampling and the number of samples used, variables and findings, limitations, and other important findings and recommendations regarding the use of screening instruments to decrease the prevalence of FAS. The levels of evidence of the research studies examined in this integrative review include: one Level II, one

Level III, five Level IV, two Level VI, and two Level VII.

## Results

Among the 11 research reports examined in the current review, nine indicate that early screening for alcohol consumption in pregnant women indirectly leads to reduced FAS prevalence when paired with targeted interventions (Breunis et al., 2021; Carter et al., 2018; Denny et al., 2019; Dozet et al., 2021; Finanger et al., 2021; Hur et al., 2022; Moise, 2019; Poole et al., 2019; Præstegaard et al., 2018). One article emphasizes the importance of provider education, while another notes the effectiveness of alcohol warning signs (Chiodo et al., 2019; Cil, 2017).

The authors of this present review conclude that there is no single screening tool that is optimal for all populations of pregnant women (Breunis et al., 2021; Carter et al., 2018; Dozet et al., 2021; Finanger et al., 2021; Moise, 2019; Poole et al., 2019; Præstegaard et al., 2018). For example, the T-



**Table 1***Summary of Research Included in the Integrative Review*

Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
Research That Examined the Efficacy of Screening Tools to Identify At-Risk and Binge Drinking				
<p>Carter, R. C., Jacobson, S. W., Booley, S., Najaar, B., Dodge, N. C., Bechard, L. J., Meintjes, E. M., Molteno, C. D., Duggan, C. P., Jacobson, J. L., &amp; Senekal, M. (2018). Development and validation of a quantitative choline food frequency questionnaire for use with drinking and non-drinking pregnant women in Cape Town, South Africa. <i>Nutrition Journal</i>, 17(1), 108. <a href="https://doi.org/10.1186/s12937-018-0411-5">https://doi.org/10.1186/s12937-018-0411-5</a></p> <p>Level II</p>	<p>In this randomized control trial, 206 pregnant women were recruited in Cape Town with varying alcohol use patterns.</p> <p>Each participant was interviewed regarding alcohol and other substance use.</p> <p>To observe choline consumption, researchers then subjected participants to a 24-hour recall interview (reference method) in addition to the Choline-QFFQ.</p>	<p>The Choline-QFFQ was found to be reliable for 50% of the group-level tests and 80% of the individual-level tests in both the alcohol consumption group and the control group.</p> <p>The Choline-QFFQ was found to be valid for 60% of the group-level tests and 75% of the individual-level tests in the alcohol consumption group. In the control group, validity was achieved for 100% of the group-level and 100% of the individual-level tests.</p>	<p>24-hour recall interviews are subject to errors related to patients' inaccurate memory of their dietary intake.</p> <p>Interview fatigue could have caused patients to report reduced levels of choline consumption.</p> <p>Patients could have inaccurately represented their choline intake to shorten the Choline-QFFQ interview.</p>	<p>The Choline-QFFQ is useful in resource-poor communities to identify pregnant mothers who may become deficient in choline. The questionnaire can also indicate when choline supplementation is needed.</p> <p>Choline supplementation and early recognition of deficiency may help to reduce the adverse effects of PAE.</p>
<p>Cil, G. (2017). Effects of posted point-of-sale warnings on alcohol consumption during pregnancy and on birth outcomes. <i>Journal of Health Economics</i>, 53, 131–155. <a href="https://doi.org/10.1016/j.jhealeco.2017.03.004">https://doi.org/10.1016/j.jhealeco.2017.03.004</a></p> <p>Level IV</p>	<p>This case-control study illustrated the effectiveness of an alcohol warning sign (AWS) as a policy tool to reduce alcohol use among pregnant women.</p> <p>The data was obtained using the National Vital Statistics Natality Detail Files (NVS).</p>	<p>The independent variable studied was the implementation of AWS at the point of purchase of alcohol distributors. The dependent variables were alcohol use among pregnant women and standard measures of the health of the newborn child.</p> <p>The results showed that AWS laws decrease alcohol use among pregnant mothers, as seen by the Behavioral Risk Factor Surveillance System (BRFSS) data.</p>	<p>There was a multi-decade time gap between the states that adopted AWS laws earliest and those that implemented them last. Moreover, alcohol consumption data was not available for all of this time span.</p> <p>Although the study's statistical models adjusted for these limitations, a straightforward analysis was not possible.</p>	<p>The AWS warning can be the first client education tool in the real-world setting. AWS laws offer notable benefits regarding reduced PAE and improved birth outcomes.</p> <p>The health of the mother and child should be a bipartisan concern. States that do not have AWS laws should implement them.</p>

Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
<p>Denny, C. H., Acero, C. S., Naimi, T. S., &amp; Kim, S. Y. (2019). Consumption of Alcohol Beverages and Binge Drinking Among Pregnant Women Aged 18-44 Years - United States, 2015-2017. <i>MMWR. Morbidity and Mortality Weekly Report</i>, 68(16), 365-368. <a href="http://doi.org/10.15585/mmwr.mm6816a1">http://doi.org/10.15585/mmwr.mm6816a1</a></p> <p>Level VI</p>	<p>This descriptive survey focused on women aged 18-44 who were pregnant and reported drinking alcohol within the last 30 days.</p>	<p>The study divided the group into current drinking and binge drinking women.</p> <p>The results showed that the overall estimate of current drinking among pregnant women was about 12%, while binge drinking among pregnant women was about 4%.</p>	<p>The data was subject to inaccuracies related to maternal self-report and did not differentiate between alcohol consumption by trimester.</p> <p>Fewer than 50% of those surveyed responded. This response rate could have led to selection bias. Additionally, some data needed to be removed due to high standard errors.</p>	<p>As evidenced by the high levels of current- and binge drinking in pregnant women, more widespread alcohol screening and community-level interventions would be beneficial to the health of the mother and the fetus.</p>
<p>Moise, I. K. (2019). Alcohol use, pregnancy, and associated risk factors: A pilot cross-sectional study of pregnant women attending prenatal care in an urban city. <i>BMC Pregnancy and Childbirth</i>, 19(1), 1-7. <a href="https://doi.org/10.1186/s12884-019-2652-5">https://doi.org/10.1186/s12884-019-2652-5</a></p> <p>Level IV</p>	<p>In this cross-sectional design, 188 pregnant women aged 18 years and older were recruited from two public health clinics in Zambia. Systematic sampling was used to obtain the participants for the study. Every third woman attending their first prenatal visit was invited to participate.</p> <p>The participants completed the T-ACE screening tool and a five-item questionnaire designed to ascertain their drinking patterns during pregnancy and the periconceptual period.</p>	<p>The variables included in this study were maternal age at screening (years), gestational age at screening (weeks), number of times pregnant, maternal age of first alcoholic drink, employment status, marital status, education, religion, household income, emotional support, prenatal care, and prenatal care accessibility.</p> <p>The results of the study were categorized as “at-risk drinking during pregnancy,” (21.2%) and “at-risk drinking during the periconceptual period,” (17.7% and 3.2%) in the Kalingalinga and Mtendere samples, respectively.</p>	<p>Information provided by the participants could have been inaccurate due to participants incorrectly recalling their alcohol consumption during the periconceptual period.</p> <p>Because it was cross-sectional, the study could not prove causality between the lack of PAE screening and the high prevalence of at-risk drinking.</p>	<p>Based on the results of this pilot study, screening questionnaires such as the T-ACE are feasible for future national studies in Zambia.</p> <p>As evidenced by the high prevalence of at-risk drinking in the population studied, PAE screening and associated interventions could assist pregnant women in Zambia.</p> <p>It is recommended that women are educated on the risks associated with drinking during pregnancy.</p> <p>Providing greater access to prenatal services is important for implementing screening and reducing the prevalence of at-risk drinking.</p>

Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
<p>Præstegaard, C., Kesmodel, P. S., &amp; Kesmodel, U. S. (2018). Is TWEAK a valid screening questionnaire to identify alcohol risk drinkers among pregnant women in Denmark? <i>Acta Obstetrica et Gynecologica Scandinavica</i>, 97(4), 483–490. <a href="https://doi.org/10.1111/aogs.13314">https://doi.org/10.1111/aogs.13314</a></p> <p>Level IV</p>	<p>In this quantitative research design conducted at the Midwife Center at Aarhus University Hospital, 2053 Danish women participated in a face-to-face interview at their first routine prenatal care visit.</p> <p>Using the TWEAK and other questions, research midwives asked participants about their periconceptional alcohol consumption.</p>	<p>Variables analyzed in the participants included: maternal age, pre-pregnancy BMI, smoking status, marital status, length of school, higher educational level, employment, and TWEAK score.</p> <p>Women who continued to drink in their second trimester were included in the study.</p> <p>882 women reported a weekly alcohol intake of 3 drinks or less, and 327 reported drinking more than 7 beverages per week.</p> <p>Women in the periconceptional period were low-risk drinkers.</p>	<p>Alcohol consumption information was based on self-reported data, which could have been affected by recall bias or alcohol intake underreporting.</p> <p>TWEAK was administered after questions about the frequency and quantity of alcohol use. Thus, the women's responses could have been affected.</p> <p>Women who did not participate in this study could have been those who consumed more alcohol than those who did participate.</p>	<p>At the time of the study, there was no standardized guidance on asking women about alcohol consumption in Denmark.</p> <p>The TWEAK tool did not effectively identify at-risk drinking in a Danish population of pregnant mothers. However, the TWEAK has been more effective in high-risk drinking populations.</p> <p>Other screening tools, such as the T-ACE and AUDIT-C, have effectively recognized pregnant women considered to be at-risk drinkers.</p>

Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
Research That Suggested a Structured Approach to Screening				
<p>Chiodo, L. M., Cosmian, C., Pereira, K., Kent, N., Sokol, R. J., &amp; Hannigan, J. H. (2019). Prenatal alcohol screening during pregnancy by midwives and nurses. <i>Alcoholism, Clinical and Experimental Research, 43</i>(8), 1747–1758. <a href="https://doi.org/10.1111/acer.14114">https://doi.org/10.1111/acer.14114</a></p> <p>Level VI</p>	<p>In this descriptive study, 578 respondents from the national roster of the American College of Nurse-Midwives (ACNM) voluntarily participated in a survey. The sample consisted of certified nurse-midwives, nurse practitioners who specialized in women's health, and nurses with prenatal care experience.</p> <p>The questionnaire examined self-reported knowledge of FAS traits and prevalence, screening methods for women drinking while pregnant, and obstacles to screening and treatment.</p>	<p>37.7% of respondents agreed that it is acceptable to consume alcohol for at least 1 trimester of pregnancy.</p> <p>35.2% of respondents reported conducting screening for women who consume alcohol while pregnant.</p> <p>23.3% of respondents stated they use a screening tool.</p> <p>56% of respondents recommended sobriety to pregnant women who reported drinking.</p> <p>Respondents who screened their patients identified barriers such as time constraints and patient refusal.</p>	<p>The sample was self-selected and highly homogenous. Respondents were ACNM members and recruited via email. Intrinsic bias among the sample was a possibility but was not assessed.</p> <p>To maintain the respondents' anonymity, the study did not obtain unique identifying information. Consequently, a respondent could have completed the survey multiple times.</p>	<p>Respondents who know less about the risks of PAE are less likely to screen, provide education about alcohol's harmful outcomes, and promote alcohol cessation to expecting mothers.</p> <p>The authors recommend that all nursing curricula include specific training about the negative influence alcohol has on the fetus and the value of targeted screening tools.</p>
<p>Dozet, D., Burd, L., &amp; Popova, S. (2021). Screening for alcohol use in pregnancy: a review of current practices and perspectives. <i>International Journal of Mental Health and Addiction, 1</i>–20. <a href="https://doi.org/10.1007/s11469-021-00655-3">https://doi.org/10.1007/s11469-021-00655-3</a></p> <p>Level VII</p>	<p>This narrative review focused on women of childbearing ages 15-49 and the benefits of several screening tools.</p>	<p>The review divided screenings into the following levels:</p> <p>Level I: the simple questions concerning alcohol consumption that providers ask at the initial prenatal visit.</p> <p>Level II: the screening tools used to further assess the patient's alcohol consumption during pregnancy.</p> <p>Level III: blood, hair, placenta, or meconium samples tested to determine if there is alcohol in the patient's body.</p>	<p>Although the authors identified the databases searched, inclusion and exclusion criteria were not specified.</p> <p>The findings focused on countries with high income which limited the study to a specific type of class globally.</p> <p>Other important screening tools may still be in the process of testing and research to determine their efficacy.</p>	<p>Providers should implement screening tools across all countries regardless of socioeconomic status.</p> <p>Based on the characteristics of their patient populations, providers can choose from various alcohol screening tools that have been validated in pregnant women.</p> <p>Research should examine screenings that are being newly developed and compare their efficacy to older ones.</p>



Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
<p>Hur, Choi, J., Park, S., Oh, S. S., &amp; Kim, Y. J. (2022). Prenatal maternal alcohol exposure: Diagnosis and prevention of fetal alcohol syndrome. <i>Obstetrics &amp; Gynecology Science</i>, 65(5), 385–394. <a href="https://doi.org/10.5468/ogs.22123">https://doi.org/10.5468/ogs.22123</a></p> <p>Level VII</p>	<p>This narrative review summarized the epidemiology, pathogenesis, and diagnostic criteria for fetal alcohol syndrome (FAS).  The review subsequently made a series of recommendations for Korean obstetrician-gynecologists to prevent and diagnose FAS.</p>	<p>FAS is caused by maternal alcohol consumption from 3 months preconception to the end of pregnancy. FAS is influenced by the teratogenicity of alcohol and an individual’s genetic susceptibility to PAE.  Diagnostic criteria for FAS include: physical anomalies, intellectual disabilities, and a detailed history of PAE.  Globally, there is a 9.8% prevalence of FAS, estimated to be 14.6 per 10,000 people.</p>	<p>Inclusion and exclusion criteria were not specified for the review’s sources.</p>	<p>Determining a mother’s alcohol consumption, medical background, dietary habits, home dwelling, and significant other’s alcohol use is needed for FAS diagnosis.  Referring mothers to counselors and encouraging participation in future research can encourage proper FAS diagnosis and follow-up care.  Obstacles to future FAS research include selection bias and misclassification in medical databases, racial differences, and underreporting alcohol use due to the social stigma it poses. Moreover, assembling cohorts is expensive and difficult, as pregnant women rarely participate in these studies.</p>
<p>Poole, N., Schmidt, R. A., Bocking, A., Bergeron, J., &amp; Fortier, I. (2019). The potential for Fetal Alcohol Spectrum Disorder prevention of a harmonized approach to data collection about alcohol use in pregnancy cohort studies. <i>International Journal of Environmental Research and Public Health</i>, 16(11), 2019. <a href="https://doi.org/10.3390/ijerph16112019">https://doi.org/10.3390/ijerph16112019</a></p> <p>Level III</p>	<p>In this retrospective study, the authors examined alcohol-use data collection across 12 cohort groups of pregnant Canadian women, as well as Canadian alcohol screening and surveillance.  Subsequently, the study proposed data collection recommendations for future cohort designs.</p>	<p>Of the 12 cohort groups, 8 included a variable regarding alcohol use; however, there was no uniform time frame used.  10 out of 12 cohort studies obtained data about the frequency and quantity of alcohol consumed.  7 out of 12 cohorts were given questions about heavy alcohol use.  3 out of 12 cohorts were asked information about when they quit drinking.</p>	<p>Across the cohort groups examined, there was not a uniform approach to collect and record data on alcohol usage.  In the cohorts, women’s responses were based on self-report and could have been inaccurate.</p>	<p>In the research setting, investigators should use standardized categories to ask pregnant women about the frequency and quantity of alcohol consumption. Visual aids can be used to assist participant understanding.  Additionally, interviewers should be mindful that they ask questions concerning alcohol use in a sensitive and trauma-informed manner.  Data collection should focus on alcohol use before, during, and following pregnancy to enhance FASD prevention.</p>

