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## Editor's Perspective

### Health Screening: Let's All Talk the Talk and Walk the Walk

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The World Health Organization and the International Agency for Research on Cancer (IARC) designated the month of January as the Cervical Cancer Awareness Month. Globally, an estimated 604,000 women were diagnosed with cervical cancer, and approximately 342,000 women died from this disease (IARC, 2022). For decades, the IARC has been at the forefront to curb the global burden of cervical cancer, which disproportionately affects women (~90% incidence and mortality rates) living in the middle- and low-income countries. This year, the IARC lauded three projects impacting cervical cancer care outcomes. These projects included innovative interventions in the areas of (a) vaccination against high-risk types of human papillomavirus (HPV), the causative agent of most cases of cervical cancer; (b) treatment of cervical precancerous lesions in a resource-constrained setting; and (c) better coverage of cervical cancer screening programs in at-risk populations.

In this issue of JNPARR, the readers will find two poignant articles highlighting the importance of health screening to detect colorectal and breast cancers (Lapiz-Bluhm & Cabungcal, 2022) and hypertension (Lapiz-Bluhm et al., 2022) as early as possible to tackle the high morbidity, mortality, and cost of care associated with these diseases. Furthermore, the staggering prevalence rate of HTN among Filipino Americans ranging from 70 % to 74 %, sends an alarming message to all healthcare providers about the looming incidence of stroke and cardiovascular events in this at-risk patient population. Everyone could not agree more with the articles' authors that there is a dire need for a concerted effort to develop culturally appropriate interventions that can improve health screening and health promotion practices among Filipino Americans. As the Program Director for the Doctor of Nursing Practice focused on primary care of children, adults, older adults, and the family, I can foresee the critical role of doctorally-prepared nurse practitioners in utilizing evidence-based interventions that can promote and sustain health screening and health promotion practices among Filipino Americans. The DNP-prepared primary care nurse practitioners are educated and trained in advanced practice nursing, scientific inquiry, healthcare informatics, policy analysis, advocacy, and organizational leadership. Thus, they are well-poised to provide quality patient care, develop and implement innovative healthcare solutions, evaluate program outcomes, and transform patient care delivery and healthcare systems, particularly in highly preventable diseases.

At the individual level, each can be a role model to our friends, families, relatives, colleagues, and peers by talking the talk and walking the walk. We must follow the guidelines for health screening and disease prevention issued by the US Preventive Services Task Force (USPSTF, 2021).

Let us all respond to the call for action by getting vaccinated whenever applicable, getting timely screening for early detection and prevention of disease spread, and getting tested and diagnosed early for better disease outcomes.

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## President's Message

### The "Great Resignation" and Our Collective Spark

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It is now over two years since the SARS-COV-2 virus spread its infection, impacting the healthcare community globally and touching each one of us at a personal level. The Philippine Nurses Association of America (PNAA) created the COVID-19 Task Force on April 3, 2020, in the hopes that the COVID-19 surge is a temporary crisis. Unfortunately, that is not the case. Despite of the COVID-19 vaccine released to the public in early 2021, only a total of 63% percent of people (208.75 million) is fully vaccinated in the United States as of January 19, 2022 (Our World in Data, 2022). Our organization worked alongside the Asian Pacific Islander American Health Forum together with its partner organizations in educating healthcare workers and the community on how to prevent the spread of SARS-COV-2 virus based on the Centers for Disease Control (CDC) guidelines. Through our community partners and resources, PNAA Foundation and PNAA translated health materials in Tagalog and Ilokano. The translated content compared the signs and symptoms of Flu with SARS-COV-2 and included facts on the importance of vaccines to build immunity.

Despite these efforts, world leaders realized that the dissemination and communication of COVID-19 information must highlight facts not myths. According to Dr. Tedros, Director-General of the World Health Organization, "We're not just fighting an epidemic; we're fighting an infodemic where fake news spreads faster and more easily than this virus and is just as dangerous." Through our grant funding, PNAA created a podcast, RISE UP (Real Issues and Stories of Everyone and Us Podcast) to bring in the knowledge of clinical experts and empower the audience to differentiate misinformation and help people make their own choice based on facts. We interviewed trusted leaders in our Filipino-American community from nurses and medical doctors who shared their expertise and personal stories on what is happening in the ground. As public health stewards, this responsibility to curate information through webinars, translated health materials, and podcast will hopefully propagate as people can now have an alternative source of reliable information from trusted experts that represent the interest of our Filipino American community.

Two years from the onset this pandemic, COVID-19 persisted in its mutation with the Omicron variant. With this latest variant, our healthcare administrators and nursing leaders are stretched to their capacity to find creative strategies to retain and recruit burn-out health care workers. Nurses and essential workers go on quarantine due to exposure, others getting sick and worse, quitting, or leaving the workplace for alternative work-life integration offered by traveling and float pool staffing agencies. The socio-economic impact on the hotel and hospitality and entertainment industries continues as they strived to recover and open the doors of their business establishments despite the constant changes with the masks/social distancing guidelines. The ambivalence, strong opposing views between political parties have led to an almost widespread sentiment expressed by thought leaders as the "great resignation." According to Thompson (2022), the term "great resignation" was coined by Anthony Klotz, a professor from Texas A&M whose prediction for 2021 framed a mass exodus from the workforce.

What is the great resignation within the context of nurses and healthcare professionals?

Within the context of our current times and COVID-19, the scientific community are pivoting on their views that COVID-19 will become an endemic. CDC describes an epidemic as an unexpected increase in the number of disease cases in a specific geographical area whereas, the World Health Organization declares a pandemic when the disease's growth is exponential and the virus covers a wide area and affects several countries and populations (Columbia Mailman School of Public Health, 2021). The WHO defines the epidemic, pandemic, and endemic based on the disease's rate of spread. With COVID-19, the expectation is that this will become an endemic which means that the pandemic will not end with the virus disappearing but rather, that people will gain immune protection from vaccination and from natural infection such as that there will be less transmission which leads to lesser COVID-19 related hospitalization and death even if the virus continues to circulate (Harvard T. H. Chan, 2021). The 'great resignation' that SARS-COV-2's presence is permanent yet remains invisible and could still be deadly (vaccinated or not) challenges our vulnerability and ability to re-calibrate our daily habits, personal interaction, health choices, circle of friends, and workplace environment.

Despite the great resignation, JNPARR's Editorial Board spearheaded by our Editor-in-Chief Dr. Cynthia Ayres, remained resilient. We are extremely grateful for the contributions of our authors in Volume 12 Number 1, showcasing a variety of

research topics centered on top health concerns for Filipino-Americans: hypertension and cancer. Two topics look at pediatric issues related with lead and the utility of urine samples as biomarkers while there are two articles on patient education and practice. This gives me hope that our frontline nurses, educators, and researchers transformed this time of “great resignation” as a moment of “great opportunity” by focusing on their body of work and contributing to new knowledge. Many of us have also resigned and adopted to the new normal. Personally, I know that my “old self” remains intact in terms of my own aspirations, my desire to continue to lead our organization, in staying resilient and hopeful.

On one hand, the great resignation within the context of nursing shortage depleted everyone’s energy but revitalized the recruitment world to offer alternatives from bonus incentives and flexible work schedules. COVID-19 brought into the forefront the cyclical problem of the healthcare industry’s reliance on internationally educated nurses (IEN) during shortage. This highlighted America’s educational system who fall short in growing a pipeline of nurses to address the demands and the need for more faculty, and grants and scholarships to attract the younger generation to go into nursing. The harsh reality that cold cash will solve the staffing crisis sounds counter-intuitive to the tenets of nursing as a caring profession, but this also attracted second-career options for other individuals who are bringing their diverse skills in marketing, computer science, arts, and design. This gig economy where healthcare workers become free agents presents an opportunity for the staffing industry to offer options to low-income workers to switch jobs and make more money. As staffing experts venture into the space of virtual nursing to augment the nursing shortage, I hope that individuals particularly our nurses, profit from this great resignation in a positive and equitable manner and reimagine how we can transform our nursing profession without causing additional brain-drain to our homeland.

The Year 2022 offers challenges and opportunities for PNAA as we are pulled into different ways to meet our members’ needs and recruit new members. Some of our chapters are going through their own moments of ‘great resignation’ as they struggle to retain members. With the national election coming up in May 2022, some chapter leaders are at a cross-road whether to volunteer and serve on top of competing priorities and family responsibilities. PNAA have offered incentive-based opportunities to promote engagements from membership raffles, to iPad, and gift cards. Our committees have worked hard through this pandemic offering new programs from master class workshops to self-help webinars. We delivered world-renowned speakers at the comfort of your homes. PNAA’s collaborative partnerships with mainstream organizations helped us navigate the challenges brought by the pandemic from Anti-Asian hate crimes to addressing health inequities. I hope that our chapter leaders see these great opportunities to amplify PNAA’s work and share why it is significant to continue membership to PNAA.

With less than six months remaining in my term as the 21st President of PNAA, my priority continues to focus on our “Heal our Nurses” campaign in addressing the psychosocial needs and overall mental well-being of our members. I hope that we can look back together five years from now, on how we brought our strong and empowered voices through our stories memorialized not only in our publications but in the meaningful relationship and network that we formed during this unprecedented crisis. My wish at the end of my term is for our members to agree that “WE have overcome the great resignation in our collective stories of achievement, resilience and kindness” through our shared spark amidst the crisis.

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# Cancer Screening Promotion among Filipino Americans: A Systematic Review to Inform Clinical Practice and Research

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The authors declare that there is  
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## Abstract

**Background:** Low cancer screening rates among Asian Americans may contribute to cancer as the leading cause of death in these minority populations. Filipino participants of a patient-centered outcomes research project in California, Hawaii, Texas, New Jersey, and New York reported that cancer is a priority healthcare issue. Early cancer detection through screening significantly influences the timing of cancer diagnosis and prognosis.

**Objective:** This systematic review synthesizes research evidence from interventional studies to promote cancer screening among Filipino Americans.

**Methods:** Five databases (Scopus, CINAHL, Ovid, PsycInfo, and PubMed) were searched on July 2020, with a time exclusion of ten years, using the terms: Filipino Americans, cancer screening, and promotion for relevant research articles. Twelve articles met the criteria and were included.

**Results:** The studies described colorectal cancer (CRC) and breast cancer screening promotion initiatives among Filipino Americans and Asian Americans (including Filipinos). CRC screening promotion studies included the Filipino Health Study in California, CRC2 Study, Lay health educator (LHE) approach, CRC Education Program/Healthy Asian Americans Project, and market-oriented and community-based participatory research approach. Two studies described breast cancer screening promotion among Asian Americans, i.e., the Michigan breast cancer screening study and the Asian grocery store-based breast cancer education program. Cancer screening promotion studies utilized community engagement strategies such as Filipino coordinators, lay health educators, partnerships with community-based organizations, and Asian grocery stores.

**Conclusions:** There are limited intervention studies that promote CRC and breast cancer screening among Filipino Americans, highlighting the need for more research. Community engagement effectively promoted recruitment and participation and could be a potential strategy for sustained cancer screening promotion programs. Future initiatives should consider more research funding and sustainability of programs.

**Keywords:** *Filipino Americans, cancer screening promotion, colorectal cancer, breast cancer, systematic review*

## Background

Filipinos make up a significant immigrant group in the United States (US), reported being the fourth-largest immigrant group with almost two million born outside of the country (US Census Bureau, 2018). Despite the size and growth of the Filipino population, there is limited information regarding their health status. Asian Americans remain underrepresented in most population-based epidemiological studies, either being excluded due to small sample sizes or included only in aggregate as Asian American Pacific Islander (AAPI) or as “others” (Choi et al., 2013; Vargas et al., 2020).

In 2019, the Patient-Centered Outcomes Research Institute (PCORI) funded a project, “Mag-PCOR Muna Tayo,” to build capacity and engage Filipino Americans (FAs) in patient-centered outcomes research (PCOR) and comparative effectiveness research (CER) (Lapiz-Bluhm, 2020; Vargas et al., 2020). The PCORI project aims to create a community-based nationwide Filipino American PCOR (FA-PCOR) network through the creation of FA-PCOR “nasyon” (village) in five US states with a large population of Filipino Americans: California (CA), Hawaii (HI), Texas (TX), New York (NY), and New Jersey (NJ). The local nasyon engages Filipinos and community stakeholders to address the specific needs of Filipino Americans to make informed healthcare decisions (Lapiz-Bluhm, 2020).

Reports from each nasyon indicate that cancer is a healthcare issue of priority in all FA-PCOR states, sometimes ranking as high after diabetes, hypertension, and obesity. Early cancer detection through screening influences the timing of cancer diagnosis and prognosis. According to the American Cancer Society (2016), cancer is the leading cause of death within the Asian American and Pacific Islander (AAPI) community, which is associated with low screening rates (Cuaresma et al., 2018; Lee et al., 2011; Maxwell et al., 2016; Sy et al., 2018). These data prompted this systematic review to synthesize research evidence from interventional studies to promote cancer screening among Filipino Americans. While some intervention studies for cancer were included in the systematic review by Lapiz-Bluhm and Nguyen (2020), this systematic review covers more databases, with a more extended inclusion date of 10 years. Also, it outlines more details of the intervention strategies. Knowledge of effective methods can inform future studies to implement an evidence-based intervention that improves cancer screening among Filipino Americans.

## Methods

The clinical research question of the study is, “What intervention studies have been conducted to promote cancer screening among Filipino Americans?” A database search was done in five databases (i.e., Scopus, CINAHL, Ovid, PsycInfo, and PubMed) using the search terms,

Filipino Americans, cancer screening, and promotion, on July 16, 2020. The literature search was limited to a ten-year period (July 2010 to July 2020). In the literature, the term Filipino American refers to individuals who self-identify as Filipino American. They may belong to one of the following categories: Filipino who migrated to the US, a US-born Filipino (one or both parents are Filipinos), or an individual with a Filipino lineage who self-identifies as Filipino American.

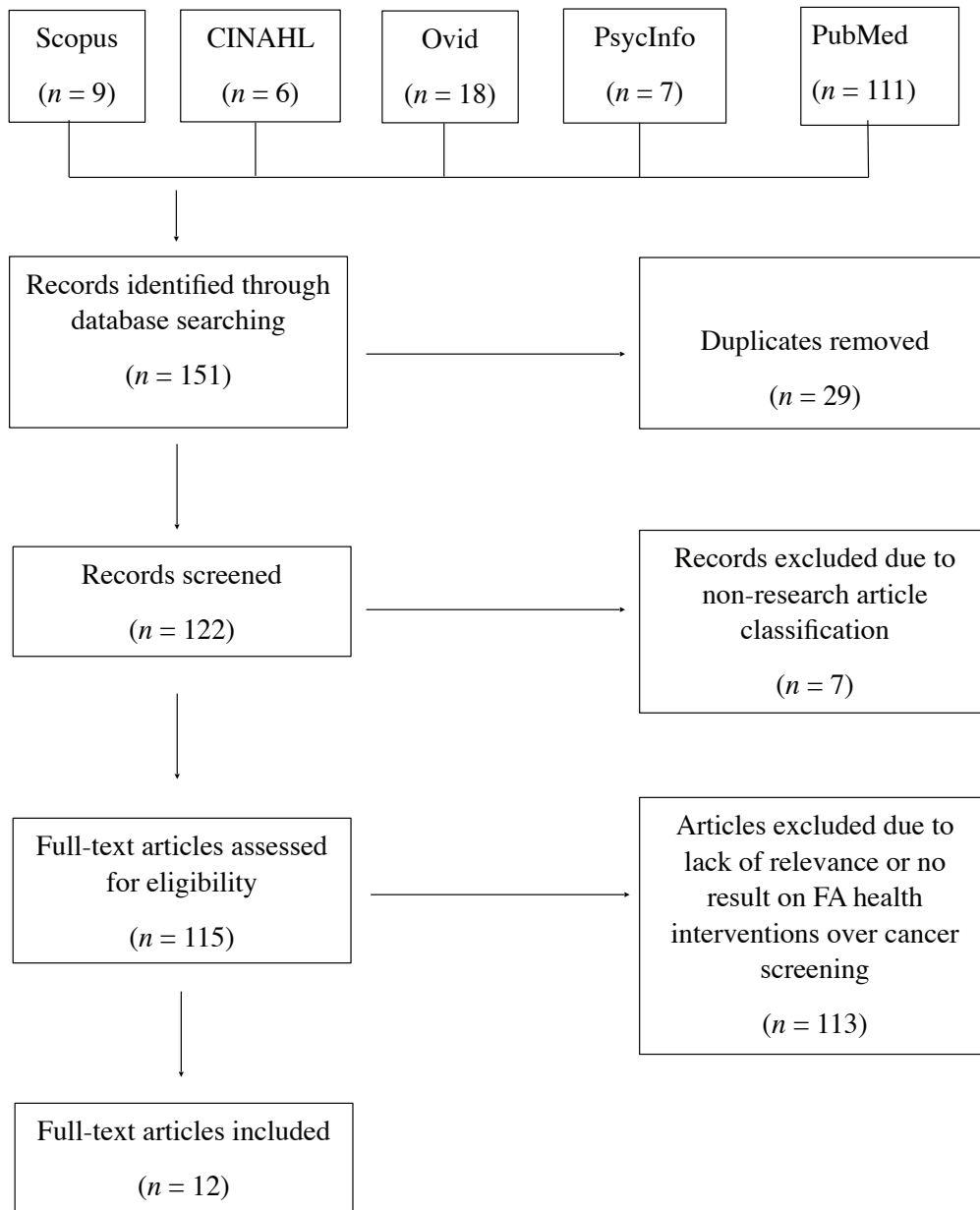
Using the PRISMA search strategy (Figure 1), titles and abstracts of studies were retrieved and screened to identify articles that address promotion strategies related to cancer screening among Filipino Americans. A review team member retrieved the full text of these potentially eligible studies. Articles were further assessed for eligibility and were finalized by the other team member.

The initial search with the time exclusion of ten years yielded 151 articles from all databases. The duplicates of 29 articles were removed using RefWorks. The remaining 122 articles were screened. Seven papers were initially excluded from the screening because they were non-research articles. From the remaining 115 full-text articles assessed, only 12 articles reported cancer screening promotion among Filipinos in the US, which were subsequently included in the systematic review (Figure 1).

A standardized form, previously piloted in another systematic review (Monney & Lapiz-Bluhm, 2018), was used to extract data from the included studies to assess study quality and evidence synthesis. Extracted information included the following: authors, study methodology, study setting, and population, participant demographics and baseline characteristics, details of the intervention and control conditions (if applicable), recruitment and study completion rates, outcomes and types of measurements, major findings, and implications, and limitations (risk of bias). Included were all relevant studies irrespective of the study design (i.e., quantitative, qualitative, or mixed methods). The primary author completed the risk of bias. Due to the lack of similar randomized controlled trials, a meta-analysis could not be performed. A narrative synthesis of the literature is reported herein.

## Results

Twelve studies described interventions to promote screening for colorectal cancer (CRC) and breast cancer. Colorectal cancer (CRC) is the third leading cause of cancer death among Filipinos (American Cancer Society, 2016). CRC screening rates among Filipinos are low. For example, the 2014 CRC screening rates among Filipinos in Hawaii was 56.5%, the lowest in the state and below the Healthy People 2020 target of 70.5% (see Cuaresma et al., 2018). Similarly, breast cancer screening rates are also low among Asian



**Figure 1**

*Database Search Flow Diagram of the Literature Search*

Americans (Park, 2018). The Cancer Prevention Institute of California reported that breast cancer rates had been fixedly increasing for Asian-American women over the past 15 years, even though breast cancer rates have stabilized in other racial groups (see Park, 2018). Vulnerability to cancer disparities has been linked to social determinants, which include being a new immigrant, limited English proficiency, lack of time for self-care because of multiple low-paying jobs and caregiving, lack of access to transportation and health insurance, and health care costs (Maxwell et al., 2010a; Maxwell et al., 2010b; Cuaresma et al., 2018).

**Intervention Studies for Colorectal Cancer (CRC) Screening Promotion**

Intervention studies that addressed CRC screening among Filipino Americans and Asian Americans (which include Filipinos) are summarized below (see Table 1). These studies include the Filipino Health Study in CA (Maxwell et al., 2010a), which was extended to the CRC2 Study (Maxwell et al., 2016), Lay health educator (LHE) approach (Cuaresma et al., 2018), CRC Education Program/Healthy Asian Americans Project (HAAP) (Wu et al., 2010), and market-oriented and community-based participatory research ap-



**Table 1***Evidence Synthesis Table for Colorectal Cancer (CRC) Intervention Studies among Filipino-Americans (FAs)*

| Authors                  | Aims  | Sample/<br>Setting  | Measurement  | Findings   |
|--------------------------|---|---|--|--|
| A. Filipino Health Study |   |   |  |  |
| Maxwell et al. (2010)    | Assess intervention addressed at increasing CRC screening rates among FAs                                   | FAs ( <i>n</i> = 548) non-compliant with CRC screening guidelines   | Self-reported CRC screening rates within a 6-month follow up   | The 6-month follow-up revealed that the intervention group participant with or without the FOBT self-reported an increased CRC screening rate at 30% and 25% respectively, while only 9% was observed in the control group.  |
| Maxwell et al. (2011a)   | Examine mediators of behavioral change to increase CRC screening in FAs effectively                         | FAs ( <i>n</i> = 548) 50 -70 years of age who were non-adherent to CRC screening guidelines in Los Angeles County             | CRC knowledge and screening  | Intervention that increased knowledge or awareness of CRC screening and provider-communicated CRC screening increased knowledge and awareness of CRC screening wherein the former accounted for 13% intervention effect while the latter accounted for 20%.  |
| Maxwell et al. (2011a)   | Examine a previous community-based trial to enhance CRC screening   | FAs aged 50 -70 years of age ( <i>n</i> = 548)  | CRC screening receipt adjusted for biases of missing data and self-report                            | After adjusting for biases, the intervention effect was effective among participants whose providers have received a letter about the intervention studies.  |
| Maxwell et al. (2012)    | Describe and evaluate the training of FA community health advisors (CHA) for CRC screenings                 | FA ( <i>n</i> = 91) pooled from 19 organizations  | Surveys on knowledge, total self-efficacy  | Knowledge and self-efficacy on CRC screening guidelines compounded 6 hours post-training 63% to 94%; and 8.2 to 8.9 on a 10-point scale both <i>p</i> < 0.001, respectively. High educational attainment, health care background, high organization participation, perceived leader in their community, and high participation in research correlated with the community health advisors' self-efficacy. |
| Maxwell et al. (2013)    | Assess the feasibility of disseminating intervention on colorectal cancer (CRC) screening in FA communities | FA participants ( <i>n</i> = 132) in Greater Los Angeles from FA organization with at least 50 members age 50 to 70 years old | Questionnaires, process checklist, log of fecal occult blood test (FOBT) distribution, CRC screening | CRC screening programs by Filipino American community-based organization are feasible with proper technical and financial support. Community health advisor led the endeavors in Filipino American community settings  |
| Maxwell et al. (2014)    | Outline the recruitment of FA CBOs and the rate of adoption by the organization for CRC screening promotion | 44 Filipino American community lead organization with a minimum of 150 Filipino American members aged 50 and over             | Assessment of community organization and comparison of the number of participating organizations     | CRC screening promotion program was adopted by 22 of the organizations; adoption rate was highest in previous partner organizations (11/14 = 79%), and community partner referred (5/10 = 50%), New organization (6/20 = 30%) had the lowest adoption rate.  |

| Authors  | Aims  | Sample/<br>Setting   | Measurement   | Findings   |
|--|---|--|---|--|
| B. CRC2 Study  |   |  |   |  |
| Maxwell et al. (2016)  | Assess CRC screening promotion in FA community-based organizations (CBOs)                               | 22 FA CBOs identified to have at least 150 FA members in Los Angeles and Orange County, CA     | Number of participants and rate of screening  | Similar effectiveness was achieved in both basic and enhanced intervention strategies with CRC screening rates at the 6-month follow-up at 49% and 53%, respectively. It was notable that the enhanced arm was more impactful due to its greater reach of $n = 223$ participants screened compared to $n = 122$ participants revealing an 83% difference.        |
| C. Lay health educator approach  |   |  |   |  |
| Cuaresma et al. (2018)   | Investigate impact of lay health educators (LHE) on CRC screening rates in FAs.                         | FA participants ( $n = 304$ ) age 50 to 70 years in Hawaii                                     | Surveys for up-to-date screening, ever screened, and knowledge and awareness of CRC | Increase in participant self-reported CRC screening from 80% to 89% ( $P = 0.0003$ ) post-intervention versus control group at 73% to 74% $P = 0.60$ ) and remained significant after covariate adjustment with significant intervention effects (OR, 1.81 85% confidence interval, 1.0-3.5). However, there was no intervention effect on up-to-date screening. |
| D. CRC Education Program/Healthy Asian Americans Project (HAAP)        |   |  |   |  |
| Wu et al. (2010)   | Assess the effectiveness of CRC education   | 304 Asian American participants 50 years or older in Michigan                                  | CRC knowledge and screening   | Educational intervention for the 304 participants significantly increased their knowledge and attitudes about the importance of screening. 78% of those that received educational intervention after the 6-12-month follow-up had been screened versus 37% who have been previously screened prior to the study.   |
| E. Market-oriented and community-based participatory research approach |   |  |   |  |
| Kim et al. (2016)  | Characterize a novel study protocol in disseminating CRC screening guidelines for seven Asian subgroups | 72 Asian Americans in 8 focus group. 470 participants from 7 AA groups (Filipinos, $n = 67$ ). | Number of participants and test kits distributed and returned, CRC knowledge        | 93.5% are in agreement about the importance of early detection, 86.9% believed that cancer can affect anyone, 74.1% believed that CRC is preventable and 83.8% are in agreement that CRC screening should be done by everyone. However, 35.8% believed that not knowing about cancer status is good and 45.5% will only get screened if symptoms arise.          |

proach (Kim et al., 2016). The Filipino Health Study resulted in several publications included in this systematic review as they provided details of the aspects of the study.

### **Filipino Health Study**

Maxwell and colleagues (2010a) conducted the first community-based trials to develop a multicomponent intervention that would increase colorectal cancer screening among Filipino Americans in CA called the Filipino Health Study. The intervention, based on the Health Behavior Framework, targeted knowledge/awareness of CRC screening, communication with the health care provider, health beliefs, social support, and barriers to CRC screening. Briefly, 548 Fili-

pino Americans, 50–70 years of age who were non-adherent to CRC screening guidelines (i.e., no FOBT within the past 12 months, no sigmoidoscopy within the past five years, and no colonoscopy within the past ten years) from 45 Filipino American community-based organizations (CBOs) and churches participated in the study. They were randomized into three groups: 1) an intervention group that received an education session on CRC screening and free fecal occult blood test (FOBT) kits, 2) an intervention group that received an education session but no free FOBT kits, and 3) a control group that received an education session on the health benefits of physical activity. The groups consisted of 6–10 subjects within the same CBO to take advantage of

**Table 2.** Evidence Synthesis Table for Breast Cancer Intervention Studies among Filipino Americans (FAs)

| Authors  | Aims   | Sample/Setting   | Measurement  | Findings   |
|--|--|--|--|--|
| A. Michigan Breast Cancer Screening Study      |  |  |  |  |
| Wu et al., (2014)                              | Assess outcomes of a breast intervention program on knowledge and intention to get screened in Southeast Asian and South Asian population  | Southeast Asian and South Asian women from Michigan with the following ethnic breakdown of India ( $n = 60$ ), Philippines ( $n = 17$ ), and Vietnamese ( $n = 60$ )   | Pre- and post-educational session survey   | Culturally appropriate intervention effectively modified knowledge, attitudes, behaviors, and perceptions regarding breast cancer and screening among SEA and SA women. Risk perception increased from a baseline of 46% to 73%. Culturally tailored interventions help in promoting early detection and cancer control among this group |
| B. Asian Grocery Store-Based Education Program |  |  |  |  |
| Sadler et al., (2012)                          | Assess the effectiveness of a randomized controlled trial of the Asian Grocery Store-based Cancer Education Outreach Program from 2000-2004 in educating Asian Americans about breast cancer | Asian American women ( $N = 1,522$ ) identified as Chinese ( $n = 381$ ), Filipino ( $n = 414$ ), Korean ( $n = 371$ ), and Vietnamese ( $n = 356$ ) of at least 20 years old at an Asian grocery store in Southern California | Pre and post-education survey (Reported mammogram in the past 12 months, adherence to mammogram and annual clinical breast exam) | Breast cancer education intervention encouraged mammogram scheduling in women aged 40 or older who were non-adherent for annual screenings vs women in the control group.  |

existing bonds between members of the same organization. Interviews (telephone or face-to-face) were conducted at baseline and six months after the session in English or Filipino. The participants received a \$20 incentive for each interview and a chance to win a \$500 prize after completing the follow-up interview. During the 6-month follow-up period, self-reported CRC screening rates were 30% for the intervention with the FOBT kit, 25% for the intervention without the FOBT kit, and 9% for the control group. The intervention with an educational group session in a community setting significantly increased CRC screening among Filipino Americans, even without free FOBT kits. Subsequent analyses further supported the effectiveness of the intervention across the demographic characteristics of the sample (Maxwell et al., 2011).

Maxwell and colleagues (2011b) assessed the Health Behavior Framework variables at baseline and 6-month follow-up ( $N = 432$ ). Knowledge/awareness of CRC screening and patient-provider communication mediated receipt of screening. An increase in CRC screening awareness accounted for 13% of the total intervention effect size, while

patient-provider communication accounted for 20%. Examining the roles of potential mediators in intervention trials may help identify constructs to target to enhance the effectiveness of interventions to increase CRC screening.

Maxwell and colleagues (2012) described the training program for the Filipino Health Study. Filipino Americans from 19 organizations conduct small-group sessions with members of their organizations to promote CRC screening. Community health advisors (CHAs) completed brief pre-and post-training surveys that included knowledge of colorectal cancer screening guidelines, perceived self-efficacy of performing specific tasks, and satisfaction with the training. The CHAs had high levels of knowledge and self-efficacy at pre-training, which increased significantly immediately after the six-hour training. Self-efficacy was associated with high educational attainment, health care background, high level of participation in the organization, being perceived by others as a leader, and past frequent involvement in research activities.

The initial feasibility of CHAs to work the community

settings for the Filipino Health Study was documented (Maxwell et al., 2013). The CHAs conducted one-on-one or small group education and passed out the free FOBT kits. Twenty CHAs from 4 organizations engaged in recruitment and education activities with 132 participants. CHAs consistently completed screening questionnaires to establish eligibility and kept logs of FOBT distribution. However, they did not always record eligible participants who did not consent to participate. Process checklists that indicated what information was covered in each educational session and post-session follow-up logs were only partially completed. Almost all participants reported receipt of intervention components and receipt of screening at 4-month follow-up and reported high acceptability of the program. Hence, there is a need for training, monitoring recruitment, intervention implementation, and follow-up of CHAs who work with the community.

The participation of 44 community-based organizations (CBOs, having  $\geq 150$  Filipino American members age 50+) was an essential component of the Filipino Health Study (Maxwell et al., 2014). They compared the organizational characteristics of organizations that did and did not adopt the CRC screening promotion program. 22 (50%) of community organizations adopted the CRC screening promotion program. Adoption was highest among organizations that had previously partnered with research teams ( $11/14 = 79\%$ ) and among organizations that were referred by community partners ( $5/10 = 50\%$ ), and lowest among new organizations ( $6/20 = 30\%$ ). This study underscores the importance of community resources, community-academic relationships, and partnership in the dissemination process. However, the moderate rate of adoption among new organizations and the demands of completing documentation and assessments to advance dissemination research raise questions regarding the generalizability of the study findings.

### **CRC2 Study**

In 2016, Maxwell and colleagues reported on the CRC2 study (2011-2014), which focused on implementing the previously developed Filipino Health Study to increase CRC screening. They evaluated the two strategies to implement an evidence-based intervention to promote CRC screening in Filipino American community organizations. Twenty-two community organizations were randomized to either a basic or enhanced implementation strategy. In both arms, CHAs recruited participants non-adherent to CRC screening guidelines, conducted educational sessions, distributed print materials, and free fecal occult blood test kits, reminded participants to get screened, and mailed letters to participants' providers. In the enhanced arm, leaders of the organizations participated in implementation efforts. While the effect was similar in both arms of the study (screening rate at 6-month follow-up was 53% in the enhanced arm, 49% in the basic arm), 223 participants were screened in the

enhanced arm versus 122 in the basic arm. The enhanced implementation strategy reached 83% more participants and achieved a higher public health impact. The results highlight and support the importance of leveraging CBOs in community health promotion activities.

### **Lay Health Educator Approach**

Using a clustered randomized controlled trial, Cuaresma et al. (2018) utilized the lay health educator approach to increase CRC screening among 304 Filipino Americans ages 50 to 75 years in Hawaii (HI) in 2012-2015. The lay health educators delivered two education sessions and two telephone follow-up calls on CRC screening plus a CRC brochure versus an attention control. Participants in the intervention group had an increased proportion of ever having received CRC screening (from 80% to 89%) than the control group (from 73% to 74%). However, the intervention did not affect up-to-date screening.

### **CRC Education Program/Healthy Asian Americans Project (HAAP)**

Wu and colleagues (2010) described the expansion of an established health promotion program, the Healthy Asian Americans Project (HAAP), to include community-based CRC education during 2005–2006. Using Asian-language media, HAAP promoted awareness throughout local Asian Indian, Chinese, Filipino, Hmong, Japanese, Korean, and Vietnamese American communities and recruited men and women over 50 years to attend health fairs at local community/cultural centers. The program had a coordinator from within their respective Asian Indian, Chinese (Taiwan and China), Filipino, Hmong, Japanese, Korean, and Vietnamese communities who connects them to churches, temples, and civic organizations. The intervention was an expert-presented educational seminar on evidence-based guidelines for early detection of CRC. The presentation was in Chinese and English; the on-site translation was provided when the audience did not speak either of those languages. Educational brochures about CRC (obtained from the American Cancer Society and other websites) were distributed in relevant Asian languages. The data from 304 participants (ethnic breakdown was not provided) showed significantly increased knowledge and attitudes on the importance of screening. Study follow-up conducted between 6 and 12 months showed that 78% of those who received the educational intervention had been screened in the last 12 months; only 37% had ever been screened with any of the tests prior to the study. The educational intervention improved CRC screening rates and may help lower CRC mortality among underserved Asian Americans.

### **Market-oriented and Community-based Participatory Research Approach**

Kim et al. (2016) tested an innovative study protocol to disseminate CRC screening guidelines in seven Asian sub-



groups (Cambodian, Chinese, Korean, Laotian, and Vietnamese, Filipinos, and Southern Asians). The study integrated a market-oriented Push-Pull-Infrastructure Model, Diffusion of Innovation Theory, and community-based participatory research approach to create a community-centered dissemination framework. Consumer research, through focus groups ( $N = 72$  participants in 8 focus groups) and community-wide surveys ( $N = 464$ ), was centered on the adopters to ensure a multilevel intervention was well designed and effective. The focus groups were facilitated by bilingual, bicultural research staff members, who participated in a 4-hour training session to enhance their facilitation skills. A focus group guide was developed to ensure consistency across groups. Most participants agreed that early detection of cancer was important (434/464, 93.5%), cancer could happen to anyone (403/464, 86.9%), CRC could be prevented (344/464, 74.1%), and everyone should screen for CRC (389/464, 83.8%). However, 35.8% (166/464) of participants also felt that people were better off not knowing if they had cancer, and 45.5% (211/464) would screen only when they had symptoms. Most participants indicated that they would get screened upon their doctor's recommendation, but half reported that they only saw a doctor when they were sick.

### **Intervention Studies for Breast Cancer Screening Promotion**

Two studies described breast cancer screening promotion among Asian Americans including the Michigan breast cancer screening study (Wu et al., 2014) and Asian grocery store-based breast cancer education program in California (Sadler et al., 2012).

#### ***Michigan Breast Cancer Screening Study***

Wu and colleagues (2014) examined the effects of a culturally appropriate community-based breast intervention program on knowledge about breast cancer and intention for screening among Indian, Filipino and Vietnamese women in MI (Wu et al., 2014). They used the Cultural Exploratory Model (CEM), which underscores the importance of understanding minority women's cultural beliefs, values, and personal life experiences regarding the utilization of breast cancer screening. Four bilingual coordinators from the Philippines, Vietnam, and India facilitated community networking and participant recruitment. Recruitment eligible women to participate in the study used the following strategies: 1. collaboration with the local community, ethnic social groups, professional organizations, and religious associations to distribute information to members; 2. collaboration with ethnic student associations to help recruit their mothers and other relatives into the study; 3. posting flyers at local ethnic grocery stores, restaurants, beauty salons, etc.; 4. making presentations and volunteering in local ethnic celebration events (e.g., the Mid-Autumn Festival, Asian New Year Celebration, etc.); and 5. providing

small monetary incentives. The study intervention was an hour-long interactive education session delivered in a group format and conducted at community centers, churches, and temples where participants gathered. At baseline, participants ( $N = 166$  Asian women; 17 were Filipinos) had limited knowledge of breast cancer screening guidelines and had misconceptions about breast cancer risk factors. After the educational intervention, they reported significantly higher knowledge scores related to breast cancer and screening recommendations and intentions to obtain follow-up CBE and mammograms. This culturally appropriate intervention provides strategies to overcome personal instructional barriers for early detection and cancer control.

#### ***Asian Grocery Store-Based Education Program***

From 2000 to 2004, Sadler and colleagues (2012) conducted a randomized controlled trial that explored the impact of the Asian grocery store-based breast cancer education program on Chinese, Filipino, Korean, and Vietnamese women ( $N = 1,160$ , at least 40 years of age) in CA. The Asian Grocery Store-Based Education Program was a brief, repetitive intervention to heighten breast cancer awareness and knowledge and stimulate participants to follow recommended screening guidelines. After a brief baseline survey (i.e., sociodemographic characteristics and their breast cancer knowledge, attitudes, and screening behaviors), the education program began with a brief face-to-face education session. The study had two arms: breast cancer arm and the control. The breast cancer arm received the flyer describing the state's free breast cancer screening program. They also received information to increase their knowledge about breast cancer, increase their motivation to become screened and decrease barriers such as fear of the screening. The control arm received an equivalent intervention for prostate cancer. A packet of in-depth easy to read educational materials was mailed to the participants two weeks later. At four weeks post-baseline training, phone contact was attempted up to five times to confirm the mailed information had been received and answer any questions since the face-to-face session. At six weeks post-baseline, a second complementary packet of relevant information was mailed to each participant. Mailings and calls were done by the same student community health educator who had initially recruited and educated the participant at the grocery store (baseline). At eight weeks post-baseline, a follow-up telephone survey was conducted by a fellow student community health worker who had no previous contact and was blind to the randomization. The follow-up survey focused on monitoring changes in breast cancer knowledge, attitudes, and screening behaviors since completing the baseline. Women aged 40 and older and non-adherent for annual screening mammograms were more likely to schedule a mammogram after receiving the breast cancer education program. Securing cancer education sites at Asian grocery stores made it easier to reach the diverse community of Asian American women



to disseminate vital cancer control information and recruit them to a breast cancer education study.

### Discussion

This study provides a synthesis of research evidence on the promotion of CRC and breast cancer screening among Filipino Americans and Asian Americans (including Filipinos). CRC screening promotion studies were conducted in CA, HI, and MI; some were more than a decade ago. These studies showed that community engagement is effective in improving knowledge about CRC and promoting CRC screening behaviors. Filipino coordinators, lay health educators, partnerships with community-based organizations, and Asian grocery stores were effective intervention platforms.