Bibliographic Info and Level of Evidence	Type of Study and Population	Variables and Results	Possible Issues and Threats to Validity	Implications and Recommendations
Research That Examined Laboratory Screenings				
<p>Breunis, L. J., Wassenaar, S., Sibbles, B. J., Aaldriks, A. A., Bijma, H. H., Steegers, E. A. P., &amp; Koch, B. C. P. (2021). Objective assessment of alcohol consumption in early pregnancy using phosphatidylethanol: A cross-sectional study. <i>BMC Pregnancy and Childbirth</i>, 21(1), 342. <a href="https://doi.org/10.1186/s12884-021-03804-7">https://doi.org/10.1186/s12884-021-03804-7</a></p> <p>Level IV</p>	<p>This cross-sectional control study used PEth, a blood test that can detect low levels of alcohol intake in the last 2-4 weeks.</p> <p>The results of the blood test were then compared to self-reported alcohol consumption.</p>	<p>The study consisted of 992 women at a single-center study in the Netherlands. The study analyzed 684 pregnant women.</p> <p>The results showed that 1 in 19 women tested positive for consuming alcohol in the last two weeks, however underreported their alcohol use to their obstetric care provider.</p>	<p>The study was done in a tertiary medical hospital used for highly advanced/complex surgeries or treatments. This study did not include low risk pregnancies. Therefore, results may not be generalizable to the broader population.</p>	<p>Questionnaires that rely on self-report can lead to underreporting of maternal alcohol consumption. Due to perceived stigma or errors in memory, subjects may not accurately report their alcohol use.</p> <p>Because it provides objective data, PEth is a useful biomarker screening to detect PAE.</p>
<p>Finanger, T., Spigset, O., Gråwe, R. W., Andreassen, T. N., Løkken, T. N., Aamo, T. O., Bratt, G. E., Tømmervik, K., Langaas, V. S., Finserås, K., Salvesen, K. Å. B., &amp; Skråstad, R. B. (2021). Phosphatidylethanol as blood biomarker of alcohol consumption in early pregnancy: An observational study in 4,067 pregnant women. <i>Alcoholism, Clinical and Experimental Research</i>, 45(4), 886–892. <a href="https://doi.org/10.1111/acer.14577">https://doi.org/10.1111/acer.14577</a></p> <p>Level IV</p>	<p>In this prospective design, 4,067 women were included in a Rhesus (Rh) typing and antibody screening as a part of a Norwegian prenatal care program. Blood testing was performed for all women at week 12 and then again at week 24 for Rh-negative women.</p> <p>Samples were analyzed for the biomarker PEth. PEth can detect alcohol use up to 1 month after consumption.</p>	<p>Independent sample t- and chi-square tests were used to compare means and proportions respectively. P-values of less than 0.05 were statistically significant.</p> <p>Variables included mean age, residency (urban vs. rural), as well as PEth concentrations.</p> <p>0.5% variations of PEth values existed in the Spring and 1.9% in the Fall. In nonpregnant women, PEth showed a link to alcohol use.</p> <p>PEth was shown to be a positive identifier for heavy drinking, not for moderate/low drinking habits.</p> <p>1.4% of pregnant women had a significant PEth value around week 12 of pregnancy and 0.4% of pregnant women around week 24.</p>	<p>There was a lack of self-reported information on alcohol use, since the ethics committee did not grant permission to gather this data.</p> <p>The study did not match PEth concentrations to a specific amount of alcohol use or to perinatal outcomes.</p>	<p>A positive PEth test is a valuable marker that can promote maternal education during periconceptual periods.</p> <p>A positive PEth result can raise the reliability of a FAS or FASD diagnosis.</p> <p>More research is needed to identify PEth concentrations that correspond to harmful levels of alcohol consumption and to undesirable perinatal outcomes.</p>

ACE (Tolerance, Annoyance, Cut down, and Eye opener) and TWEAK (Tolerance, Worries, Eye opener, Amnesia, and Cut down) are useful to identify at-risk and binge drinking; the 1-Step Questionnaire for initial screening of mothers for alcohol use; the AUDIT-C for exploring FAS prevention; and phosphatidylethanol (PEth) for combating underreporting. For review purposes, these screening tools are described in terms of their components and respective processes of administration.

The one-question screen is a fast and effective way of asking about the last time a person had an alcoholic drink and does not require any higher-level training for a provider to administer (Dozet et al., 2021, p. 8). The 4P Plus (Parents, Partners, Past, Pregnancy) is a tool used to ask patients to answer four questions identifying whether they have had any difficulties in the past due to alcohol or drugs, if their parents or partner have had any problems with alcohol or drug use, or if they (themselves) have used any alcohol or drugs in the past month (Dozet et al., 2021, p. 9). The Alcohol Use Disorders Identification Test (AUDIT) is a screening tool that identifies alcohol intake patterns, problems, and behaviors among pregnant women. It includes questions such as how often a mother has had a drink containing alcohol, how many of these drinks she has consumed in a day, and how many times she has had more than five drinks on one occasion during the perinatal period (Poole et al., 2019, p. 4). Other questionnaires, such as the T-ACE and TWEAK, have been designed to counteract underreporting of alcohol use. Instead of focusing directly on drinking patterns, i.e., quantity and frequency, these tools gauge PAE by inquiring about indicators of potential problems with alcohol consumption (Poole et al., 2019, p. 5). The T-ACE is used to ask the patient how many alcoholic drinks they can tolerate, if they have felt annoyed by criticism of their drinking, if they have felt the need to reduce their drinking, and if they have needed to drink immediately after waking. The TWEAK is similar, with the addition of a question about relatives or friends who may have expressed worry over the patient's drinking habits (Moise, 2019, p. 2; Præstegaard et al., 2018, p. 487). According to Denny et al. (2019, p. 2) and Cil (2017, p. 133), the Behavioral Risk Factor Surveillance System (BRFSS) is a beneficial questionnaire that asks about the amount and frequency of alcohol intake over a 30-day period. Because this questionnaire is administered over telephone, mothers may be more forthcoming with their responses to the telephone survey, despite the inclusion of demographic information (i.e., pregnancy status). The Choline-Quantitative Food Frequency Questionnaire (Choline-QFFQ) is a tool that looks at choline intake rather than alcohol consumption. However, it is also useful for FAS prevention, because choline is recognized as a nutrient that can mitigate alcohol's teratogenic effects on the fetus. If a patient is identified to have choline deficiency using the Choline-QFFQ tool, mothers can then be educated on dietary modifications or supplementation

(Carter et al., 2021, p. 2). Other methods, such as testing for the PEth biomarker, have shown greater accuracy and fewer biases compared to self-reported alcohol consumption (Finanger et al., 2021, pp. 887-888; Breunis et al., 2021, p. 2). Although the aforementioned screening tools were found to be reliable, no Cronbach's alpha were reported in any of the studies reviewed.

The sub-sections that follow explain the details of screening tool applications according to the conceptual subgrouping determined for this review: screening tools for at-risk and binge drinking, structured approach to screening, and laboratory tests.

### Screening Tools for At-Risk Drinking and Binge Drinking

PAE is a major public health concern in populations around the world. Nearly 10% of pregnant women are reported to consume alcohol, and almost 15 out of 10,000 of those in the general population have FAS (Hur et al., 2022, p. 385). While the overall administration of the screening tools to identify PAE and prevent FAS is desirable, the choice of the optimal tool varies based on the population being screened (Dozet et al., 2021, p. 13; Moise, 2019, p. 2; Præstegaard et al., 2018, p. 484).

Research shows that women of lower socioeconomic status, including a variety of historically disadvantaged ethnic and cultural minorities, as well as women in Sub-Saharan countries, have a particularly high risk for alcohol consumption and binge drinking during pregnancy (Carter et al., 2018, p. 2; Denny et al., 2019, p. 366; Dozet et al., 2021, pp. 2-3; Moise, 2019, p. 2). For example, in Sub-Saharan African countries such as Zambia and the Republic of South Africa, where prenatal care is lacking, the prevalence of FAS has been reported to be as high as 80 per 10,000 (Carter et al., 2018, p. 2; Moise, 2019, p. 2). In these populations where drinking is prevalent, targeted PAE screening using the T-ACE and TWEAK tools can identify alcohol consumption well. Studies examining women in Zambia have supported the use of the T-ACE to detect both at-risk and binge drinking. At-risk drinking was delineated as daily intake of one or more ounces of alcohol during pregnancy, and binge drinking as a single episode of consuming four or more alcoholic drinks (Moise, 2019, p. 3). Furthermore, the Choline-QFFQ can be useful as a supplemental screening questionnaire in socioeconomically disadvantaged populations such as Cape Town, where choline deficiency has been reported as high as 90%. Choline intake is vital to support both maternal health and reduce the teratogenic effects of alcohol (Carter et al., 2021, p. 2).

In the US, alcohol use and binge drinking among pregnant women are relatively high. As measured by the BRFSS, women reported current and binge drinking at nearly 12% and 4%, respectively (Denny et al., 2019, p. 365). To meet

the needs of the US population, the American College of Obstetricians and Gynecologists (ACOG) recommends that clinicians augment validated tools like the T-ACE with questions to document the quantity and frequency of alcohol use, as well as administer them yearly and within the first three months of pregnancy (Dozet et al., 2021, p. 9).

The T-ACE and TWEAK screening instruments have been optimized to identify pregnant women who engage in heavy drinking. Consequently, these tools were found to be substandard in populations where PAE was less likely (Dozet et al., 2021, p. 8; Præstegaard et al., 2018, p. 489). In a Danish setting, for example, the sensitivity of the TWEAK was low (Præstegaard et al., 2018, p. 487). In contrast to Sub-Saharan countries or the US, the Netherlands has a relatively low incidence of PAE measured at 4% (Breunis et al., 2021, p. 2). Because of their low sensitivity in these settings, using these tools in countries such as the Netherlands can only identify a few mothers who consume alcohol.

### Structured Approach to Screening

In a structured approach, as recommended by the Society of Obstetricians and Gynecologists of Canada (SOGC), screening for PAE was conducted in a series of steps to stratify women according to their risk and to better manage clinicians' time (Chiodo et al., 2019, p. 1754; Dozet et al., 2021, p. 9; Hur et al., 2022, pp. 386-388; Poole et al., 2019, pp. 3-4). According to this framework, healthcare professionals first used standard questions to determine which women needed additional screening using a validated tool (Dozet et al., 2021, p. 9; Hur et al., 2022, p. 386).