Interventions to improve cancer screening must attempt to address the social determinants associated with cancer disparities. These may include but not be limited to being a new immigrant, limited English proficiency, lack of time for self-care because of multiple low-paying jobs and caregiving, lack of access to transportation and health insurance, and health care costs (see Cuaresma et al., 2018). Sy et al. (2018), using the CA Medical Expenditure Panel Survey data for 2009–2014, reported that older age, having health insurance, and a usual care provider predicted CRC screening across all ethnicities. Different demographic, health care access and health attitude predictors within each ethnic group were also related to CRC screening. Understanding these issues among Filipino Americans in their respective states can improve intervention strategies. The CRC screening promotion studies undertaken in CA in the Filipino Health Study increased CRC screening. There was a 5% difference in the increase of CRC screening between groups that received an educational intervention with FOBT kit (30%) and those without FOBT kits (25%), which highlights the importance of the education piece of the intervention. Other CRC screening promotion studies were conducted among Asian Americans, including Filipinos. Data from these studies must be taken with caution, especially those with no subgroup analyses. They may mask subgroup-specific issues that influence the results. Lee et al. (2011) highlight the importance of identifying differences in CRC screening behavior of various Asian American/Pacific Islander (AAPI) subgroups to better aid the development of interventions relevant to the specific Asian group.

Although breast cancer is high among Asian American women, studies that promote breast cancer screening in this population are even more limited. Two studies conducted in MI and CA leveraged community connections to reach the Asian American community. Wu and colleagues (2014) utilized the community coordinator model to reach out to Asian Americans in the community. Sadler et al. (2012) used the Asian grocery store-based model to reach the

community with follow-up provided accordingly. Both were effective in improving screening rates. The use of an Asian grocery was an innovative approach that successfully reached the target population. Studies that target Filipino women are needed to address breast cancer screening issues in this population.

This systematic review is not without any limitations. Like any other review, its quality is dependent on the original research. It is also dependent on the extent of the database search. The literature search was conducted in five databases and limited to the last ten years. This database search is more extensive than reported in Lapiz-Bluhm and Nguyen (2020); they searched three databases and included studies conducted in the past five years. Although utmost care was done to capture relevant research studies, there remains a likelihood that the team may have missed other intervention studies that address CRC and breast cancer promotion among Filipino Americans, which are published elsewhere.

### Implications for Clinical Practice

Data from cancer screening promotion studies highlight the lack of awareness or knowledge among Filipinos and other Asian American subgroups about the cancer screening guidelines. Hence, education on cancer screening guidelines during clinical visits is of utmost importance. Clinicians are encouraged to take time to educate, promote and facilitate cancer screening. The clinician's role is critical because research data indicate that Asians are more likely to get screened following their doctor's recommendation (Kim et al., 2016). Where appropriate, the cancer screening can occur during the visit to help mitigate transportation barriers. If the practice cannot provide screening, clinicians should consider having a mechanism where a staff member can schedule the referral appointment with the relevant institutions. This approach can assist barriers related to the navigation of a complex healthcare referral system. Hence, at the end of the visit, the patient would have a confirmed appointment for cancer screening.

Kim et al. (2016) reported that while most participants indicated that they get screened upon their doctor's recommendation, half shared that they only saw a doctor when they were sick. This information highlights the need to emphasize routine preventive well visits. Clinical practices should schedule annual visits accordingly and provide follow-up reminder calls to ensure that they make it to the appointment. If possible, the visit should include relevant cancer screening procedures to overcome common screening barriers (i.e., transport, time, and ability to navigate a complex healthcare system). Most health plans cover preventive services such as vaccinations and screening tests at no cost to the patient. This information should be checked and relayed to the patient to address reservations to screening related to healthcare costs.

Clinicians may consider providing their patients the information from the American Cancer Society (2021) website, specifically the American Cancer Society Guidelines for the Early Detection of Cancer. This website provides an outline of recommended screening by age for the different forms of cancer. Alternatively, the National Cancer Institute (NCI, 2019) also offers printed and downloadable online resources for various cancer screenings for the patient population (see <https://www.cancer.gov/publications/patient-education#screening>). These resources are important clinical tools to combat the lack of awareness of the importance of cancer screening and cultural-related issues on cancer, such as lack of treatment follow-up and stigmatization of women with breast cancer (see Park et al., 2018). Asian-American women who do get screened are less likely to get follow-up treatment after abnormal mammogram results than their white counterparts. The stigma surrounding breast cancer in the Asian-American community is still prevalent. Cultural differences, such as superstition, can cause shame about opening up about having breast cancer (see Park, 2018).

### Implications for Research

This systematic review highlighted the limited research on breast cancer screening promotion among Filipino Americans. The two studies included were conducted among Asian Americans, not solely on Filipino Americans. The Michigan Breast Cancer study (Wu et al., 2014) had 17 Filipino participants; 60 were from India and 60 from Vietnam. This disproportionate distribution raises the question of the validity and representativeness of the study for Filipino Americans. While studies among Asian Americans are helpful, interpretations of specific subgroups from these studies must be considered with caution. The aggregate analyses could mask subgroup-specific issues that may be important for further studies and practical applications. More studies to promote breast cancer screening and other types of cancer among Filipinos are needed. Such studies are important because of the Filipinos' cultural tendency not to seek preventive health care. It is known among the Filipino community that most wait until the symptoms are undeniably unbearable before seeking medical treatment. With cancer, early detection through screening tests can potentially reduce the chance of dying from that cancer. Hence, cancer screening is of utmost importance.

The lack of studies of Filipinos in other states is also apparent. The PCORI-funded project, "Mag-PCOR Muna Tayo," reports that Filipinos' health and healthcare issues differ depending on their state of residence (Lapiz-Bluhm, 2020). Such results highlight the need for studies among Filipinos' cancer screening knowledge, attitudes, and behaviors in different states other than CA and MI. These studies can leverage the Filipino-American "nasyon" networks created

by the "Mag-PCOR Muna Tayo" project. Details about the project and the FA-PCOR "nasyon" networks in CA, HI, TX, NJ, and NY are located in the Center for Filipino American Health website: <https://filamhealth.org/>.

Lapiz-Bluhm and Nguyen (2020) and Nguyen et al. (2020) highlight the need for a three-pronged approach to effectively increase research among Filipino Americans to improve health outcomes. The tripartite model includes research funding, researchers, and research participants. More funding for research among Filipino Americans will encourage more researchers to study health and healthcare issues among Filipino Americans. On the other end, community engagement initiatives to build research capacity, such as the FA-PCOR network, can encourage Filipino Americans to participate in research. Among Filipinos, the community networks have a significant influence on their attitudes and behaviors. Faith-based and professional organizations such as the Philippine Nurses Association of America (PNAA) and its local chapters can be leveraged as community engagement platforms. For example, "Mag-PCOR Muna Tayo" formed the FA-PCOR "nasyon" networks through the leadership of PNAA members as academic research collaborators partnered with patient advocate leaders in each state. Filipinos have also identified social media platforms (i.e., Facebook) as potential means to connect with community networks and influence health promotion behaviors. Cancer screening promotion campaigns can use these platforms and other advances in information technology to improve the penetrance among Filipino American communities.

### Conclusions

This systematic review highlights the intervention studies that promote CRC and breast cancer screening among Filipino Americans. It underscores the limited research among this vulnerable population. The studies included were community-based, engaging local lay health workers or coordinators, Asian groceries, and community-based organizations. The involvement of community-based organizations effectively promoted recruitment and could be a potential strategy for sustained cancer screening programs. Future initiatives should consider more funding to encourage researchers to study Filipino health and healthcare priorities along with community engagement efforts to create a cadre of Filipino Americans willing to participate in research. The sustainability of community-based cancer screening programs should also be a priority.

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# A Call to Action: Community Health Screening Data Highlight the Need to Address Hypertension among Filipino Americans in the United States

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The authors declare that there is  
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## Abstract

**Background:** Since the early 2000s, there has been research evidence indicating the high prevalence of hypertension among Filipinos in the United States. Recent data from Philadelphia, New York, and New Jersey show rates of hypertension as high as 63%. Rates of hypertension in South Texas and Eastern Virginia are not known.

**Objective:** This study describes the community health screening data of Filipinos in South Texas and Eastern Virginia. Community data can help determine health issues in a population for potential intervention.

**Methods:** Demographics and health screening data (blood pressure, blood glucose, hemoglobin A1c, and blood cholesterol) were collected from Filipinos who attended community health screenings in South Texas ( $N = 282$ ) and Eastern Virginia ( $N = 35$ ) and extracted for analysis, where available. Descriptive statistics mean or median (interquartile), min, max, standard deviation, or frequency were utilized to summarize the data.

**Results:** For the participants in South Texas, the median health scores were BMI = 26 kg/m<sup>2</sup>, blood glucose = 105 mg/dL, total blood cholesterol = 173 mg/dL, systolic blood pressure = 128 mmHg and diastolic blood pressure = 78 mmHg. Approximately 70% of the South Texas participants ( $N = 195$ ) had abnormal ( $> 120/80$  mmHg) blood pressure readings. For participants in Eastern Virginia, the median health scores were BMI = 24 kg/m<sup>2</sup>, blood glucose = 127 mg/dL, hemoglobin A1c = 5.65, systolic blood pressure = 134 mmHg, and diastolic blood pressure = 82 mmHg. About 73% ( $N = 22$ ) of the Eastern Virginia participants had abnormal blood pressure.

**Conclusions:** This study is first to report the high prevalence ( $\geq 70\%$ ) of hypertension among Filipinos in South Texas and Eastern Virginia, which were comparable to published rates in Philadelphia and New Jersey. The alarming pattern of increase in hypertension rates among Filipinos in the US calls for an urgent need to address hypertension disparities. Culturally tailored community and evidence-based intervention to reduce hypertension in this minority population should be initiated.

**Keywords:** *Filipinos in the US, Filipino American, hypertension, South Texas, Eastern Virginia, health disparities, blood pressure, community health screening*



## Background

Filipino migration to the United States (US) began in the late 19th century and has been largely driven by long-standing political, military, and educational ties between the two countries (Gallardo & Batalova, 2020). Now, the US is home to the largest number of Filipino immigrants. Estimated to be about 4.2 million, Filipinos in the US is the third largest Asian origin group, after Chinese and South Asians (Mendiola, 2021). According to the American Community Survey (ACS) data, 43% of the US Filipino community professions are in management, business, science, and arts (Abad, 2020). Filipinos have filled US labor shortages in agriculture, the military, and nursing (McNamara & Batalova, 2017). Filipinos represent 28% of registered nurses among all immigrants in the US (Abad, 2020). By virtue of these jobs, these Filipinos and their families need to be healthy. To the contrary, the prevalence of chronic diseases in Filipino American population is alarming.

Due to the limited research on the health of Filipinos in the US, much information about the chronic diseases in this minority population are gleaned from aggregated studies among Asian subgroups. Disaggregated data highlight the risks of Filipinos to lifestyle modifiable chronic conditions. Since the early 2000s, studies have highlighted the risk of Filipinos Americans for chronic lifestyle modifiable disease conditions such as diabetes, hypertension, and other cardiovascular diseases. Risk factors among FAs include high blood pressure, low HDL cholesterol levels, high rates of smoking and physical inactivity, and increased body mass index (BMI) (Barnes et al., 2008; Nguyen et al., 2020 and Lapiz-Bluhm & Nguyen, 2020). Other risk factors for FA include older age, family history, stress, alcohol consumption, and chronic conditions such as high LDL cholesterol and diabetes. Traditional Filipino diets are also high in sodium and cholesterol. These studies were consistent with epidemiological reports of higher rates of cardiovascular disease (CVD) and diabetes in FAs compared to Whites, Blacks, and other Asian groups (Hastings et al., 2015).

There have been limited studies addressing hypertension among Filipinos in the US despite the risks and high hypertension rates (Nguyen et al., 2020; Lapiz & Nguyen, 2020). A review of literature on hypertension among Filipinos shows a highly disturbing pattern of increased incidence. According to the 2004-2006 National Health Interview Surveys (NHIS), 27% of Filipino American (FA) adults self-reported a diagnosis of hypertension, the highest rate among Asian subgroups, higher than Hispanics (24.1%), and almost at par with American Indians or Alaska Natives (32%) and Blacks (36%) (Barnes et al., 2008, 2010). Subsequent NHIS reports (2010-2016 and 2010-2018) highlight the high prevalence of hypertension (29%) among South Asians (Commodore-Mensah, 2018) and Southeast Asians (Koirala et al., 2021), which included FAs, although

the data was aggregated. In 2013, based on health screening data among Filipino immigrants in New York City area ( $N = 1028$ ), 53% of participants as hypertensive, a prevalence substantially higher than estimates obtained for Blacks (37%) and Hispanics (32%) (Ursua et al., 2013). Older age, male gender, living in the US for over 5 years, a BMI greater than 23.0 kg/m<sup>2</sup>, an elevated glucose reading, a family history of hypertension, and fair or poor self-reported health status were predictors of hypertension (Ursua et al., 2013). Ma and colleagues reported 67% of 200 self-identifying Filipinos aged 18 years or older residing in the Pennsylvania and New Jersey regions were hypertensive (Ma et al., 2018). This increasing trend in hypertension among FAs calls for an urgent need to further assess vulnerable populations in other areas of the US.

To the best of our knowledge, the rates of hypertension among FAs in South Texas (STX) and Eastern Virginia (EVA) are not known. Knowing these rates is important because these two regions are in the top ten states with the greatest number of Filipinos. Texas has the third largest population of Filipinos while Virginia ranks 10th (Pew Research Center, 2021). Filipinos living in these states are especially vulnerable due to statewide policies influencing their health profiles and access. Texas has the highest uninsured rate in the US, with nearly one-third of the state's residents not having access to health insurance (Blumenthal and Radley, 2021). Healthcare access is also an issue in Virginia. In 2019, 55% ( $N = 1,100$ ) of Virginian adults experienced healthcare affordability burdens in the past year and 78% expressed worry about affording healthcare in the future (Altaram, 2021).

This study aims to describe hypertension rates among Filipinos in STX and EVA from community health screenings conducted by Filipino professional organizations in collaboration with the community. Collaborative grassroots initiatives have the potential to uncover and address health and healthcare issues relevant to the community.

## Methods

### Participants and Setting

**South Texas.** Data of Filipino participants ( $N = 280$ ) from community health screenings conducted in STX between 2009 - 2020 were extracted for analysis. The health screenings were organized by the International Nursing Students Association (INSA) of the University of Texas Health Science Center at San Antonio in collaboration with local entities such as the Philippine Nurses Association of San Antonio (PNASA), the Institute of Texas Cultures which organizes the annual Asian Festival to celebrate the Chinese Lunar New Year, the Santo Nino Catholic Church which hosts the annual feast for Santo Niño de Cebu, and the Aguman Capampangan of San Antonio (ACOSA) which hosts the annual Fiesta La Naval in October.

The health screenings were open to all event attendees irrespective of race or ethnicity. The process of the health screening is as follows: at check-in, all participants signed a consent about the health screening; then completed a short health history form that included basic demographics (age, marital status, race/ethnicity), insurance status, preventive services (vaccination), and lifestyle questions (smoking, alcohol drinking, and exercise); and participants provided their weight and height, which was used for the body mass index (BMI) determination. Subsequently, health screening measures for blood pressure (BP) and blood glucose were conducted. BP measurement was done once using an automated BP machine as the noise of the activity often makes manual BP reading difficult. The BP reading was then shared with the participant and confirmed if it falls within the individual's BP range. If the reading falls outside the individual's range or was abnormally high or low, the BP was re-measured manually at least twice with a five-minute gap between each trial. Health education was provided to all participants based on their health history and screening scores and referrals to available services were provided as needed.

**Eastern Virginia.** On February 16, 2020, the Filipino Health Alliance (FHA) of Eastern VA conducted a community health fair in collaboration with Living Well with Diabetes, which is a 4-hour program led by two FA certified diabetes educators. The FHA organizes community health fairs across the region and in the Philippine Cultural Center. The original FHA convened the Philippine Medical Association of Southeastern Virginia, Inc. (PMA SEV), the Philippine Nurses Association of Virginia (PNAVA), and the Philippine American Medical Technicians of Virginia (PAMET) to collaboratively conduct health fairs for the Filipino health fairs for the Filipino community. The current Filipino Health Alliance includes Filipinos in health-related fields including dentistry, podiatry, physical therapy, and optometry, as well as other community organizations and home health agencies.

Community health fair participants were required to register for the Live Well with Diabetes educational session, which included a visit to the health screening booths that provided a variety of services. Demographic information (i.e., age, race/ethnicity, gender), blood pressure, pulse, height, weight, and BMI were obtained by South University nursing students (many of whom were FA) and nurse volunteers from the PNAVA. Blood glucose and HbA1C were obtained by a nurse volunteer from Eastern Virginia Medical School (EVMS) Strelitz Diabetes Center. FA Physician volunteers (i.e., family medicine, internal medicine, endocrinology) answered questions and provided education.

### Ethical Approval

Use of the health screening data was approved for publication in *Nursing Practice Applications & Reviews of Research*

as non-regulated research as determined by the Institutional Review Board of the University of Texas Health Science Center at San Antonio.

### Data Analysis

All statistical analyses were performed in collaboration with the EVMS Healthcare Analytics and Delivery Science Institute (HADSI) using SAS version 9.4 (SAS Institute, Cary, NC). The South Texas (STX) data used for analysis included gender (male/female), age (years), marital status (single, married, divorced, widowed, unknown), exercise frequency (irregular, more than three times per week, once per week, no exercise, unknown), BMI (kg/m<sup>2</sup>), blood glucose (mg/dL), cholesterol (mg/dL), systolic and diastolic blood pressure (mmHg). The EVA data included in this analysis were gender (male/female), age (years), blood glucose (mg/dL), HbA1c (%), and systolic and diastolic blood pressure (mmHg). Descriptive statistics such as minimum, maximum, mean, median (interquartile or IQR), standard deviation and frequency were utilized to summarize the data. T-test was utilized to compare the mean of two groups. For skewed data, Wilcoxon rank-sum test has been utilized for the comparison. For multiple comparisons, Kruskal-Wallis methods have been employed. A chi-squared test or Fisher exact test has been utilized for testing the associations between categorical variables. To control the false positive rate, Benjamini-Hochberg method has been utilized for the adjustment of multiple comparisons. All hypothesis testing was carried out at the 95% significance level with a p-value of < 0.05 accepted as statistically significant.

## Results

### South Texas

Table 1 shows the summary of demographic data and health scores from FA health screening participants ( $N = 282$ ) in STX. Most of the participants were adults (18 years and above), female (55%), and married (44%). The median BMI was 26 kg/m<sup>2</sup>, with the BMI range of 18-48 kg/m<sup>2</sup>, the maximum score being in the morbidly obese category. The median blood glucose reading was 105 mg/dL, with the range of 35-367 mg/dL. The median total blood cholesterol reading was 173 mg/dL (range = 100-310 mg/dL). The median systolic blood pressure was 128 mmHg (range = 100-200 mmHg), and median diastolic blood pressure was 78 mmHg (range = 45-121 mmHg). When the participants were classified into normal (100-120/60-80 mmHg) vs abnormal (> 120/80 mmHg) categories, 70% of the participants ( $N = 195$ ) had abnormal blood pressure readings.