In the first step of screening, clinicians can quickly and immediately screen for alcohol risk during prenatal visits by using the 1-Question screen. Dozet et al. (2021, p. 8) reported that the 1-Question screen required the clinician only to ask when the patient last consumed alcohol. This screen compared favorably to the T-ACE almost 95% of the time (Dozet et al., 2021, p. 8). Then, clinicians would choose from a variety of more detailed questionnaires, and their recommendations varied depending on the set of practitioner guidelines examined (Dozet et al., 2021, pp. 9-10). The TWEAK, T-ACE, AUDIT-C, and 4Ps Plus have been validated among pregnant adults (Dozet et al., 2021, pp. 13-14; Præstegaard et al., 2018, p. 484). The 4Ps Plus questionnaire detected non-heavy alcohol consumption among pregnant women that yielded both sensitivity and specificity rates above 75% (Dozet et al., 2021, p. 8; Poole et al., 2019, p. 5). Any of the screening tools mentioned above can be administered in less than 15 minutes, even by those without clinician training (Chiodo et al., 2019, p. 1755; Dozet et al., 2021, p. 9).

Certain structured screening tools are beneficial not only in the clinical context but also to guide research on FAS

prevention. One of the barriers to current research on FAS prevention is that large numbers of pregnant women are unlikely to volunteer to participate in research that examines drug or alcohol use; consequently, many cohort studies examining PAE have small sample sizes (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 887; Hur et al., 2022, p. 390; Poole et al., 2019, pp. 2-3). To better analyze the data for FAS prevention, it is beneficial for researchers to use the same screening tools across these studies (Hur et al., 2022, p. 390; Poole et al., 2019, pp. 2-3). Poole et al. (2019, p. 4) recommend standardized screening tools such as the AUDIT-C for FAS prevention research. The AUDIT-C does not differentiate between alcohol use before or after conception but makes up for this shortcoming with its focus on these elements: how often the patient drinks alcohol; the quantity of standard-sized alcoholic beverages they typically consume per day; and the number of times they consume more than five drinks on a single occasion (Dozet et al., 2021, pp. 8-9; Poole et al., 2019, p. 4). To further improve consistent data collection, the AUDIT-C can be augmented with pictorial representations of the size of a standard drink (Poole et al., 2019, p. 10). In contrast to the clinical setting, where healthcare professionals can simply identify women at risk for PAE and refer them for the appropriate interventions, FAS prevention researchers must understand the harmful levels of alcohol exposure, and document both the quantity and frequency of alcohol consumption (Dozet et al., 2021, p. 14; Poole et al., 2019, p. 5). While the T-ACE, TWEAK, and 4Ps Plus are validated with pregnant women and can identify problematic alcohol use, they are not optimal for FAS prevention research (Poole et al., 2019, p. 5). For this purpose, AUDIT-C is particularly well-suited.

### Laboratory Screening

Prenatal care providers can reduce maternal underreporting in questionnaires by developing rapport with their clients across multiple prenatal visits and alcohol-use assessments. Dozet et al. (2021, p. 12), however, found that underreporting can still result. The use of ethanol biomarkers is therefore important in objectively identifying alcohol use (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 887).

Meconium testing is considered the gold standard for capturing PAE. But this test is most significant towards the late stages of pregnancies, and mild alcohol exposure that occurs early in pregnancy can be missed (Dozet et al., 2021, p. 12). In contrast, multiple studies have suggested that PEth testing via blood sample is a feasible method to identify alcohol consumption before the 15th week of gestation (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 887). PEth can detect small levels of alcohol use from the previous two to four weeks (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 890). While the threshold of detection and lower limit of quantification have been as small as 3.0 and 2.0 micrograms per liter respectively, further studies are needed to identify



levels of PEth that correspond to harmful levels of prenatal alcohol consumption (Breunis et al., 2021, p. 2; Finanger et al., 2021, pp. 887-888). In a study conducted with 684 samples at the largest tertiary hospital in the Netherlands, 5.3% tested positive for PEth, an indication of alcohol use in the past two weeks. Out of these respondents, 89% failed to reveal alcohol consumption when interviewed by their obstetric care provider (Breunis et al., 2021, p. 5). While laboratory screening tools can offer an objective gauge of PAE compared to maternal self-report, the routine use of biomarker testing is also much more resource-intensive (Dozet et al., 2021, p. 10). The cost-effectiveness of laboratory screening must be considered as it appears that PEth blood testing can serve as a useful alternative to questionnaires or surveys that are hindered by maternal underreporting.

### Discussion

This current integrative review found that early screening for PAE is a cost and time-efficient means of identifying at-risk women and preventing FAS (Chiodo et al., 2019, p. 1748; Denny et al., 2019, pp. 367-368; Dozet et al., 2021, p. 3). FAS and its related adverse outcomes create a large economic burden, which screening can ameliorate. Globally, it costs more than \$22,000 on an annual basis to care for a person with FAS. In contrast, preventing one case of FAS costs only 3% of this amount (Dozet et al., 2021, p. 3).

As early as the first prenatal care encounter, it is useful to ask standard questions that assess clients' pre-pregnancy and current alcohol use (Dozet et al., 2021, pp. 4-11). Medical organizations such as the American Academy of Pediatrics and the Korean Society of Obstetrics and Gynecology emphasize the need for practitioners to consider the drinking pattern of women three months before conception, as it is predictive of drinking into the first trimester (Hur et al., 2022, p. 390).

Nine out of the 11 research studies examined in the current review indicate that early screening for alcohol consumption in pregnant women indirectly leads to reduced FAS prevalence when paired with targeted interventions (Breunis et al., 2021; Carter et al., 2018; Denny et al., 2019; Dozet et al., 2021; Finanger et al., 2021; Hur et al., 2022; Moise, 2019; Poole et al., 2019; Præstegaard et al., 2018). Among the two remaining articles, one focuses on provider education regarding PAE, while another research demonstrates the effectiveness of alcohol warning signs (Chiodo et al., 2019; Cil, 2017).

Healthcare professionals can pair several targeted interventions with early screening. These interventions include counseling regarding the risk of alcohol use, educating about optimal nutrition, and offering healthcare referrals (Dozet et al., 2021, pp. 11-13). Although these interventions may warrant further study, their efficacy was outside the scope of

the current review. Instead, the current review focused on how healthcare professionals can best select and administer screening tools to reduce the prevalence of FAS. This present research found that providers should weigh the needs of their particular patient population when selecting a screening tool because there is no single instrument that is optimal for all populations (Breunis et al., 2021; Carter et al., 2018; Dozet et al., 2021; Finanger et al., 2021; Moise, 2019; Poole et al., 2019; Præstegaard et al., 2018).

When selecting a screening device, one of the critical characteristics that healthcare professionals should consider is the prevalence of at-risk or binge drinking among their patients. In Sub-Saharan African countries such as Zambia and the Republic of South Africa, where prenatal care is lacking and the prevalence of FAS is high, PAE screening with the T-ACE and TWEAK can identify at-risk and binge drinking effectively (Carter et al., 2018, p. 2; Moise, 2019, p. 2). Additionally, the Choline-QFFQ screening questionnaire is helpful for these financially disadvantaged populations where choline deficiency is widespread (Carter et al., 2021, p. 2). The American College of Obstetricians and Gynecologists (ACOG) similarly recommends the T-ACE in the US where alcohol use and binge drinking among pregnant women are also relatively high (Dozet et al., 2021, p. 9). These screening tools, however, are not as effective in populations with lower at-risk drinking rates during pregnancy. In these populations, the TWEAK tool may have low sensitivity and may also fail to identify pregnant women with PAE. This finding was reported in a research study conducted in the Netherlands, a country with a relatively low incidence of PAE (Præstegaard et al., 2018, p. 487). Because of the varying effectiveness of screening questionnaires between different demographics, it is suggested that clinicians and healthcare professionals tailor their choice of screening tools to the at-risk and binge-drinking characteristics of their patient population.

Healthcare professionals can also select screening tools based on the demands of their clinical or research needs. In the clinical setting, providers must efficiently determine if a client is at risk for PAE and refer them for appropriate interventions (Dozet et al., 2021, p. 14; Poole et al., 2019, p. 5). To do so, they can stratify their screening into two stages. In the first step, questionnaires, such as the 1-Question Screen, can be used to quickly identify when a client last consumed alcohol and if a more detailed alcohol screening questionnaire is warranted (Dozet et al., 2021, p. 8). In the second step, the provider can choose from multiple screening questionnaires which have been validated among pregnant adults; these questionnaires include TWEAK, T-ACE, AUDIT-C, and 4Ps Plus (Dozet et al., 2021, pp. 13-14; Præstegaard et al., 2018, p. 484). For studies on FAS prevention, researchers must be aware of the quantity and frequency of alcohol consumption that leads to teratogenic effects. This informa-

tion can then be related and analyzed with multiple cohorts (Dozet et al., 2021, p. 14; Poole et al., 2019, p. 5). In their research, Poole et al. (2019, pp. 9-10) recommended that future FAS prevention studies use the standardized AUDIT-C questionnaire with a pictorial representation of the size of a standard drink.

Finally, healthcare professionals should consider the likelihood of underreporting when selecting a screening tool. Questionnaires and survey methods that measure PAE by eliciting maternal self-report have been shown to underestimate actual alcohol intake (Breunis et al., 2021, p. 2; Cil, 2017, p. 133; Denny et al., 2019, p. 367). Underreporting can be attributed to a patient's inaccurate recall of their alcohol-use pattern, perceived social stigma associated with PAE, or legal implications that may result in child custody loss (Breunis et al., 2021, p. 2; Dozet et al., 2021, p. 12; Finanger et al., 2021, p. 887). Multiple studies have suggested that PEth testing via blood sample is a feasible method to identify alcohol consumption before the 15th week of gestation (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 887). PEth testing can detect small levels of alcohol use from up to 2 - 4 weeks prior (Breunis et al., 2021, p. 2; Finanger et al., 2021, p. 890). While it is more costly than using questionnaires alone, providers should consider PEth blood testing as an option to objectively identify PAE when maternal underreporting is suspected.