Table 2 shows the comparison health screening data between female and male health screening participants in STX. Female participants were significantly older than males ( $p = 0.0203$ ) but had lower BMI ( $p = 0.0061$ ), systolic ( $p = 0.0034$ ) and diastolic ( $p < 0.001$ ) blood pressure compared

**Table 1***Demographics and Health Scores of Health Screening Participants in South Texas*

| <b>Variable</b>                           | <b>N (%)</b>       |
|---|--------------------|
| <b>Gender</b>                             |                    |
| Female                                    | 156 (55.31%)       |
| Male                                      | 110 (39.01%)       |
| Unknown                                   | 16 (5.68%)         |
| <b>Age (Years)</b>                        |                    |
| Min-Max                                   | 12-90              |
| Mean ( $\pm$ SD)                          | 47.29 $\pm$ 18.42  |
| Median (IQR)                              | 49 (29)            |
| <b>Marital Status</b>                     |                    |
| Married                                   | 124 (43.97%)       |
| Single                                    | 103 (36.52%)       |
| Divorced                                  | 20 (7.1%)          |
| Widowed                                   | 11 (3.9%)          |
| Unknown                                   | 24 (8.51%)         |
| <b>Exercise</b>                           |                    |
| Irregular                                 | 110 (39%)          |
| More than 3x per week                     | 87% (13.48%)       |
| Once a week                               | 88 (13.48%)        |
| No  | 36 (12.77%)        |
| Unknown                                   | 11 (3.9%)          |
| <b>Body Mass Index (kg/m<sup>2</sup>)</b> |                    |
| Min-Max                                   | 18-48              |
| Mean ( $\pm$ SD)                          | 27 $\pm$ 5.59      |
| Median (IQR)                              | 26 (7)             |
| <b>Blood Glucose (mg/dL)</b>              |                    |
| Min-Max                                   | 35-367             |
| Mean( $\pm$ SD)                           | 114.04 $\pm$ 42.33 |
| Median (IQR)                              | 105 (53)           |
| <b>Blood Cholesterol (mg/dL)</b>          |                    |
| Min-Max                                   | 100-310            |
| Mean( $\pm$ SD)                           | 171.75 $\pm$ 40.6  |
| Median (IQR)                              | 173 (53)           |
| <b>Systolic Blood Pressure (mmHg)</b>     |                    |
| Min-Max                                   | 100-220            |
| Mean ( $\pm$ SD)                          | 126.89 $\pm$ 14.73 |
| Median (IQR)                              | 173 (53)           |
| <b>Diastolic Blood Pressure (mmHg)</b>    |                    |
| Min-Max                                   | 45-121             |
| Mean ( $\pm$ SD)                          | 78 $\pm$ 10.02     |
| Median (IQR)                              | 78 9 (11.5)        |
| <b>Blood Pressure Category</b>            |                    |
| Normal (100-120/60-80 mmHg)               | 195 (69.64%)       |
| Abnormal (above 120/80 mmHg)              | 85 (26.67%)        |

**Table 2**

*Comparison of Health Screening Data between Female and Male Participants in South Texas*

| Variable                               | Female (n = 156) | Male (n = 110) | p-value           |
|--|------------------|----------------|-------------------|
| Age (median ± SD)                      | 53.5 ± 18.56     | 44.5 ± 17.56   | <b>0.0203</b>     |
| BMI (median ± SD)                      | 25 ± 6.04        | 27 ± 5.02      | <b>0.0061</b>     |
| Blood Glucose (median ± SD)            | 108 ± 45.91      | 109 ± 35.24    | 0.4306            |
| Blood Cholesterol (median ± SD)        | 182 ± 43.08      | 159.5 ± 34.31  | <b>0.0024</b>     |
| Systolic Blood Pressure (median ± SD)  | 125 ± 15.9       | 130 ± 13.21    | <b>0.0034</b>     |
| Diastolic Blood Pressure (median ± SD) | 76 ± 9.74        | 80 ± 9.67      | <b>&lt; .0001</b> |

to their male counterparts. Interesting, the cholesterol levels of females were significantly higher ( $p = 0.0024$ ) than males. There was no significant difference in their blood glucose levels.

#### Eastern Virginia

Table 2 shows the summary of health screening data in Eastern Virginia from 35 FA participants.

Most participants were adults (18 years and above) and female (60%). The median BMI was 24 kg/m<sup>2</sup> (range = 21-31 kg/m<sup>2</sup>). The median blood glucose was 127 mg/dL (range = 84-450 mg/dL) while the median HbA1c was 5.65% (range = 5.2%-11.1%). The median systolic blood pressure was 134 mmHg (range = 107-168 mmHg) while the median diastolic blood pressure was 82 mmHg (range = 61-106 mmHg). When blood pressure was categorized into normal (100-120/60-80 mmHg) and abnormal (> 120/80 mmHg) blood pressure, 73% of participants had abnormal (> 120/80 mmHg) blood pressure readings.

Table 4 shows the comparison of health screening data between female and male participants in EVA. The age, blood glucose, HbA1c, and blood pressure (systolic and diastolic) of female and male participants were comparable. The only significant differences were in terms of height and weight with males significantly taller ( $p < 0.0001$ ) and heavier ( $p = 0.02$ ). Interestingly, these differences did not translate into BMI, which was not significant ( $p = 0.08$ ).

**Table 3**

*Demographics and Health Scores of Health Screening Participants in Eastern Virginia*

| Variable                                  | N (%)           |
|---|-----------------|
| <b>Gender</b>                             |                 |
| Female                                    | 21 (60 %)       |
| Male                                      | 14 (40 %)       |
| <b>Age (Years)</b>                        |                 |
| Min-Max                                   | 30-83           |
| Mean (±SD)                                | 64.41±12.57     |
| Median (IQR)                              | 65 (15)         |
| <b>Body Mass Index (kg/m<sup>2</sup>)</b> |                 |
| Min-Max                                   | 21-31           |
| Mean (±SD)                                | 25.09±2.95      |
| Median (IQR)                              | 24 (5)          |
| <b>Blood Glucose (mg/dL)</b>              |                 |
| Min-Max                                   | 84-450          |
| Mean (±SD)                                | 150.03±79.47    |
| Median (IQR)                              | 127 (14)        |
| <b>Hemoglobin A1c (%)</b>                 |                 |
| Min-Max                                   | 5.2-11.1        |
| Mean (±SD)                                | 6.1±1.21        |
| Median (IQR)                              | 5.65 (0.9)      |
| <b>Systolic Blood Pressure (mmHg)</b>     |                 |
| Min-Max                                   | 107-168         |
| Mean (±SD)                                | 134.5±17.4      |
| Median (IQR)                              | 134 (26)        |
| <b>Diastolic Blood Pressure (mmHg)</b>    |                 |
| Min-Max                                   | 61-106          |
| Mean (±SD)                                | 81.13 +/- 10.45 |
| Median (IQR)                              | 82 (14)         |
| <b>Blood Pressure Category</b>            |                 |
| Normal (100-120/60-80 mmHg)               | 22 (73.33 %)    |
| Abnormal (above 120/80 mmHg)              | 8 (26.67%)      |

#### Discussion



**Table 4**

*Comparison of Health Screening Data between Female and Male Participants in Eastern Virginia*

| Variable                             | Female (n = 21) | Male (n = 14)   | p-value  |
|--------------------------------------|-----------------|-----------------|----------|
| Age (mean ± SD)                      | 64.45 ± 13.15   | 62.86 ± 15.56   | 0.75     |
| Height (mean ± SD)                   | 62.05 ± 3.11    | 66.35 ± 2.50    | < 0.0001 |
| Weight (mean ± SD)                   | 136.91 ± 40.05  | 172.21 ± 40.73  | 0.02     |
| BMI (mean ± SD)                      | 24.65 ± 2.72    | 26.93 ± 4.14    | 0.08     |
| Blood Glucose (mean ± SD)            | 133.38 ± 35.17  | 161.57 ± 110.57 | 0.37     |
| HbA1c (mean ± SD)                    | 5.82 ± 0.65     | 6.41 ± 1.65     | 0.22     |
| Systolic Blood Pressure (mean ± SD)  | 133.43 ± 17.79  | 134.93 ± 15.53  | 0.79     |
| Diastolic Blood Pressure (mean ± SD) | 81.05 ± 10.83   | 82.43 ± 10.21   | 0.70     |

and cholesterol (Kim et al., 2008; Barnes et al., 2008). The health screening data for both STX and EVA did not provide much information about the profile of the participants. However, only 13% of the STX participants reported to exercise more than three times per week. The median BMI was 26 kg/m<sup>2</sup> and the mean BMI was 27 kg/m<sup>2</sup>, which is considered Class 1 obesity. It should be noted that the maximum BMI reported was 48 kg/m<sup>2</sup>, which is classified as morbidly obese. While

The community health screening data from STX and EVA paint a highly vulnerable minority population. Among the participants, 70% and 73% had abnormal blood pressure in STX and EVA, respectively. These findings are the first to report these high proportions of abnormal blood pressure readings in these regions which highlight the paucity of data on the risks and health disparities among FAs. However, the data showcase the rising trend of hypertension among FAs elsewhere in the US and mirror the findings which reported 67% of FA participants in a health screening distributed in Pennsylvania and New Jersey region have hypertension (Ma et al., 2018). At the community level, FAs are cognizant of this health issue. A study funded by the Patient-Centered Outcomes Research Institute (PCORI) aimed at building capacity and engaging FAs for patient-centered outcomes research and comparative effective research reported that hypertension is a prioritized issue in the five states studied: California, Hawaii, Texas, New Jersey, and New York (Vargas et al., 2020; Lapiz-Bluhm, 2020). The high rate (70%) of Filipino screening participants with abnormal blood pressure in STX provided support for the PCORI project results for TX. The high rate (73%) of abnormal blood pressure among older (mean age = 64 years old) Filipinos who participated in the EVA health screening indicate that hypertension is also an important issue in VA.

In the 2000s, disaggregated data from Asian American studies indicated high rates of hypertension among FAs. Identified risk factors included high blood pressure, low HDL cholesterol levels, high rates of smoking and physical inactivity, increased BMI, older age, family history, stress, alcohol, and chronic conditions such as high cholesterol and diabetes, and traditional Filipino diets high in sodium

the mean total cholesterol (172 mg/dL) was within normal limits, the max cholesterol score was 310 mg/dL, 110 units higher than the normal range. Interestingly, comparison of female and male health screening data for STX participants indicate that the latter has a more vulnerable profile than the former (see Table 2). Comparable data was seen among the EVA participants: high maximum range of blood glucose and HbA1c as well as BMI. The increased vulnerability of males among EVA participants were not as significant (see Table 4) although height and weight was significantly different between the males and females. The difference in results between STX and EVA maybe due to the smaller sample size for the EVA health screening.

The current data described were from health screenings conducted before the COVID-19 pandemic. The COVID-19 pandemic in 2020 was associated with blood pressure control declined in the US, particularly among women and older adults (Brooks, 2021). It is more than likely that the hypertension rates among Filipinos in STX and EVA would even be higher during the COVID-19 pandemic. These data is currently not available.

The current findings highlight the urgent need to test evidence-based interventions to help address hypertension among FAs. Such interventions will prevent morbidity and mortality from cardiovascular diseases resulting from uncontrolled hypertension. The limited literature on interventional studies among FAs emphasizes the need for cultural considerations when working with this minority population (Nguyen et al., 2020; Lapiz-Bluhm & Nguyen, 2019). Published intervention studies for hypertension among Filipinos include Racial and Ethnic Approaches to Community Health for Asian Americans (REACH FAR) – Keep on



Track (KOT) (Yi et al., 2019; Kwon et al., 2017), Project Asian American Partnership in Research and Empowerment (AsPIRE) – Million Hearts© (Katigbak et al., 2019; Ursua et al., 2018) and the Community Health Worker Health Disparities Initiative (Hurtado et al., 2014). Successful studies engaged the community (i.e., professional, non-profit, and faith-based organizations) and used culturally-tailored approaches to improve recruitment, retention, and study completion (Nguyen et al., 2020; Lapid-Bluhm & Nguyen, 2019). Study design considerations may include having trusted individuals from Filipino descent providing the intervention, language considerations, involvement of family and community, and connection with faith-based organizations. The FA communities in both STX and EVA are very similar in the cultural, social, religious, and professional ties. Community leaders express a strong desire to raise the awareness of hypertension risks and support interventional studies in the FA community to prevent severe debilitating sequelae including myocardial infarctions and strokes.

Several local, regional, state, and national factors may preclude the utilization of past intervention strategies to address hypertension in STX and EVA. For example, the REACH-FAR Keep on Track (KOT) Program was developed by the New York City Department of Health and Mental Hygiene (NYC DOHMH). It implemented a multi-level and evidence-based health promotion and hypertension (HTN) control program in faith-based organizations serving Asian American (AA) communities (Bangladeshi, Filipino, Korean, Asian Indian) across multiple denominations (Christian, Muslim, and Sikh) in New York/New Jersey (NY/NJ) (Kwon et al., 2017). It was led by a coalition composed of academic (NY University Center for the Study of Asian American Health or NYU CSAAH, which was the lead agency funded by the National Institutes of Health), government, and community-based organizations. It culturally adapted and implemented the KOT program in 2015 and 2016. Filipinos were reached through the New York-based Kalusugan Coalition, a multidisciplinary collaboration dedicated to improving the health of the Filipino community through educational activities, research, community action and advocacy (Kwon et al., 2017). The aim of the REACH-FAR Keep on Track (KOT) volunteer-run, community-based blood pressure monitoring program was to lower blood pressure in community-dwelling adults in New York City and New Jersey. Unfortunately, similar city and academic-supported mechanisms and infrastructures are not available in STX and EVA. It is not known if the KOT program and others continue to exist to address hypertension among Asians, which is an important aspect to consider for program sustainability. Alternative mechanisms to address hypertension in STX and EVA are needed.

A grassroots approach may be more advantageous in US

regions or states where there is lack of state or federal support. One such program that shows promise for Filipino Americans in STX and EVA is the evidence-based program for hypertension called HEALS (Healthy Eating and Living Spiritually). HEALS is a faith-based, socio-culturally modified 12-week lifestyle intervention aimed at obtaining a sustained blood pressure reduction and tested in the African American populations located in semi-urban Florida (Dodani et al., 2014). Lifestyle interventions proven to effectively lower blood pressure were culturally tailored and included weight loss, exercise, reduced salt (sodium) intake, improved diet with Dietary Approaches to Stop Hypertension (DASH)—style eating pattern, and moderation of alcohol intake were implemented in African American church communities. Following the intervention, the mean reduction of systolic blood pressure from baseline was 22 mmHg ( $p < 0.001$ ) and 6.5 mmHg for diastolic BP ( $p = 0.0048$ ). A mean weight reduction of 3.11 kg from the baseline ( $p < 0.0001$ ) was also observed. The reported reduction of blood pressure is truly promising and the HEALS intervention appears to be appropriate for the reduction of hypertension risk factors among FAs (high blood pressure, increased BMI, lack of exercise, high sodium food, among others). The approach of using church communities will also be appropriate as Filipinos are steeped in religion and find supportive communities through faith-based organizations.

This study is not without its limitations. The data were retrospectively retrieved from community outreach projects intended for screening, not for rigorous scientific endeavors. The sample size for EVA health screening data is small. More rigorous systematic studies determining risk factors associated with the high rates of hypertension in these populations are recommended. The self-selection to participate in the health screening may have also biased the data. Nevertheless, the data highlight the disturbing disparities for hypertension in these populations. Moreover, our findings are supported by a previous report among FAs residing in Philadelphia and New Jersey.

### Conclusions

This study is first to report the high incidence of hypertension in STX ( $\pm 70\%$ ) and EVA ( $\geq 73\%$ ). These data and the reported alarming pattern of increase of hypertension rates among Filipinos in the U.S. call for an urgent need to address hypertension disparities in this population. The data support a call to action – to test culturally-tailored evidence-based intervention to reduce hypertension among Filipinos in the US.

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# Utility of Urine Samples for Biomarker Collection in Pediatric Studies

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## Conflict of Interest

The authors declare that there is no conflict of interest.

## Abstract

**Background:** Biobanks are critical tools for advancing scientific knowledge. Barriers to collecting biological samples exist for all clinical populations but remain especially understudied in pediatric patients. Literature focused on the ability to biobank blood and urine specimens in children is underexplored.

**Objective:** This retrospective study is an exploratory, secondary analysis of a longitudinal parent study to evaluate the availability of serial blood and urine samples for biobanking, when collected as part of standard of care.

**Methods:** Children admitted to a university-affiliated hospital for traumatic brain injury were enrolled into a parent study ( $N = 60$ ), which collected serial biologic samples. The analysis included 37 children, of which 75.7% ( $n = 28$ ) were Caucasian, the majority were male 59.5% ( $n = 22$ ), and 94.6% ( $n = 35$ ) were diagnosed with mild traumatic brain injury. Participant injury characteristics and clinical data were abstracted from electronic health records, and statistics were generated to explore differences in biospecimen availability by type.

**Results:** On day 1, urine samples were available 2.46 times more often than blood samples. By day 5, 13.5% of participants were still providing urine when compared to only 2.7% for blood. Over the five-day period 18.9% switched from providing both blood and urine samples to providing urine only.

**Conclusions:** These findings demonstrate that urine is more readily available than blood as a biospecimen when collected in children for biomarker analysis. Future studies should evaluate the utility of urine biomarkers for diagnostic and prognostic purposes.

**Keywords:** biospecimen; biomarker; urine; blood; pediatrics



### Background

Biological markers, better known as “biomarkers”, are proteins or other biomolecules that can be objectively measured. Sources of biomarkers include blood, urine, cerebrospinal fluid (CSF), saliva, hair, and other tissues. Biomarkers are often evaluated as an indicator of normal biologic functions, pathogenic processes, or pharmacologic responses; these applications have become common in clinical research and practice (Strimbu & Tavel, 2010). Medical applications of well-validated biomarkers are numerous and include diagnosis, prognosis, and monitoring of therapeutic response, including the use of Glial fibrillary acidic protein (GFAP), Interleukin 6, (IL-6), Tumor Necrosis Factor alpha (TNF $\alpha$ ), Ubiquitin C-terminal hydrolase L1 (UCHL1), and S100 calcium-binding protein B (S100B) in the diagnosis of traumatic brain injury (TBI) (Chaban et al., 2020; Dadas et al., 2018; Kulbe & Geddes, 2016; Vos, et al., 2010; Yang et al., 2013). Urinary biomarkers are used for kidney disease and beyond, such as in the study of Alzheimer’s disease, Parkinson’s disease, and other neurologically-based diseases (An & Gao, 2015; Kurbatova et al., 2020; Lisowska-Myjak, 2010; Seol, Kim, & Son, 2020). The majority of FDA-approved biomarkers are for use in adults, while pediatric biomarker research lags; leaving an important gap because adult biomarker data cannot be presumed applicable to pediatric patients. An example of this gap is found by Oris et al. (2018) in that the child’s age is essential in the interpretation of S100 calcium-binding protein B concentrations because protein values vary physiologically during the first two years of life. Promising biomarkers in adult populations should be vetted in children to confirm their utility. This finding necessitates additional pediatric research studies that include biobanking of biologic samples for future biomarker analysis.

There are many practical barriers to collecting biospecimens in children, such as the desire to avoid painful blood draws and limitations in amount of blood that can be drawn; these challenges have been extensively discussed but have not been empirically studied (Davitt et al., 2011; Duff, 2003; Howie, 2011). The quest for clinically predictive biomarkers of pediatric disease and/or injury must include considerations for the practicality of sample collection in the context of clinical care, as these can impact the ability to effectively conduct biomarker research and ultimately clinical translation efforts.

Despite the known impact of clinical realities on biobanking, no study has addressed longitudinal collection of biospecimens when it was feasible to dovetail research sample collection as part of the standard of care. This line of inquiry is relevant to promoting collection of future research specimens, while avoiding the need for additional invasive and painful sample collection procedures. The purpose of this exploratory pilot study was to leverage data from a longitudinal biobanking parent study which dovetailed collection

of blood and urine with standard of care activities to assess differences in availability of these biospecimens in children hospitalized for TBI.

### Methods

This exploratory study was a secondary, retrospective analysis of previously collected data from an Institutional Review Board-approved longitudinal parent study in a cohort of children with TBI. The enrollment process followed three main steps: Prescreening the census, screening the chart for study eligibility, and obtaining consent; assent was obtained whenever possible, based on the child’s age and cognitive capacity. Children were considered eligible for enrollment into the parent study if they were previously healthy, had no history of TBI, were aged 5 days to 15 years at the time of injury, and were admitted for a mild, moderate, or severe TBI to the Pediatric Intensive Care Unit or Step-Down Unit at a university-affiliated level 1 trauma hospital. The parent study excluded children with prior diagnosed TBI, acquired brain injury (such as an aneurysm) and/or developmental delay. The study team also did not enroll children who were likely to be progressing to brain death within 24 hours of hospital admission. Eligible individuals were enrolled if their parent or legal guardian completed enrollment paperwork, which included a blanket consent to provide multiple specimens whenever possible based on standards of care, over the course of their hospital stay (on days 1, 2, 3, and 5). Blood samples were collected whenever there was an existing point of access (e.g., indwelling intravenous catheter) or when/if a standard of care lab was being collected. No venipuncture outside of standard of care was obtained. Blood was collected using standard 4 mL ethylenediaminetetraacetic acid prepared tubes. Urine was collected via nursing personnel by access to a sterile indwelling urinary catheter, by free catch sterile collection into a sterile urine container, or, for young participants, into a diaper; the exact route for sample collection is unavailable at the time of this report. Urine and blood, when collected, were obtained at the same time points. Samples were collected between days 1 and 5, with differing frequency among participants, depending on if/when there was a clinical indication for blood draw and timing hospital discharge. All biospecimens were processed according to the manufacturer’s instruction and stored in a -80° Celsius freezer until future biomarker analysis. In addition to the inclusion criteria for enrollment into the parent study, participants had to have blood and/or urine available on day 1 to be included in this secondary analysis.

Participant injury characteristics and clinical data were abstracted from electronic health record and data was stored in a Research Electronic Data Capture database. SPSS version 25 was used for data analysis, management, and cleaning. Descriptive statistics were generated to explore differences in biospecimen donation by type.

**Results**

**Demographics**

Of the 60 children enrolled in the parent study, 37 children had blood and/or urine collected at time-point 1 and were included in this secondary analysis. The majority of participants identified as white 75.7% (*n* = 28), non-Hispanic 86.5% (*n* = 32), and male 59.5% (*n* = 22). TBIs were primarily due to falls 56.8% (*n* = 21) and 94.6% (*n* = 35) were diagnosed as mTBI, defined as a Glasgow Coma Scale (GSC) score of 13-15. The most common structural alteration visible on imaging was a skull fracture (48.6%; *n* = 18), and the second most common was a subdural hematoma (35.1%; *n* = 13). See Table 1 for additional demographic and injury characteristics of the participants.

**Sample Availability**

Whenever possible, urine and blood samples were collected on days 1, 2, 3, and 5. Notably, differences in TBI severity, clinical management, and discharge led to major differences between the number of blood and urine collections. On day 1, 2.46 times more urine samples were collected than blood samples (see Figure 1). By day 5, 13.5% of participants were still providing urine samples when compared to only 2.7% of participants who provided blood samples. Over the five-day period, 8.1% (*n* = 3) participants switched from giving blood only to giving urine only, and 18.9% (*n* = 7) switched from providing both blood and urine samples to only providing urine. Patients providing only blood or both blood and urine samples fell from 35% to 3% over the course of the five days, while patients providing only urine versus blood and urine fell from 86% to 11% over the same time-period. Discontinuation of urine collection was due to hospital discharge, whereas discontinuation of blood was based on IV removal or lack of need for blood-based laboratory tests.

**Table 1**

*Demographics and Injury Characteristics (n = 37) of Consented Individuals.*

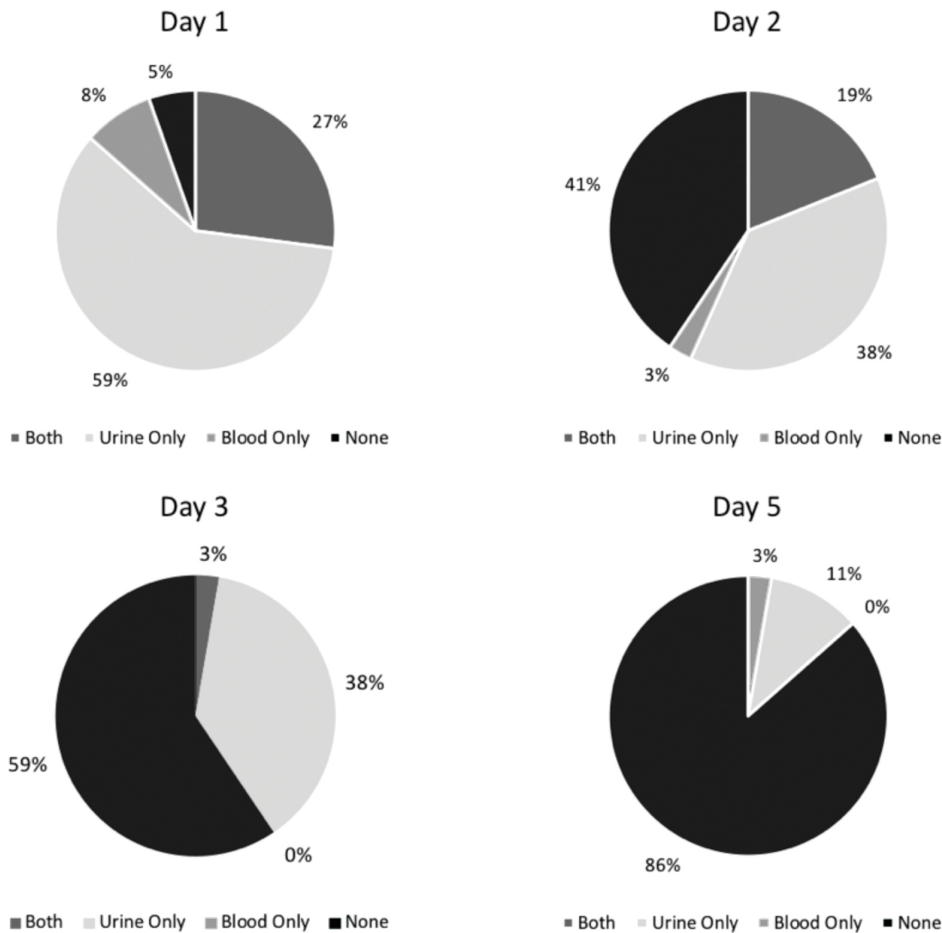
| Variable  | Categories (If Applicable)                    | (n) %          |
|---|---|----------------|
| Sex   | Male  | (n = 22) 59.5% |
|   | Female  | (n = 15) 40.5% |
| Race  | White   | (n = 28) 75.7% |
|   | Black   | (n = 8) 21.6%  |
|   | Other   | (n = 1) 2.7%   |
| Ethnicity   | Non-Hispanic                                  | (n = 32) 86.5% |
|   | Hispanic                                      | (n = 5) 13.5%  |
| Glasgow Coma Scale Severity                         | Mild (14-15)                                  | (n = 35) 94.6% |
|   | Moderate (9-13)                               | (n = 2) 5.4%   |
|   | Severe (3-8)                                  | (n = 0) 0.0%   |
| Age in Years, mean (range, standard deviation [SD]) | 5.5 years (mean range= 0-15; SD = 5.45)       |                |
| Mechanism   | Fall  | (n = 21) 56.8% |
|   | Motor Vehicle Collision                       | (n = 3) 8.1%   |
|   | Abusive Head Trauma                           | (n = 6) 16.2%  |
|   | Other   | (n = 7) 18.9%  |
| Injury Type   | Subdural Hemorrhage                           | (n = 13) 35.1% |
|   | Epidural Hematoma                             | (n = 10) 27.0% |
|   | Intracerebral Hemorrhage                      | (n = 1) 2.7%   |
|   | Subarachnoid Hemorrhage                       | (n = 8) 21.6%  |
|   | Extra Axial Hematoma                          | (n = 6) 16.2%  |
|   | Skull Fracture                                | (n = 18) 48.6% |
|   | Cerebrospinal Fluid Leak                      | (n = 1) 2.7%   |
|   | Contusion                                     | (n = 3) 8.1%   |
|   | Concussion With No Acute Intracranial Process | (n = 7) 18.9%  |

**Discussion**

The present study is novel in that it is the first to demonstrate the availability of urine and blood samples when dovetailing collection of biospecimens for research purposes with clinical care. When feasible, researchers wishing to analyze biomarkers should consider trying to collect samples as part of standard of care to minimize risks to pediatric participants and burden to clinicians. Blood collection poses risk for in-

**Figure 1**

*Breakdown of Participants Who Donated Blood, Urine, Both, or Neither on Each Day of Biospecimen Collection in the Parent Study*



fection to participants and has the potential for specimen contamination or coagulation, which could lead to a need for repeat blood draws (Hall et al., 2013). Utilizing well-trained phlebotomy teams has been found to reduce risk of infection (Gander et al., 2009), but the resources necessary to support such staff is not always available. Likewise, there are risks associated with both urinary catheterization and sterile catch; considerations for infection risk, invasiveness, and time/resource utilization must be considered (Eckert et al., 2020; Kaufman, Sanci, et al., 2020; May, 2018). More importantly, understanding the availability of dovetailing research sample collection with clinical care may inform future study design to improve study enrollment, longitudinal retention, maximize biobanking success and subsequent expansion of the pediatric biomarker knowledge base.

The primary finding of this study was that, for pediatric TBI patients undergoing biomarker collection that dovetailed with standard of care, urine was more readily available when com-

pared to blood. Many children who sustain a brain injury, such as a mild TBI, do not require IV access or blood-based laboratory tests. Likewise, as children recover from injury over the course of their hospitalization, IV lines are discontinued when no longer clinically indicated and the need for blood analysis to measure physiologic and homeostatic stability decreases over time; these clinical realities contributed to decreased rates of blood biobanking over time in the parent study. After invasive catheters were removed and blood test orders discontinued, parents and children were not asked to continue to provide non-standard of care blood samples. This decision considered a desire to avoid continuing painful procedures and to not overburden clinicians by asking them to assist in additional sample collection outside of the standard of care.

While this study utilized blanket consent that piggybacked biobanking with a standard of care, this approach is not always possible. Many research studies collect biological specimens outside of standard of care, which relies on individual consent to additional specimen collection procedures. In the parent study, urine was the most available for collection; the pediatric TBI patients had limited and highly variable use of IV lines and venipuncture for blood analysis as part of standard of care. Limited vascular access as part of standard of care means that studies wishing to collect blood in the pediatric TBI population may need to rely more on informed consent for study-specific venipuncture. Investigators wishing to prospectively collect blood for research purposes should consider published evidence surrounding factors that may impact blood draw success, study recruitment and retention of participants longitudinally. Available evidence suggests fear of needles is significant for pediatric patients, which highly impacts willingness to provide blood samples for biobanking purposes. This finding is evidenced by McMurty and teams (2015) study, where 63% of chil-

dren 6 to 17 years of age acknowledged a fear of procedures involving needles. Whereas another study found the self-reported fear of needles varied by age, with a rate of 68% in children aged 6 to 8, 65% in children aged 9 to 12, and 51% in children aged 13 to 17 (Taddio et al., 2012). Studies have also reported venipuncture and blood procurement influences parental consent in pediatric studies; 42% of participants whose parents did not consent to one study listed blood procurement as a reason, due to the pain involved during the procedure (Langley et al., 1998). Options to minimize needle fear or repeated non-standardized blood collections may include a detailed informed consent and assent document that addresses these risks in understandable terms and adoption of pain relief methods (e.g., numbing spray), which may reduce the impact of fear on biobanking success. Ultimately, blood collection can be a significant barrier to pediatric study enrollment as it can impact consent rates, increases risk to participants, and creates additional costs for studies. Yet, a viable option exists in the collection of non-invasive biologic samples, which are more likely to be met with more successful enrollment, retention, and collection (Gorodischer et al., 1994; Oerlemans et al., 2018; Ritchie et al., 2019).

Urine was the most easily accessible biospecimen in all severities and informal discussion with parents and children suggested that they did not find this type of collection objectionable. In this study, patients provided significantly more urine samples than blood samples. On the first day, 2.46 times as many urine samples were collected than blood samples, whereas on the fifth day of data collection, there were five times as many urine samples collected than blood samples. This result echoes the findings of another study, focusing on biomarkers in multiple sclerosis, which highlighted the use of urine in serial sampling because of its ease of collection (Dobson, 2012). Whether dovetailing sample collection with clinical care or collecting samples exclusively for research purposes, there are some practical advantages to urine over blood. For example, blood collection requires sample tubes containing anticoagulating compounds and ligand binding compounds to stabilize the blood components, while urine collection simply involves a sterilized sample (Lindsay & Costello, 2017). Urine collection methods have been validated in young neonates to identify biomarkers that promote care management (Ritchie et al., 2019) and in non-toilet-trained children in biological monitoring studies (Oerlemans et al., 2018). Thereby indicating the use of urine as an alternative to blood as a source of biomarkers could reduce costs, resolve these fears and parental apprehension, and lead to higher consent rates and ultimately enrollment into biological banks that can be used to support diagnostic and prognostic advances.

While dovetailing research specimen collection minimized risk to participants and healthcare provider burden, it result-

ed in limited biospecimens available for biomarker analysis because blood was not available unless an existing blood-based access was in place, or a venipuncture was performed as a part of the standard of care for treatment. Moreover, this secondary analysis is a single-site study with a small, homogeneous sample which included mostly white males; this limits the generalizability of the present study. Replication in larger, more diverse samples is needed. Due to the lack of blood versus urine samples in the mTBI patients, direct comparisons between serum and urinary biomarker levels were not possible. Continued efforts to compare the type, nature, and utility of biomarkers in blood versus urine are warranted. Future studies on procurement and analysis of urinary biomarkers would allow for potentially larger sample populations with greater power, and diagnostic and/or prognostic significance. Due to the practicality of using urine, additional research addressing the sensitivity and specificity for noninvasive diagnostic biomarkers is required. Additionally, there is minimal evidence regarding the most efficient methods to biobank pediatric samples when not collected as part of standard of care, as well as the feasibility and limits of collecting other biospecimens (e.g., cerebrospinal fluid; other tissues). Finally, replication is limited by the nature of retrospective secondary analyses. Larger prospective trials would be directly aimed at addressing the limitations of the present study.

### Conclusions

Although there were limitations in this study, the study provides interesting early data that suggests collection of urine for future biomarker discovery are more readily available in pediatric TBI patients receiving standard of care. Considerations for the nature of sample collection should be considered, beyond what was included in this study. For example, factors that affect availability of samples as part of clinical care or willingness of children and their legal guardians to participate should be considered. Factors including the cost-effectiveness, infection risk, and acceptability to children and families must be considered (Eckert, et al., 2020; Kaufman, Knight, et al., 2020; Kaufman, Sancu, et al., 2020). Likewise, consideration for timing of urine collection and processing technique should be explored, as these have been found to impact biomarker data; formal evaluations of urine collection route are worth pursuing as the impact on biomarker analysis remains unknown (Thomas et al., 2010).

Overall, compared to blood-based biomarkers, the state of the science for urinary biomarkers is lagging and the need for reproducible protocols has been identified; Likewise, less is known about the normal human urinary proteome (Beretov, et al., 2014; Harpole et al., 2016). Current applications for urine are also more limited with the most common applications surrounding urinary health (Watson et al., 2016). Although there is a growing body of literature exploring urinary biomarkers of neurodegenerative disease (An & Gao, 2015).



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# The Impact of a Multi-Modal Childhood Lead Educational Intervention among Undergraduate Nursing Students in the United States

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## Conflict of Interest

The authors declare that there is no conflict of interest.

## Abstract

**Background:** Lead exposure and poisoning pose significant risks to public health. Effective educational intervention is needed to prepare nursing students to take an active role in response to this public health crisis. It is imperative that quality childhood lead poisoning prevention instruction be part of educating nursing students.

**Objective:** The purpose of this study was to describe and evaluate the effectiveness of a multi-modal childhood lead educational intervention.

**Methods:** A mixed methods study was implemented with 190 undergraduate community health nursing students from a Midwestern, urban, public university during fall 2019 and winter 2020 semesters. The control group (fall 2019 semester) consisted of students who received the existing curriculum while the intervention group (winter 2020 semester) consisted of students who received an additional pediatric lead exposure educational module. Pretest and posttest study surveys were completed. Quantitative and qualitative data underwent statistical and thematic analysis, respectively.

**Results:** Quantitative study results showed that scores increased from the pretest to the posttest for all participants in both the control and intervention groups (general lead exposure and poisoning knowledge  $p < .05$ ; lead exposure knowledge, lead poisoning prevention knowledge, and total lead exposure and poisoning knowledge  $p < .001$ ; and confidence in knowledge  $p < .001$ ). However, the posttest means were statistically higher for students in the intervention group in the area of general lead exposure and poisoning knowledge ( $p < .05$ ). Qualitative study results revealed what participants learned, found most helpful, and how they plan to apply and utilize this knowledge in their nursing practice.

**Conclusions:** This research demonstrates the effectiveness of the lead poisoning prevention educational intervention in increasing participants' knowledge of lead poisoning prevention and confidence in their knowledge levels.

**Keywords:** *lead poisoning; curriculum; community health nursing; public health nursing*

## Background

Lead poisoning occurs when a person's health is negatively impacted by lead from contamination via contact, inhalation, or ingestion (Centers for Disease Control and Prevention [CDC], 2021). Lead exposure and poisoning represent a public health threat. Approximately 3.6 million homes in America with at least one child have substantial lead paint dangers (Hauptman et al., 2017). Questions regarding lead exposure are the most common questions received by professionals who work for North America's Pediatric Environmental Health Specialty Units (Hauptman et al., 2017). According to the 2018 Provisional Michigan Childhood Lead Poisoning Prevention Program Data Report, areas with a history of a high number of children with elevated blood lead levels (which in Michigan is defined as  $\geq 5 \mu\text{g/dL}$  of blood), and where the Michigan Department of Health and Human Services (MDHHS) funds interventions to reduce the risk of lead exposure in children include: Adrian, Detroit, Flint, Grand Rapids, Hamtramck, Highland Park, Jackson, Lansing, and Muskegon (MDHHS, Division of Environmental Health, Childhood Lead Poisoning Prevention Program, 2020). According to the United Health Foundation (2021), homes in the Midwestern and Northeastern United States had the highest amount of lead-based paint and lead-based paint hazards. Individuals who live in poverty and those from communities of color who experience housing inequity are at a higher risk of lead exposure because they are more likely to live in older homes with lead-based paint (CDC, 2020b). Lead exposure is especially of concern in low and middle-income countries as well, including but not limited to Mexico, China, India, Philippines, and Nigeria (Kordas et al., 2018).

Young children are at highest risk of lead poisoning because of their developing brains and small size (CDC, 2020b). Sources of lead include lead-based paint chipping usually found in homes built before 1978, some toys and toy jewelry, imported candies, and certain water pipes (CDC, 2020c). Lead exposure can have a negative effect on health and even low levels have been shown to reduce children's IQs, ability to concentrate, and academic success; however, lead poisoning is preventable which includes removing sources of lead exposure (primary prevention) and blood lead testing (secondary prevention) (CDC, 2020a). Goals of Healthy People 2030 related to environmental health are to reduce exposure to lead and reduce blood lead levels in children (United States Department of Health and Human Services, Office of Disease Prevention and Health Promotion, n.d.). Prevention of pediatric lead exposure is essential and this problem rests largely in part on public health departments (Michel et al., 2020).

Public health nurses often work with environmental health personnel as part of a multidisciplinary approach to lead poisoning prevention. It is important for nurses to know how to

assess for environmental health risks and educate on how to decrease risks, yet nurses' knowledge of the environment and environmental threats to health needs to be improved (Stanhope & Lancaster, 2018). Given that nurses make up the single largest group of healthcare workers, it is imperative that they can recognize and address environmental hazards, and knowledge of environmental health concepts is essential to nursing practice (American Nurses Association, 2007). Tohidi et al. (2019), found that utilization of electronic self-learning modules can improve nursing students' clinical competency and be helpful in asynchronous learning. Morrison et al. (2017) found that although existing literature has shown that nursing students have a knowledge deficit of childhood lead poisoning risk factors, and more education could be appropriately integrated into the community health course of the nursing program curriculum, research regarding nursing students' perception of risk factors for childhood lead poisoning is still lacking.

The Flint water and Detroit lead crisis presented a window of opportunity to provide nursing students with the lead knowledge, skills, and abilities necessary to be effective nurses and prepare them to play a role in public health emergency response. In this lead initiative, the study team provided students with a lead exposure prevention module to introduce students to various forms of lead exposures, as well as to various response skills essential to address this critical public health issue.

The purpose of this study was to describe and evaluate the effectiveness of a multi-modal childhood lead educational intervention. The following research questions were examined: 1) Do students' scores increase from the pretest to the posttest, indicating an increase in knowledge as a result of the educational intervention? 2) Is the addition of a lead module to the existing curricular materials more effective than the use of the existing curricular materials only? This study will help to fill gaps in the literature by assessing community health nursing students' lead exposure and poisoning knowledge and confidence levels, and will also contribute to the existing, minimal body of literature on this topic.