When utilizing any of the aforementioned screening tools, healthcare professionals must have the skill and comfort level to discuss alcohol use with pregnant women. While women sometimes feel stigmatized about alcohol use during pregnancy and consequently underreport their behavior, studies have shown that most pregnant women are accepting of questions about alcohol use (Chiodo et al., 2019, p. 1755; Dozet et al., 2021, pp. 11-12; Poole et al., 2019, p. 2). Additionally, healthcare professionals should understand that PAE and FAS often recur generationally. The correct use of PAE screening tools can help prevent a woman from consuming alcohol in future pregnancies and prevent multiple cases of FAS (Dozet et al., 2021, p. 11).

### Limitations

Although there were strengths in each study, each research article presented with some important limitations. Of the 11 articles selected, five considered the risk of recall bias due to self-report as a limitation. Recall bias can occur when a respondent cannot remember a previous event or action, or fails to fully disclose the information. In a study by Carter et al. (2018), participants were required to fill out a QFFQ regarding their past choline intake. Conducting a 24-hour dietary recall interview could yield inaccurate results due to participants' inability to recall precisely what they ate. The inability to recall information imposes a significant issue with the integrity of the data. Denny et al. (2019) relied

on self-reported data from pregnant women who engaged in current and binge drinking. In these studies, the recall bias of subjects was strongly linked to subsequent maternal underreporting of alcohol use. In a cross-sectional study, Moise et al. (2019) examined prenatal care in urban clinics in Zambia and concluded that there was a perceived social stigma surrounding alcohol use during pregnancy. This research study relied on participants' self-report of alcohol use before and during pregnancy. Some participants in the study failed to remember the extent of their prior alcohol consumption, possibly skewing the research data. Similarly, Præstegaard et al. (2018) found that self-reporting by participants increased the risk of recall bias which led to lower estimates of alcohol use. Poole et al. (2019) also noted the challenge of recruiting pregnant women to participate in research that required sharing their alcohol-use behaviors.

### Conclusions

The objective of this integrative review was to identify if early screening, patient teaching, and guidance among pregnant women who consume alcohol could decrease the prevalence of FAS. Two of the articles examined focused on either provider education or alcohol warning signs. Nine out of the 11 articles indicated that early screening for alcohol consumption in pregnant women indirectly led to reduced FAS prevalence when paired with targeted interventions.

When healthcare professionals use screening tools early in patients' pregnancies, they are able to identify appropriate interventions to decrease alcohol consumption. Research shows the importance of data collection regarding problematic alcohol use not only during pregnancy but as early as three months before pregnancy (Breunis et al., 2021; Carter et al., 2018; Denny et al., 2019; Dozet et al., 2021; Finanger et al., 2021; Hur et al., 2022; Moise, 2019; Pool et al., 2019; Præstegaard, 2018). Findings show that in resource-poor countries and populations, there is an increased need for developing and implementing screenings and interventions to prevent and reduce alcohol use during pregnancy. Screenings, blood tests, and targeted interventions have been shown to lower alcohol use during pregnancy. This reduction has resulted in a lower prevalence of FAS (Breunis et al., 2021; Carter et al., 2018; Denny et al., 2019; Dozet et al., 2021; Finanger et al., 2021; Hur et al., 2022; Moise, 2019; Pool et al., 2019; Præstegaard et al., 2018).

When using screening tools, providers assume that participants are being truthful in their responses. However, there is no definitive way of knowing whether they are or not. Because PEth is an objective biomarker sensitive to low levels of alcohol in the blood, this current review posits that PEth should be considered as a validated method to detect alcohol use during pregnancy (Breunis et al. 2021, p. 1). Research shows the importance of providers not only using screening questionnaires but also blood tests to obtain a more reliable

determination of alcohol consumption (Breunis et al., 2021; Finanger et al., 2021).

This present research also shows that pregnant mothers who abuse alcohol are particularly vulnerable because of its accessibility and availability. Early screening, health education, and intervention for susceptible pregnant mothers are essential services that healthcare professionals must provide to prevent alcohol consumption among this population, promote healthy pregnancies, and lower the incidence of FAS.

### Recommendations

This integrative review describes a variety of screening tools and biomarkers available, but also presents challenges. Healthcare professionals must be educated on which screening instruments are appropriate for their particular patient population. Continuing education and annual competencies for professionals who administer these screening questionnaires or biomarker tests are important to guide quality and safe practice to detect PAE and prevent FAS. All populations deserve proper treatment during pregnancy; screening questionnaires and PEth blood tests must be made available to all pregnant patients, regardless of socioeconomic status. The government should support and fund this service in order to facilitate success. While biomarker tests can be indicative of PAE, further research is needed to determine blood levels of PEth associated with FAS. Future research should also examine the cost-effectiveness of implementing PEth blood testing in resource-poor communities.

Some research studies (Chiodo et al., 2019; Dozet et al., 2021) cite the time constraints on providers and the stigma associated with alcohol consumption among pregnant women as significant barriers to regular PAE screening. Further research should be conducted on routine periconceptional administration of validated screening questionnaires by nurses. Nurses play an important role in screening these patients and can streamline prenatal visits and care. Alcohol use in women before pregnancy has been shown to predict alcohol use during pregnancy. Routine periconceptional alcohol screening by nurses will increase the identification of problematic drinking before pregnancy, improve client-provider relations, reduce the stigma linked with alcohol use during pregnancy, increase the reliability of clients' self-reported alcohol use, and decrease the incidence of FAS and other complications.

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