The main theoretical framework for this study was Nightingale's Theory of Nursing Practice, which indicates that environmental quality influences health and healing (Stanhope & Lancaster, 2018). This theory serves as the theoretical framework, specifically the principle of environmental alteration (Selanders, 2010). In this theory, Nightingale indicates that environmental factors can be altered to improve conditions that facilitate health and healing (Selanders, 2010). This theoretical framework relates to this study in that changing the environment by removing lead exposures can prevent lead poisoning and its complications, and thus promote human flourishing. An educational theory that also supports this research is Knowles' Adult Learning Theory (1984), which



indicates that adults prefer meaningful learning experiences with applicability to their career. This theory relates to this study in that the nursing students are adults and the information they are learning has relevance to their nursing career; this theory also relates in that it is a multi-modal theory and this study involves evaluation of a multi-modal childhood lead educational intervention (Knowles, 1984).

### Methods

This study utilized a mixed methods design to evaluate a multi-modal childhood lead educational intervention among community health nursing students. The quantitative component of this study was quasi-experimental and examined whether students' scores increased from the pretest to the posttest, indicating an increase in knowledge of lead exposure and lead poisoning prevention, as well as an increase in confidence in knowledge levels resulting from the educational intervention. The qualitative component of this study was evaluative and utilized students' responses to a questionnaire to understand what they learned, found most helpful, and how they plan to apply and utilize this knowledge in their nursing practice. The use of both quantitative and qualitative study components provided a more complete understanding and strengthened the study. Approval to conduct this study was obtained from the University Human Subjects Review Committee/Institutional Review Board (UHSRC-FY19-20-72). Purposive sampling was utilized.

The study sample ( $N = 190$ ) consisted of undergraduate, community health nursing students from multiple nursing program types at a Midwestern, urban, public university during fall 2019 and winter 2020 semesters. The fall 2019 semester cohort represented the control group and the winter 2020 semester cohort represented the intervention group. This study included community health nursing students in the following Bachelor of Science in Nursing (BSN) programs: traditional (where nursing is their first degree), second-degree (where they have a non-nursing primary degree), collaborative (where they complete two years at a community college and two years at the university), and completion (RNs with an associate degree returning for their BSN). Data collection was completed in person with students during fall 2019 semester and online with students during winter 2020 semester using Qualtrics Survey Software.

All students were required to complete the educational activities as part of their community health nursing coursework. Students completed a consent form one week prior to beginning the unit on environmental health and disaster management under which lead poisoning prevention was covered. Immediately after completing a consent form, students completed a pretest consisting of demographic questions that assessed gender, nursing program type, and whether they currently work in healthcare and if so, what capacity. The pretest also included quantitative content ques-

tions using the Nursing Students Lead Knowledge and Confidence Scale (NS-LEKS). The NS-LEKS consists of items adapted from the Chicago Lead Knowledge Test (Rabito et al., 2004) and Chinese Lead Knowledge Test (Huang et al., 2017), for which validity and reliability were established, and assessed students' general knowledge about lead exposure and lead poisoning prevention, knowledge specific to lead exposure, knowledge specific to lead poisoning prevention, and confidence in their knowledge levels.

In terms of standard content for the unit on environmental health and disaster management, students in both the control group (fall 2019 semester) and the intervention group (winter 2020 semester) received an interactive PowerPoint presentation on Environmental Health and Disaster Management. They were assigned the corresponding chapters in their community/public health nursing textbook, articles regarding notable natural and manmade disasters, and a video about asbestos contamination. Students in the intervention group (winter 2020 semester) were additionally assigned the Pediatric Environmental Health Specialty Units (PEHSU) e-learning module titled, "Pediatric Lead Exposure: Diagnosis, Management and Prevention," which covered diagnosis, management, and prevention of pediatric lead poisoning as a result of environmental exposures (PEHSU, 2017).

Students then completed a posttest one week after the unit on environmental health and disaster management concluded. The posttest contained all the same questions from the pretest with the addition of independently developed qualitative evaluative questions that only appeared on the posttest. The qualitative evaluative questions assessed what students learned that they did not know before about lead poisoning and prevention; what they found most helpful to learn about lead poisoning and prevention and why; how they plan to apply and utilize this knowledge in their nursing practice; and any additional comments or suggestions.

The quantitative data were analyzed using Statistical Package for the Social Sciences version 25. The qualitative data underwent thematic analysis.

## Results

### Quantitative

#### *Participant Demographics*

The participants consisted of community health nursing students ( $N = 190$ ) at a Midwestern, urban, public university. Descriptive frequencies revealed that the majority of participants were female (87.9%), prelicensure students in the traditional, second degree, or collaborative BSN program (68.4%), and currently work in healthcare (73.8%). For those who currently work in healthcare, the largest capacity for prelicensure students was Patient Care Technician (28.7%) and for postlicensure students was RN (44.1%). See Table 1 for demographics for study participants.

**Table 1***Demographics for All Participants*

| Demographic Characteristic                  | <i>n</i> | %      |
|---|----------|--------|
| <b>Gender</b>                               |          |        |
| <b>Female</b>                               | 167      | 87.90% |
| <b>Male</b>                                 | 22       | 11.60% |
| <b>Prefer Not to Reply</b>                  | 1        | 0.50%  |
| <b>Nursing Program</b>                      |          |        |
| <b>BSN-Traditional</b>                      | 74       | 38.90% |
| <b>BSN-Second Degree</b>                    | 35       | 18.40% |
| <b>BSN-Collaborative</b>                    | 21       | 11.10% |
| <b>BSN-Completion</b>                       | 60       | 31.60% |
| <b>Current Healthcare Work</b>              |          |        |
| <b>Yes</b>                                  | 141      | 73.80% |
| <b>No</b>                                   | 49       | 25.70% |
| <b>Main Healthcare Work Capacities</b>      |          |        |
| <b>Prelicensure-Patient Care Technician</b> | 39       | 28.70% |
| <b>Postlicensure-RN</b>                     | 60       | 44.10% |

***Impact of Lead Education on All Study Participants***

Paired samples t-tests of the pretest and posttest means revealed that participants' scores increased from the pretest to the posttest (meaning more correct responses on the posttest than the pretest) indicating an increase in knowledge levels in all areas of: general lead exposure and poisoning knowledge, lead exposure knowledge, lead poisoning prevention knowledge, and total lead exposure and poisoning knowledge, which were all statistically significant (general lead exposure and poisoning knowledge  $p < .05$  and lead exposure knowledge, lead poisoning prevention knowledge, and total lead exposure and poisoning knowledge  $p < .001$ ). Pretest and posttest means also revealed that participants' confidence in their knowledge levels increased from the pretest to the posttest, which was also statistically significant ( $p < .001$ ). Increases in lead knowledge levels and confidence in knowledge indicate that the educational intervention was effective. See Table 2 for pretest and posttest means with statistical significance for all participants.

***Comparison of Impact Between Control and Intervention Groups***

Pretest and posttest means were higher for students in the intervention group compared to students in the control group in the areas of lead poisoning prevention knowledge, total lead exposure and poisoning knowledge, and confidence in knowledge, which were statistically significant ( $p < .05$ ). The posttest mean was higher for students in the intervention group compared to students in the control group in the area of general lead exposure and poisoning knowledge and this finding was statistically significant ( $p < .05$ ). Pretest means for students in the intervention group may have been higher because there were practicing RNs in that group but not the control group. Posttest means for students in the in-

tervention group were likely higher due to the addition of the lead module to the existing curricular materials that semester; however, the mixed participant groups may affect the accuracy of the results on the effect of the difference in educational modes. See Table 3 for pretest and posttest means by control group (fall 2019 semester) versus intervention group (winter 2020 semester).

***Qualitative Information Learned About Lead Poisoning and Prevention***

In response to the question of what participants learned that they did not know before about lead poisoning and prevention, the first theme identified was sources of lead exposure. Examples of participant responses included: "Increased water temperature increases lead leaching," "Houses built before 1978 are more likely to have lead risks," and "I learned that imported pottery and jewelry can contain lead." Another example of a participant response included: "I also learned there are many ways that lead can make it to the home, like on people's work attire. Lead is almost like bacteria a health-care worker can bring home."

A second theme identified was signs and symptoms of lead poisoning and its effects. Examples of participant responses included: "Signs and symptoms to look for," and "That it can affect a child's IQ and ability to focus."

A third theme identified was screening and diagnosis, especially pertaining to lead levels. Examples of participant responses included: "I learned a lot about the levels of lead poisoning in bodies and how there is no safe level," and "I was unaware about serum blood levels of lead that were considered dangerous. I didn't realize how these recommendations were created either."

**Table 2***Pretest and Posttest Means with Statistical Significance for All Participants*

| Area/Category                                 | Pretest Mean | Posttest Mean | Significance |
|---|--------------|---------------|--------------|
| General Lead Exposure and Poisoning Knowledge | 92.97        | 95.24         | 0.021*       |
| Lead Exposure Knowledge                       | 79.06        | 83.39         | 0.000**      |
| Lead Poisoning Prevention Knowledge           | 69.55        | 80.13         | 0.000**      |
| Total Lead Exposure and Poisoning Knowledge   | 80.55        | 85.75         | 0.000**      |
| Confidence in Knowledge                       | 9            | 11.4          | 0.000**      |
| * $p < 0.05$                                  |              |               |              |
| ** $p < 0.001$                                |              |               |              |

**Table 3***Pretest and Posttest Means by Semester*

| Area/Category                                 |               | Cohort Category |             | Significance |
|---|---------------|-----------------|-------------|--------------|
|   |               | Fall 2019       | Winter 2020 |              |
|   |               | Mean            | Mean        |              |
| General Lead Exposure and Poisoning Knowledge | Pretest Mean  | 91.84           | 93.49       | 0.354        |
|   | Posttest Mean | 92.18           | 96.67       | 0.031*       |
| Lead Exposure Knowledge                       | Pretest Mean  | 78.13           | 79.49       | 0.058        |
|   | Posttest Mean | 82.64           | 83.73       | 0.481        |
| Lead Poisoning Prevention Knowledge           | Pretest Mean  | 63.60           | 72.34       | 0.001*       |
|   | Posttest Mean | 76.00           | 82.06       | 0.036*       |
| Total Lead Exposure and Poisoning Knowledge   | Pretest Mean  | 78.26           | 81.59       | 0.001*       |
|   | Posttest Mean | 83.65           | 86.7        | 0.012*       |
| Confidence in Knowledge                       | Pretest Mean  | 8.56            | 9.28        | 0.032*       |
|   | Posttest Mean | 10.80           | 11.66       | 0.025*       |
| * $p < 0.05$                                  |               |                 |             |              |

A fourth theme identified was prevention of lead poisoning, especially pertaining to diet. Examples of participant responses included: “That having a diet rich in vitamin C, calcium, and vitamin D is good to prevent the absorption of lead,” and “How nutrition is important in decreasing lead absorption.”

The fifth and final theme identified was policy and state-wide issues. An example of a participant response included: “More detailed information about how lead policy differs across states.”

### ***Most Helpful Information Learned About Lead Poisoning and Prevention***

Concerning the question of what participants found most helpful to learn about lead poisoning and prevention and why, the first theme identified was utilization of this information for application in practice with patients and in personal life with families. An example of a participant response regarding application in practice with patients included: “I think it will be helpful to educate my future patients and families,” and an example of a participant response regarding application in personal life included: “Education around children because I have children.”

A second theme that was identified was everything/all information. Examples of participant responses included: “Everything I learned was most helpful because it is all equally relevant to prevent lead exposure in children and adults,” and “Everything was helpful. The information was intriguing and informative to ensure children’s safety.”

A third theme identified was various learning modalities, with the video module emerging as its own subtheme. In regard to the theme of various learning modalities, examples of participant responses included: “Powerpoint + book. I learn well from reading,” “The movie presented facts in an easy way,” and “Taking the pre and posttest because it showed me how much I did or didn’t know about lead exposure.” Regarding the subtheme of the video module, examples of participant responses included: “I thought the video module was helpful. It went over a lot of things I did not know about lead exposure,” “The video you had us watch. This is because it explained things very well and then tested our knowledge at the end,” and “The video was very informative. Had lots of info.”

### ***Application and Utilization of This Knowledge in Nursing Practice***

In reference to the question of how participants plan to apply and utilize this knowledge in their nursing practice, the first theme identified was educating patients, especially around prevention, particularly avoiding exposure. Examples of participant responses included: “I will educate my patients on the dangers of lead,” and “I plan to use this informa-

tion to educate to prevent lead poisoning.”

A second theme identified was recognizing signs and symptoms. Examples of participant responses included: “Watch for signs and symptoms of lead poisoning,” and “To know what symptoms to look for in a child with lead poisoning and factors that can contribute.” Another example of a participant response pertaining to a combination of the first and second themes included: “I plan to use my knowledge I learned during this activity to practice primary and secondary prevention with my patient population to reduce the risk of exposure and decrease the chances or incidence of the harmful effects lead poisoning causes.”

A third theme identified was surveillance and monitoring. An example of a participant response included: “More closely monitoring for lead in patients.”

An additional theme that emerged was participants feeling it was not applicable to them in their current or projected nursing practice setting. An example of a participant response included: “I plan to work in adult critical care, so I’m not sure how I will use this information on a daily basis.”

### ***Additional Feedback Regarding the Educational Intervention***

Regarding the question of any additional comments or suggestions, most participants indicated that they did not have any additional comments or suggestions, for example, by noting not applicable (N/A). However, the theme of appreciation and support for this information was identified. Examples of participant responses included: “Thank you!” “I found this program very useful and beneficial,” and “I found it informative and educational. I like that questions are clear and to the point.”

## **Discussion**

This study is one of the few studies in existing literature that described and examined the impact of a multi-modal educational intervention to prepare nursing students in addressing the timely public health crisis. The educational intervention (the standard environmental health and disaster management unit, and the pediatric lead exposure e-learning module) improved participants’ knowledge of lead exposure and lead poisoning prevention, as well as participants’ confidence in their knowledge levels. The quantitative findings were further strengthened with participants’ responses that indicated how the educational intervention improved their knowledge of lead poisoning prevention and their behavioral intent. Particularly pertaining to what participants found most helpful, themes from the responses showed various learning modalities increased participants’ knowledge and behavioral intent in taking nursing interventions to prevent lead exposure and lead poisoning. In addition, the subtheme of the video module indicated that while participants felt



that the existing curriculum was helpful, their education was positively augmented by the addition of a pediatric lead exposure e-learning module as it further improved their knowledge of lead exposure and lead poisoning prevention.

The existing literature identified knowledge deficits of childhood lead poisoning among nursing students and supports more education on childhood lead poisoning in nursing program curriculum, as well as a need for research focusing on nursing students' knowledge of childhood lead poisoning (Morrison et al., 2017). According to this study's main theoretical framework, Nightingale's Theory of Nursing Practice, it appears that this educational intervention was effective in educating community health nursing students on how to positively alter the environment by educating the public about sources of lead exposure, lead testing, and prevention of lead exposure and lead poisoning. In relation to this study's supportive theoretical framework, Knowles' Adult Learning Theory, it seems that most students found the educational intervention to be valuable and relevant to their career. This study fills the gap by providing evidence on how educational intervention improved nursing students' knowledge of childhood lead poisoning, thereby contributing to the body of literature on this topic. Additionally, results of this study can improve the lead-based education given to the public, thereby promoting their health and helping to prevent and decrease lead exposure and lead poisoning.

A potential limitation to this study could include the mixed participant groups between the control group (fall 2019 semester) which consisted of prelicensure students only and the intervention group (winter 2020 semester) which consisted of pre- and postlicensure students, and the greater number of students (approximately double) in the intervention group (winter 2020 semester). Another potential limitation could include that this study has a relatively small sample, which may limit the generalizability of the findings. However, given that this study utilized a mixed methods approach, it is more comprehensive than the use of a single method, and strengthens the study, helping to counteract the small sample study limitation. An additional limitation could include the Coronavirus disease of 2019 (COVID-19) pandemic that occurred between the semesters, which may have had an impact on participants in the intervention group (winter 2020 semester), in that results may have been even more positive if this study was conducted at a time without the impact of the COVID-19 pandemic.

More research is needed in this area. Future plans include piloting the addition of a state-specific developed lead module and expanding community-based education with community-based organizational partnerships.

### Conclusions

The purpose of this mixed methods study was to describe and evaluate the effectiveness of a multi-modal childhood lead educational intervention. This study indicates that the educational intervention was effective, and the participant feedback shows support for the usefulness of this information. This research advances the science by helping to improve the lead-based education provided to community health nursing students.

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## Nurses' Perceived Readiness in Evidence-Based Practice: An Organizational Assessment

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The authors declare that there is no conflict of interest.

### Abstract

**Background:** Globally, nursing service departments of various hospitals encounter challenges in implementing Evidence-based Practice (EBP). Critical to the improvement of nursing outcomes is the practice of EBP. That is why EBP is considered a state of the art in the hospital organization. Organizational assessment, therefore, is needed to determine the hospital nursing service readiness in EBP.

**Objective:** The aims of the study are two-fold: (1) to identify the sources of nurses' knowledge and to determine the extent of knowledge-practice gap, skills, and attitude; and (2) to describe middle- and top-level managers of a hospital on evidence-based practice.

**Methods:** Descriptive, concurrent mixed-methods design was employed. The Promoting Action on Research Implementation in Health Services (PARIHS) model served as the theoretical framework where Context, Evidence, and Facilitation are considered important elements to the successful adoption of EBP. A survey questionnaire on EBP perceived knowledge, attitude, and practices by Malik et al. (2015) was responded to by 240 eligible staff nurses from a tertiary level, national government-funded hospital in the Philippines. The qualitative component of the study involved review of records, focus group discussions of seven middle managers, and structured interviews of four top level managers.

**Results:** The results revealed that the nursing service institution scored low to moderate readiness on evidence and facilitation elements of the framework, while moderate to high on contextual readiness on EBP. Three themes emerged in the qualitative data, namely: willingness to learn, research and EBP were difficult, and unmotivated to do EBP.

**Conclusions:** Nursing services of the institution point to the need to strengthen readiness on EBP. Of the three elements of the PARIHS framework, Context element scored favorable on EBP. The Evidence and Facilitation elements of the institution may need to be strengthened through the partnership between the academe and hospital.

**Keywords:** *evidence-based practice, Promoting Action on Research Implementation in Health Services (PARIHS)*

## Background

Evidence-based practice (EBP) improves patient, nurse, and organizational outcomes (Memtsoudis et al., 2019). Despite the importance of EBP in improving hospital organizations, adoption remains difficult and complex. Various reasons for the complexity of the EBP adoption in health care points to lack of experienced mentors, resistance to change, organizational infrastructures, the dearth of resources, and weak to sometimes non-existent health research uptake policies (Shayan et al., 2019; Wang et al., 2021). Nurses, being the largest workforce in the hospital setting can have valuable impact on the implementation of EBP. However, a recent study by Masuda et al. (2020) showed that in the practice of EBP in maternal and childcare, there is a significant discrepancy between the latest scientific evidence and in the actual intrapartum practice. Paler and Cachaper (2021) found out that nurses may have appreciated EBP in nursing practice but there still is a need to strengthen their skills and organizational support. To ensure the success of EBP, it is vital to assess the readiness of nurses which can reverberate to the different levels of the institution.

Over the last five years, various research on EBP focused on measuring the nurses' knowledge, skills, attitude, and beliefs (Chan et al., 2020; Harper et al., 2017; Yousseff et al., 2018). Time and time again, the findings are almost similar in these studies. Nurses believed that EBP is essential in nursing practice but lacks the institutional resources and support system to adopt the approach. The major gap is that most scientific literature focus on the line-managers without looking at the perspectives of those executives who develop policy, maintain the vision of the institution, and who lead in the execution of strategic plans. The organizational readiness is essential to initiate, support, and sustain EBP (Pittman et al., 2019). Hospital policies, guidelines, and procedures usually operate from top-down direction. However, without the support of the line level managers, any changes instituted in the hospital will not come to fruition. So, both the top-, middle-, and line-level managers must work toward a common objective- adoption of EBP approach. Organizational assessment on EBP readiness must be done systematically and in all levels in the organization.

Yoo and colleagues (2019) indicate that despite nurses' positive level of EBP beliefs, adequate knowledge and implementation of latest evidence is insufficient. This may be attributed to the lack of readiness of the institution to EBP (Yoo et al., 2019). This situation calls for the need to assess the readiness of executive mid-level managers, and not only among the nurses on the bedside.

One strategy in the conduct of an organizational assessment is through a partnership between the hospital and the academe of which this study aimed to accomplish. The overall purpose of the study is to describe the organizational readi-

ness of top-managers, middle-managers, and staff nurses in EBP. Specifically, the aims are two-fold: (1) to identify the sources of nurses' knowledge and to determine the extent of knowledge-practice gap, skills, and attitude; and (2) describe middle- and top-level managers of a hospital on evidence-based practice.

## Theoretical Framework

This study was primarily informed by the framework PARIHS or Promoting Action on Research Implementation in Health Services (Harvey et al., 2015). The PARIHS framework has three major elements: evidence, context, and facilitation. Harvey et al. (2015) partitioned the evidence into three namely: research, clinical experience, and patient preferences, while context includes culture, leadership, and measurement. In the study, the researchers assessed the extent of knowledge of the nurses on research, clinical experiences, as well as perceived patient preferences on EBP. Aside from best evidence and context, the framework suggests attention to facilitation (Kitson et al., 2008). Facilitation is the process used by an individual (i.e., the facilitator) to assist others change their attitudes, skills, or behaviors to improve the likelihood success of the intervention (Kitson et al., 1998). In the study, facilitation was largely assessed by the middle to high level managers as to the factors that facilitate EBP adoption. This framework implies that there must be coherent collaboration between the implementers and stakeholders.

## Methods

### Study Design

Descriptive, concurrent mixed-methods research design was employed in this study. This mixed-method research was guided by Creswell (2012) where corroboration of quantitative and qualitative data was made. Quantitative design was used to describe the nurses' sources of knowledge, knowledge-practice gap, skills, and attitude of staff nurses because numerical quantification can be a basis for initial assessment and progress in EBP. While qualitative designs on middle- and top-level managers to complement the assessment that numbers may not be able to capture like the experience and perceived barriers on EBP.

### Setting and Sample

The setting of the study is a 500-bed capacity government hospital located at Benguet, Philippines, approximately 206 kilometers from Manila, which operates under the mandate of the Department of Health (DOH) of the country. The researchers secured the approval of the Institutional Ethics Review Committee (\*\*\*\*\* ERC 2016-07). The population of interest for the quantitative part of the study are the staff nurses of the hospital. The sample was chosen using the following inclusion criteria: registered nurse; 18 years old and above and employed with the institution. The exclusion criterion includes those who are on leave. Of the 358 poten-



tial participants, 299 participated, but 59 of whom did not complete the questionnaire, resulting in 240 respondents.

The researchers requested time after the monthly staff nurses meeting to explain the purpose of the study and the partnership between the hospital and the university. Informed consent was explained that participation is voluntary and that there are no repercussions if they choose not to participate in the study. Questions were entertained to ensure the shared understanding of the items. Participants were given adequate time to complete the questionnaire.

The sample for the qualitative part were the middle managers: nurse supervisors and ward managers ( $n = 7$ ), who were selected through purposive sampling. The researchers approached the prospective participants then a schedule agreed by all was set for the focus group discussions. The four top-level managers (i.e., Medical Center Chief, Chief Nurse, and two Assistant Chief Nurses) participated in the focus group interview.

#### **Data Collection and Data Analysis: Quantitative**

The quantitative data was gathered using a questionnaire developed by Malik et al. (2015) (permission granted to researchers), which has a reliability of  $> 0.70$  for each section. The Likert-type questionnaire consisted of four sections: sources of knowledge (with 9 items, assessment on the various sources of information used by nurses from scientific to non-scientific sources); knowledge-practice gap (5 items, assesses the specific steps of EBP), skills (10 items, assesses process of searching, appraising, and synthesizing evidence), and attitude (17 items, assesses beliefs and biases on EBP). Line managers or staff nurses were asked to rate the extent of their readiness on a scale from 1 to 5: knowledge (1 = never; 2 = seldom; 3 = sometimes; 4 = frequently; 5 = always), skills (1 = beginner; 2 = novice; 3 = quite skilled; 4 = competent, 5 = expert), and attitude (1 = strongly disagree; 2 = disagree; 3 = unsure; 4 = agree; 5 = strongly agree). Immediately after accomplishing the questionnaire, each submitted tool was reviewed for completeness and approached staff nurses if there are missed items. Aided by SPSS v. 20 (Chicago, IL, USA), data were plotted using frequency, percentage, median, and mode. The researchers followed the guidelines by Malik et al. (2015) on interpretation of the tool.

In ranking the organizational readiness on EBP, the work of Hill et al. (2017) was used as a reference. The article categorizes the readiness of an institution to EBP based on the PARIHS framework. An EBP-ready institution is perceived to be strong in evidence (i.e., robust research, supportive clinicians, and patient preferences incorporated in most aspects of care), contextually ready (i.e., strong leadership, innovative culture, and a regular performance audit) and facilitators are well-equipped (i.e., EBP champions viewed

as respectable and credible, clear roles, and adaptive implementation style). A mixed or moderate ready institution is described as evidence in moderation (i.e., research mostly descriptive or anecdotal, divided clinical experience, and some incorporation of patient preferences), context is unsure (mixed delineation of leadership role, some innovation is seen, and few performances auditing), and facilitators characteristic, role, and style is unclear. Finally, a low ready institution is known to show low evidence (i.e., weak research, unsupportive clinicians, and non-participative patients), unready context (i.e., poor leadership, morale is low, and performance feedback), and overall ill-defined facilitation (i.e., poor facilitator characteristics, undefined EBP roles, and unclear styles) (Hill et al., 2017).

#### **Data Collection and Data Analysis: Qualitative**

The other half of the research team conducted the qualitative data gathering. A letter of invitation to participate in the research was forwarded to the top-level managers (i.e., medical center chief, chief nurse, and two assistant chief nurses). Additionally, enclosed in the letter was a request for documented evidence of Philippine Department of Health (DOH) guidelines and institutional policies of the hospital related to EBP. Submitted documents were then reviewed, looking into discussions on the utilization of EBP approach. Institutional policies related to EBP projects were analyzed. Administrative orders from the DOH were cross-examined to look for process, incentives, and the role of EBP in promotion in the institution. Existing structures for mentoring and sustainability were reviewed with regards to EBP. The results were cross-referenced and validated in the interviews and focus group discussion (FGD).

One week after the letter of invitation was sent, researchers followed-up on the top-level managers' responses. When affirmative responses were given, the schedule was set for the interview. Informed consent was obtained. The top-level managers were purposively selected and were assigned pseudonyms TM1 for top level manager 1, TM2 for top level manager 2, and so forth. The four top-level managers were interviewed exploring the institutional readiness of EBP from attitude, resources, and organizational policy. The setting of the interview was in the top-managers' office. Interviews lasted for 45 minutes to 1 hour. After the interviews were conducted with the top-level managers, each was asked to nominate the most active middle-level managers in the hospital with regards to EBP.

One of the guide questions for the top-level managers was to nominate nurse supervisors (middle-level managers) who the top-managers think are EBP champions in the hospital. When top managers differ with their nomination, they were asked collectively to choose the names until consensus was reached leading to seven middle-level managers (nurse supervisors). Informed consents were secured. FGD was done

with seven ( $n = 7$ ) nurse supervisors/ ward supervisors. To maintain anonymity, the researchers used the code names- NS1 for nurse supervisor 1, NS2 for nurse supervisor 2, and so forth. The FGDs took place at the hospital conference room which lasted for 1 to 1 ½ hours. There were nine people sitting in circle: seven were the supervisors and one facilitator (RCM-L) and one a notetaker (MTB). Initial neutral questions were asked during the FGD. Following, guided questions were asked in the FGD: (1) When you hear evidence-based practice, what are your thoughts? feelings? (2) What are the implemented projects on EBP? Barriers? Facilitating factors? (3) Roles in EBP? Explain. (4) What are your recommendations on EBP in the institution? (5) How do you bring staff nurses to EBP? Probing and follow-up questions were asked as needed. Further clarifications were conducted by approaching each individual participant for more information.

### Establishing Rigor for the Qualitative Data

Credibility and auditability criteria proposed by Marshall et al. (2011) were used to establish the rigor of the qualitative data. In establishing credibility, method and data source triangulation were employed. The researchers attempted to get the perspective of the top- and middle-level managers of the institution. The use of iterative questioning, paraphrasing and probing questions were emphasized to describe the institutional readiness to EBP. Member checks were done by summarizing important themes at the end of the interview/ FGD. For auditability purposes, the researchers transcribed verbatim. The table was divided into four columns: line number, verbatim, summary statements, and themes. The line number started with 001, 002, 003, 004, until all verbatim were covered. This step ensured that the transcribed verbatim could easily be audited.

Before data gathering, informed consent was secured from all participants and was explained that participation was voluntary. Confidentiality was observed using pseudonyms. The study results were also communicated to the participants and stakeholders. The researchers and the top-level managers met to share the findings of the FGD.

## Results

The results of this research were divided into two major sections: quantitative and qualitative. Quantitative results include sources of knowledge, knowledge-practice gap, skills, and attitude rating regarding EBP. Themes emerged from the qualitative findings based on identified enablers and barriers to EBP and included willingness to learn, research and EBP are difficult, and lack of incentive to do EBP.

### Quantitative Findings

#### Source of Knowledge in Nursing Practice

Table 1 shows that the sources of knowledge are varied. More than half of the nurses (55.8%) base their practice

from the information taken directly from the patient. Frequently staff nurses used intuition ( $n = 114$ , 47.5%) which concurs with their experience as the source of knowledge ( $n = 134$ , 55.8%). One-hundred thirty-one (54.6%) of staff nurses tend to stick with their previous actions, some information is frequently gathered from co-workers ( $n = 128$ , 53.3%) while doctor information is frequently asked by 130 of the respondents. However, 93 (38.8%) nurses sometimes sought information from non-peer reviewed sources like magazines or television and the majority (42.9%) frequently consulted these media.

### Knowledge-Practice Gap on EBP

As to the knowledge-practice gap, findings are presented in Table 1. The mode and the median of 4 interpreted as frequently. Majority of the staff nurses can frequently ( $n = 111$ , 46%) formulate an EBP question while one-hundred two (42.5%) sometimes do it. Moreover, most staff nurses (44.2%) frequently appraise research while 16 (6.7%) seldom checks the value of studies. More than half ( $n = 129$ ) frequently integrate clinician expertise and best evidence while 22.9% sometimes evaluate the outcomes.

### EBP Skills Rating

Most staff nurses described themselves as novice to quite skilled in EBP as reflected in Table 2. For instance, 69 (28.8%) are self-rated novice and 91 (37.9%) are quite skilled in finding research evidence. Thirty staff nurses consider themselves as beginner in performing comprehensive literature review. Self-rate evaluation of appraisal skills seems in consonance to earlier findings to which 35% were quite skilled but 21 were beginner as to locating information in the library. Often staff nurses are novice to quite skilled in seeking organizational protocols to inform their practice. Finally, 21 nurses are beginner in using research evidence to change practice.

### Attitude on EBP

Table 3 shows the staff nurse's attitude towards EBP. One-hundred thirty-five (56.3%) of the staff nurses agree to stick to tried and tested methods rather than something new while 36.3% ( $n = 87$ ) felt bad when their practice is questioned. Many of the staff nurses disagree as to understanding research articles. This result concurs with the frequently occurring score ( $Mo = 4$ ) meaning that most agree that they do not want their nursing actions questioned while the point in a distribution above and below of the 50% cases fall is unsure ( $Md = 3$ ). Majority (42.9%) of the staff nurses disagree as to the irrelevance of the research articles and 47.5% ( $n = 114$ ) agree that they don't have sufficient time to search for evidence relevant to practice. More than half ( $n = 146$ ) describe that research is paramount to the resources available but still 112 staff nurses disagree that EBP is a waste of time. Notably, 50% of the nurses are unsure about the difficulty with which they keep up with changes in their work. The

**Table 1**  
Sources of Knowledge on EBP, N=240

|  | Never |     | Seldom |      | Sometimes |       | Frequently |       | Always |       | Median | Mode |
|--|-------|-----|--------|------|-----------|-------|------------|-------|--------|-------|--------|------|
|  | n     | %   | n      | %    | n         | %     | n          | %     | n      | %     |        |      |
| 1. Information that I learn about each patient as an individual.                 | 0     | 0   | 4      | 1.7% | 38        | 15.8% | 134        | 55.8% | 64     | 26.7  | 4      | 4    |
| 2. My intuitions about what seems to be right for my patient.                    | 2     | .8% | 9      | 3.8% | 59        | 24.6% | 114        | 47.5% | 56     | 23.3% | 4      | 4    |
| 3. My personal experience of caring for patients/clients over time.              | 0     | 0   | 4      | 1.7% | 38        | 15.8% | 134        | 55.8% | 64     | 26.7% | 4      | 4    |
| 4. The ways I have always done it.   | 1     | .4% | 3      | 1.3% | 51        | 21.3% | 131        | 54.6% | 54     | 22.5% | 4      | 4    |
| 5. Information my co-workers share.  | 1     | .4% | 3      | 1.3% | 58        | 24.2% | 128        | 53.3% | 50     | 28.8% | 4      | 4    |
| 6. What doctors discuss with me.   | 0     | 0   | 2      | .8%  | 41        | 17.1% | 130        | 54.2% | 67     | 27.9% | 4      | 4    |
| 7. Information I get from attending in-services/ training/ conferences.          | 0     | 0   | 0      | 0    | 27        | 11.3% | 103        | 42.9% | 110    | 45.8% | 4      | 4    |
| 8. Information I get from policy and protocols.                                  | 0     | 0   | 0      | 0    | 29        | 12.1% | 115        | 47.9% | 96     | 40%   | 4      | 4    |
| 9. Information I get from:   |       |     |        |      |           |       |            |       |        |       |        |      |
| a) Articles published in medical journals.                                       | 0     | 0   | 13     | 5.4% | 98        | 40.8% | 103        | 42.9% | 26     | 10.8% | 4      | 4    |
| b) Articles published in nursing journals.                                       | 0     | 0   | 15     | 6.3% | 99        | 41.3% | 98         | 40.8% | 28     | 11.7% | 4      | 3    |
| c) Articles published in research journals.                                      | 0     | 0   | 15     | 6.3% | 96        | 40%   | 105        | 43.8% | 24     | 10%   | 4      | 4    |
| d) Textbooks.  | 1     | .4% | 5      | 2.1% | 55        | 22.9% | 133        | 55.4% | 46     | 19.2% | 4      | 4    |
| e) Internet.   | 1     | .4% | 4      | 1.7% | 56        | 23.3% | 122        | 50.8% | 57     | 23.8% | 4      | 4    |
| f) Media (magazines, TV).  | 1     | .4% | 13     | 5.4% | 93        | 38.8% | 103        | 42.9% | 30     | 12.5% | 4      | 4    |
| <b>Knowledge-Practice Gap</b>  |       |     |        |      |           |       |            |       |        |       |        |      |
| 1. Formulated a clearly answerable question as the beginning of the process.     | 0     | 0   | 7      | 2.9% | 102       | 42.5% | 111        | 46.3% | 20     | 8.3%  | 4      | 4    |
| 2. Tracked down the relevant evidence once formulated the question.              | 1     | .4% | 9      | 3.8% | 95        | 39.6% | 109        | 45.4% | 26     | 10.8% | 4      | 4    |
| 3. Critically appraised, against set criteria, any literature I have discovered. | 0     | 0   | 16     | 6.7% | 103       | 42.9% | 106        | 44.2% | 15     | 6.3%  | 4      | 4    |
| 4. Integrated the evidence I have found with my expertise.                       | 1     | .4% | 8      | 3.3% | 70        | 29.2% | 129        | 53.8% | 32     | 13.3% | 4      | 4    |
| 5. Evaluated the outcomes of my practice.  | 2     | .8% | 5      | 2.1% | 55        | 22.9% | 134        | 55.8% | 44     | 18.3% | 4      | 4    |

**Table 2***EBP Skills Rating, N = 240*

|   | Beginner |       | Novice   |       | Quite skilled |       | Competent |       | Expert   |       | Median | Mode |
|---|----------|-------|----------|-------|---------------|-------|-----------|-------|----------|-------|--------|------|
|   | <i>n</i> | %     | <i>n</i> | %     | <i>n</i>      | %     | <i>n</i>  | %     | <i>n</i> | %     |        |      |
| 1. Finding research evidence.                                   | 26       | 10.8% | 69       | 28.8% | 91            | 37.9% | 51        | 21.3% | 3        | 1.3%  | 4      | 4    |
| 2. Comprehensive literature review.                             | 30       | 12.5% | 62       | 25.8% | 102           | 42.5% | 46        | 19.2% | 0        | 0     | 3      | 3    |
| 3. Critical appraisal skills.                                   | 29       | 12.1% | 58       | 24.2% | 84            | 35%   | 68        | 28.3% | 1        | .4%   | 3      | 3    |
| 4. Finding organizational information.                          | 21       | 8.8%  | 60       | 25%   | 85            | 35.4% | 71        | 29.6% | 3        | 1.3%  | 3      | 3    |
| 5. Using the library to locate information.                     | 16       | 6.7%  | 58       | 24.2% | 93            | 38.8% | 69        | 28.8% | 4        | 1.7%  | 3      | 3    |
| 6. Using the internet to search the information.                | 8        | 3.3%  | 27       | 11.3% | 80            | 33.3% | 96        | 40%   | 29       | 12.1% | 4      | 4    |
| 7. Reviewing research evidence.                                 | 22       | 9.2%  | 51       | 21.3% | 90            | 37.5% | 70        | 29.2% | 7        | 2.9%  | 3      | 3    |
| 8. Reviewing organizational information (protocols/guidelines). | 24       | 10%   | 35       | 14.6% | 96            | 40%   | 79        | 32.9% | 6        | 2.5%  | 3      | 3    |
| 9. Using research evidence to change practice.                  | 21       | 8.8%  | 42       | 17.5% | 93            | 38.8% | 80        | 33.3% | 4        | 1.7%  | 3      | 3    |
| 10. Using organizational information to change practice.        | 22       | 9.2%  | 47       | 19.6% | 85            | 35.4% | 84        | 35%   | 2        | .8%   | 3      | 3    |

**Table 3***Staff Nurses Attitude on EBP, N = 240*

|  | Strongly disagree |      | Disagree |       | Unsure   |       | Agree    |       | Strongly agree |      | Median | Mode |
|--|-------------------|------|----------|-------|----------|-------|----------|-------|----------------|------|--------|------|
|  | <i>n</i>          | %    | <i>n</i> | %     | <i>n</i> | %     | <i>n</i> | %     | <i>n</i>       | %    |        |      |
| 1. I stick to tried and trusted methods rather than changing anything new.     | 6                 | 2.5% | 52       | 21.7% | 30       | 12.5% | 135      | 56.3% | 17             | 7.1% | 4      | 4    |
| 2. I resent having my practice questioned.                                     | 20                | 8.3% | 74       | 30.8% | 57       | 23.8% | 87       | 36.3% | 2              | .8%  | 3      | 4    |
| 3. Much of the available research is not relevant to my professional practice. | 19                | 7.9% | 103      | 42.9% | 49       | 20.4% | 69       | 28.8% | 0              | 0    | 2      | 2    |



|     |  | Strongly disagree |       | Disagree |       | Unsure |       | Agree |       | Strongly agree |       | Median | Mode |
|-----|--|-------------------|-------|----------|-------|--------|-------|-------|-------|----------------|-------|--------|------|
|     |  | n                 | %     | n        | %     | n      | %     | n     | %     | n              | %     |        |      |
|     |  | <hr/>             |       |          |       |        |       |       |       |                |       |        |      |
| 4.  | I find that research articles are not easily understood.   | 7                 | 2.9%  | 99       | 41.3% | 43     | 17.9% | 85    | 35.4% | 6              | 2.5%  | 3      | 2    |
| 5.  | I don't have sufficient time to find research reports.   | 3                 | 1.3%  | 61       | 25.4% | 50     | 20.8% | 114   | 47.5% | 12             | 5%    | 4      | 4    |
| 6.  | I believe in putting research into practice is to some extent dependent on how much is going to cost.                  | 3                 | 1.3%  | 42       | 17.5% | 35     | 14.6% | 146   | 60.8% | 14             | 5.8%  | 4      | 4    |
| 7.  | Evidence-based practice is a waste of time.  | 70                | 29.2% | 112      | 46.7% | 24     | 10%   | 33    | 13.8% | 1              | .4%   | 2      | 2    |
| 8.  | I feel that there are benefits to changing my practice, based on research.   | 2                 | .8%   | 9        | 3.8%  | 22     | 9.2%  | 160   | 66.7% | 47             | 19.6% | 4      | 4    |
| 9.  | I find compliance is a major factor in the use of evidence.  | 1                 | .4%   | 11       | 4.6%  | 15     | 6.3%  | 167   | 69.6% | 46             | 19.2% | 4      | 4    |
| 10. | I find it difficult to keep up all the work changes happening in my work environment at present.                       | 6                 | 2.5%  | 71       | 29.6% | 50     | 20.8% | 105   | 43.8% | 8              | 3.3%  | 3      | 4    |
| 11. | I find it hard to influence changes to clinical practice in my work setting.   | 6                 | 2.5%  | 71       | 29.6% | 39     | 16.3% | 114   | 47.5% | 10             | 4.2%  | 4      | 4    |
| 12. | I would feel more confident if there was an individual experienced in research to supply me with relevant information. | 1                 | .4%   | 4        | 1.7%  | 16     | 6.7%  | 171   | 71.3% | 48             | 20%   | 4      | 4    |
| 13. | I would feel more confident if there was an individual experienced in research to supply me with relevant information. | 56                | 23.3% | 164      | 68.3% | 16     | 6.7%  | 3     | 1.3%  | 1              | .4%   | 2      | 2    |
| 14. | I would like to access current best evidence more often than I currently do.   | 37                | 15.4% | 173      | 72.1% | 20     | 8.3%  | 8     | 3.3%  | 2              | .8%   | 2      | 2    |
| 15. | Research findings are often not easily transferable into my practice.  | 7                 | 2.9%  | 52       | 21.7% | 50     | 20.8% | 112   | 46.7% | 19             | 7.9%  | 4      | 4    |
| 16. | Evidence-based practice is fundamental to professional practice.   | 3                 | 1.3%  | 4        | 1.7%  | 15     | 6.3%  | 145   | 60.4% | 73             | 30.4% | 4      | 4    |
| 17. | Implementing evidence-based practice will be of benefit to my professional development.                                | 10                | 4.2%  | 2        | .8%   | 13     | 5.4%  | 133   | 55.4% | 82             | 32.2% | 4      | 4    |

median to keeping up with the work and doing research is 3 interpreted as unsure. Most staff nurses (71.3%) disagree that mentoring would be helpful to increase their attitude on EBP. Staff nurses disagree on deluging themselves of best evidence more than their current practice. Surprisingly, a majority agree that research findings are not easily transferable to practice (46.7%), even though they are fundamental (60.4%) and beneficial to their practice (55.4%).

## Qualitative Themes

### Willingness to Learn

The top- and middle-level managers are provided a more accurate portrayal of the organizational readiness with regard to the context and facilitation. In the structured interview, TM1 is “very much willing” to partner in this program (between the hospital and the academe), as seconded by TM2 saying, “My people here are listening to me, I can use that as a tool to further the cause of improving patient outcomes.” TM2 quipped that they have the “100%” support for this partnership program between the academic institution and the hospital. The leadership seems ready to pour out their support on this partnership. In-depth data collection using records review showed that there is no EBP protocol followed by nurses except those that are related to the International Organization for Standardization (ISO) accreditation, continuous improvement accreditation for various industries including hospital to ensure that services meet excellent standards (Mohammad Mosadeghrad, 2014). The scope of ISO (2015) includes implementation of quality management system, customer confidence on services, and continuous training and assessment in quality management. As to measurement, they have a regular chart audit and feedback as ISO framed. An external audit by physicians and other allied health workers is also done based on the standards set forth by ISO. As to the records review, research committee is present but focuses on the role as members of the Institutional Ethics Review Board. No evidence of EBP projects has been presented.

TM4 revealed, “There is no EBP implementation here... but we are willing to learn.” TM1 shared this contention, saying that learning EBP would “improve the institution.” “As to how it’s done, how to formulate questions, appraising, but we are willing to learn the research skills,” TM3 added while NS5 summed up, “supportive training would help us.”

### Research and EBP are Difficult

The TM1 stated that the institution is “not engaged” in any EBP implementation and that screening and evaluating research studies are filtered solely by their institutional ethics committee. The TM2 added that to put it quantitatively, the institution is about “60%” ready on EBP because nurses conduct research only in relation to postgraduate studies. There have been research initiatives but remained incom-

plete or unfinished. The “60%” statistics provided by TM2 is refuted by the FGDs of which NS3 said, “To my knowledge, we did not finish even one study. The closest we got was the shifting to 12-hour duty but was stopped by the DOH” because of ethical and administrative issues. Aside from the ethics committee, a research committee in the nursing service exists, but the policy and operating procedures are not well stipulated. When asked to provide committee protocols or policies regarding EBP or research utilization, the top managers admitted that these are not fully set or crafted. Embedded in the dearth EBP implementation is the lack of structure to support the sustained research adoption.

Despite these assertions, nurses believed that their present leadership and current efforts to bring organizational change and partnership with the non-government/ private organizations can facilitate the adoption of EBP. TM2 indicated that most staff nurses want EBP as their approach in nursing care, but the problem is where to start. Given that the researchers’ institution is perceived to be a credible academic institution, this advantage can be used as an anchor to private-public partnership. With this context, TM1 even wanted to sign the memorandum of agreement immediately which speaks of their willingness for this joint program. In the records review, the researchers found out that guidelines and protocols on EBP by the DOH are non-existent, at least to the knowledge of the nursing services leadership. The researchers counterchecked the presence of EBP protocol and guidelines in the DOH website ([www.doh.gov.ph](http://www.doh.gov.ph)), and it turned out missing or unavailable.

Corroborating the quantitative result based in their actual practice, NS1 claimed, “We all base what we do on what we have been used to.” NS5 added, “The closest of evidence-based practice we had in the delivery room is the skin-to-skin contact” parallel to what NS2 added that in the Operating Room staff nurses, “use scrubless, only sterillum” during surgical hand washing. However, middle managers also shared that most of these evidence-based practices were instituted by physician and not nurses. On culture, the FGDs participants implied that they are not ready for the reason of work overload and their limited knowledge and skills in EBP. As NS3 noted, “.....many of us are so difficult to change, they always reason that we always have done it like that. They tend to be very complacent in their work.” The rest of the nurse supervisors in the FGDs nodded in agreement with what NS3 stated. The learning culture is not cultivated according to the nurse supervisors. “Many of us just encountered research during our masters, and forgot about it,” NS3 added.

### Unmotivated to do EBP

The findings from the FGDs show a certain degree of reluctance in research and EBP engagement due to the perception that it is an academic activity (and it does not involve them as clinicians). At the same time EBP involves much

thinking, time, and effort. There is a fear that engaging in EBP interferes with their primary function of providing bedside care to patients. NS1 exasperatedly said, "The truth is I don't like research," suggesting research aversion. This claim is mirrored to EBP aversion. When asked for reasons, middle managers mentioned difficulty to understand, lack of interest, and no incentives provided. TM4 said that the old system awards "2% salary increase" for those staff nurses who finished graduate studies, which is evaluated as "very small" compared to the bulk of work, effort, and resources it entails. This lack of interest in research is attributed by TM3 to the dearth of incentives and to the heavy workload of staff nurses. In the records review, the researchers found out that there are less than 100 books in their hospital library and all are outdated (published 10 years or more). The hospital does not subscribe to any electronic databases.

### Discussion

The study contributes to nursing scholarship because it highlights the importance of looking at the different levels of the organization when it comes to EBP readiness. Looking in silos as revealed in the literature, that is, on the staff nurses' knowledge, skills, and attitude alone- the researcher posits are compartmentalized and is not reflective of what is happening in nursing practice. The study highlights the importance of an external partnership to determine the organizational readiness on EBP. Overall, the findings of this study point to the facilitators and barriers to the integration of EBP in nursing practice.

The sources of knowledge imply that nurses use a combination of research, protocol, colleagues, experience, intuition, and non-peer-reviewed materials as the bases for practice, which is similar to the findings of Malik et al. (2015). The research findings concur with previous studies of the difficulty incorporating EBP approach in the hospitals. For example, in China, Chen et al. (2020) found out that nurse managers believe in the value of EBP but lack the necessary organizational environment and knowledge to foster the approach in the nursing practice. The EBP implementers may need to first incorporate the approach in the institutional vision and mission. This way, the EBP approach will trickle down to the line-managers or staff managers.

The findings also coincide with that of Johansen et al. (2016), describing the nurse's use of knowledge as complicated. Despite increasing calls to base nursing practice on best evidence (Majers & Warshawsky, 2020), many nurses opt for non-scientific sources. An intervention not based on substantial scientific evidence could not only be replicable and could lead to lethal consequences both to the patients and nurses. Albano et al. (2014) found that health workers who based their decision on non-scientific journals have a professional's higher risk of acquiring infections. This observation implies giving importance to being careful about

sifting information to be used in nursing practice. The finding can be related to one of the qualitative themes of this research, i.e., nurses are averse in making rigorous scientific processes and it was not reinforced by the institution. Going back to the Harvey et al. (2015) continuum- along with evidence, the institution seems to have an inconsistent view on clinical experience and patients, nurses fall in between low to moderate evidence (Hill et al., 2017). The lack of actual studies conducted by nurses supports the low to moderate description. Moreover, patient preferences are incorporated only in some aspects of nursing care while the institution is not fully equipped with open and web resources in the hospital library. The finding implies that based on PARIHS framework the institution evidence (i.e., research, patient preferences, and clinician experience) element could be from low to moderate readiness.

The status of the majority of staff nurses demonstrating novice to quite skills on EBP necessitates the call of stronger partnership between the academic institution and the hospital. Developing a program that benefits both institutions can be grounded based on these findings. Most staff nurses find comprehensive literature review and appraisal lacking that could be refined by partnership training between the two institutions. The qualitative findings show that nurses had not completed an EBP project therefore nothing was implemented. The culture, to some extent, does not value research while the leadership is willing to take the risk and pour support into the partnership. This finding is made evident by the institution's willingness to undergo external accreditation, suggesting a mission to transform the organization and not settle on status quo. The resources are lacking, such as a good library and access to databases but this limited access to information resources is compensated by the willingness of the academic institution to lend the researchers subscribed electronic databases with direct supervision.

As to facilitation, nurses seem to be on a low to moderate level of EBP readiness. This finding may be attributed to the apprehension of many nurses towards EBP. Undeniably, the top-level managers exhibit respect, credibility, and empathy to the staff nurses; however, based on the record's review, the research committee's role is unclear with regards to EBP. The willingness to learn by the top-level, middle-level, and line-level managers suggests some flexibility and adaptability. Overall, the PARIHS framework can be used to describe organizational readiness on EBP.

### Limitations

The study may be susceptible to single institution bias given that the study was conducted in one institution. The high rating on the questionnaire could have been affected also by social desirability bias. Notably, 34.6% of the total respondents are Job Orders. Nurses on a Job Order basis are renewed (or not) every five months by the DOH. This

temporary job situation could question their ability to fully engage on EBP which requires time and effort plus long-term commitment to improve patient and organizational outcomes. Finally, the descriptive design of this study does not render causal inferences.

### Conclusions

The study shows that nurses may not be ready for evidence-based practice adoption. Of the three elements based on the PARIHS framework, only the context seems ready to the partnership between the academe and hospital. This condition is an avenue to strengthen the EBP capability in the institution.

Using the PARIHS framework, the researchers inferred that there is an overall low to moderate readiness. It may be a manifestation of the relative infancy of nursing research in their nursing services, lack of EBP institutional and country-wide guidelines and unavailability of EBP protocols. The clinical experience may need enrichment while the sources of knowledge be directed to scientific origins. As to the context, there is strong leadership support by the top-level managers, presence of measurement tools as ISO accreditation mandates, while the culture is uncertain on research. The apprehension on EBP by the middle-managers and staff nurses can be changed by the strong leadership support seen from the top-level managers. Yet at the moment, with the weak to moderate contextual readiness, it will benefit much with updates and enrichment. EBP is one way to improve patient outcomes. However, if nurses are not fully equipped and policies are not ready, efforts to promote EBP will not come to fruition. The policy should enhance their knowledge, skills, and attitude on EBP, and there is a need to explicitly stipulate in the protocol and support nurses who are doing EBP projects. Incentives could be given to implementers, while EBP policies can be created to ensure sustainability.

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# Effect of Ask3Teach3 on Patient Satisfaction on Medication Communication

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## Conflict of Interest

The authors declare that there is no conflict of interest.

## Abstract

**Introduction:** Communication about medication is a vital domain in patient satisfaction and quality of care. A useful health literacy tool, the Ask3Teach3 approach can increase the patient's understanding of medication using a standardized script to teach three main components of the new medication and patients are to respond to three relevant questions.

**Objective:** The purpose of the study was to examine if the implementation of the Ask3Teach3 approach improved patient satisfaction related to medication communication.

**Methods:** Using a pre- and post-study design, the Ask3Teach3 approach was employed by twenty-one staff nurses to oncology unit patients receiving new medication during their hospital stay. Patient satisfaction with the healthcare experience including communication about medication was measured by Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey scores. Eleven survey results were compared before and after implementation of Ask3Teach3 to determine the effect of the intervention on patient satisfaction on communication on medication.

**Results:** Patient satisfaction overall scores on medication communication increased by 37.5% from 62.5% to 100% after implementing the Ask3Teach3 approach.

**Conclusions:** The project shows a potential benefit of Ask3Teach3 in improving patient satisfaction on medication communication among oncology patients. It is suggested that having the Ask3Teach3 approach structured and consistent with multiple reinforcement was supportive of quality of care and knowing that patients understood their medication gave mutual satisfaction to both patients and nurses.

**Keywords:** *HCAHPS, Ask3Teach3, patient satisfaction, medication communication*

### Background

Improving quality of care has been an ongoing subject of healthcare systems with regards to patient experience. Patient experience has become the prime focus of quality improvement in the face of rising healthcare costs and concerns on quality and patient safety (Stimfel et al., 2016). In 2002, the Agency for Healthcare Research and Quality (AHRQ) developed the Hospital Consumers Assessment of Health Providers and Systems (HCAHPS) in collaboration with the Centers for Medicare & Medicaid Services (CMS). Designed as a patient satisfaction tool, it reflects the patient's perception of care quality received at healthcare facilities across the country. The scores are used to compare hospitals using various metrics and alert healthcare facilities of their performance as it relates to patient engagement and patient satisfaction. The CMS reimbursement method has also been changed to a value-based purchasing program based on the HCAHPS patient experience domain score (Khan et al., 2015; Price, 2021). This makes the HCAHPS survey score a significant variable in the fiscal year of the healthcare organization.

Patient experience is a commonly accepted core indicator of a healthcare system's quality (Luxford & Sutton, 2014). Hospital organizations increasingly monitor patient experience to evaluate and improve care quality (Kieft et al., 2014). One of the patient experience domains in HCAHPS survey is communication on new medication. Medication education affects patients' satisfaction (Sze et al. 2020). Strategies to increase patient engagement in understanding medication communication are invaluable in improving patient experience and outcomes. Gillam et al. (2016) stated that it is the nurses' responsibility to provide patient education on medications and their side effects. The American Nurses Association identified patient satisfaction on educational information as a quality indicator that captures care (Neil, 2015).

The enhancement of patient education through effective communication can improve the quality of care and the safety of the patients. Patient education is a critical element of patient care, while inadequate patient education is detrimental to patient safety. Poor communication regarding medication management may result in patients not adhering to their medication (Linn et al., 2016) leading to poor health outcomes (Taani et al., 2020). Safety issues may arise from insufficient medication information, resulting in patients' inability to manage or prevent adverse effects, and likely non-compliance which leads to a longer length of hospital stay or preventable readmission. According to Hume and Tomsik (2014), effective patient education strategies to ensure the clear understanding of medication play a crucial role in reducing readmission rates, affecting the hospital's Medicare reimbursement. The gap in nurse-patient communication on medication can influence patient safety and qual-

ity of care. When patients are discharged with prescribed medication, they are expected to adhere to the discharge care plan. The other effect of inadequate patient education was a higher readmission rate leading to additional hospital costs. Edgar (2016) reported increased hospital readmission rates and jeopardized patient safety when discharge education with written instructions were not adequately provided to the patients. Ruiz et al. (2008) work, as cited in Anderegg et al. (2014) noted that 4.5% of all-cause readmissions were related to adverse drug reactions.

Nurses need to understand different modalities in enhancing patient's perception of communication regarding new medication. In their research, Jones and Coke (2016) expressed that multiple interventions were essential for a successful medication education program. The comprehensive educational program included the following: a training module and teach-back competency assessment of nurses, new medication alerts in the electronic medical record, medication sheets for patients, rounds, phone calls after patient discharge, teach-back technique during bedside shift reporting and the use of patient communication board to reflect the teaching. The patient's combined experience during the bedside report and the communication board's visual reminder on the new medication was part of this evidence-based multi-component program. When HCAHPS was used to evaluate patients' knowledge of medication and satisfaction after the intervention, it revealed a 4% increase on domain composite scores. A similar approach of multi-intervention described by Price (2019) included teach-back technique and preprinted adhesive labels with common adverse reactions of new medications placed on the patient's water pitcher were opportunities to educate patient of the new medication. Other studies focused on the value of medication information sheets as a communication tool to the patients. According to Ingles and Rosillo (2015), consistency was relevant in educating patients on medication purpose and potential side-effects. The study led to the development of easy-to-understand printed hand-outs with the elements of generic and brand names, medication purpose, and top five potential side-effects to help discuss the medication information. A quality improvement study by Garlapow and Pagan (2016) resulted in an evidence-based, two-page pamphlet, *Indication and Common Side Effects of the Most Used Medications*, designed to address the two HCAHPS survey questions on medication domain. The pamphlet has information on the medication name, purpose, and potential side effects which was provided to patients upon admission. Garlapow and Pagan (2016) stated that nurses used the pamphlet to highlight the specific medications prior to administration of the new drug using the teach-back method's communication strategy. Also, according to Jones and Coke (2016), user-friendly educational material with pictures helped educate patients on their new medication. The same description was also emphasized when side

effect information sheets were developed for nurses to highlight the appropriate medication class while integrating the teach-back method (Gillam et al., 2016). Moreover, Bowen et al. (2017) and Hegeman et al. (2021) noted that providing written educational resources in different languages in patient-friendly format is important in improving medication education.

Nurses assume an educational role in improving patient's understanding of new medication by determining the patient's assimilation of information. Teach-back is a commonly used evidence-based practice in verifying patient comprehension. It also allows for immediate correction on any medication misconception. Nickles et al. (2020) study on a medical-geriatric unit supported teach-back as an effective medication education intervention for improving patient knowledge on the purpose and side effects of current medications. Pagels et al. (2015) in their research expressed teach-back method was used more often compared to another approach, Ask Me 3 when teaching patients about their medication treatment. Participants acknowledged teach-back was effective in reviewing what the patient had learned after the education session. White et al. (2013) also identified teach-back as an effective assessment tool on learned and retained information after educating 276 heart failure patients at a California medical center. The study revealed 75% of patients were successfully able to teach-back the information. Another study conducted by Ahrens and Wirges (2013) has proven teach-back methodology to be successful in reinforcing the learning of medication side effects by patients in a neuro-medical surgical unit. The HCAHPS new medication domain scores specifically on medication side effects increased from 29.7% to 77.3% after implementation. From that same study, Ahrens and Wirges (2013) commented that effective communication was relevant because of its linkage to improved patient satisfaction and health outcomes. Moreover, Khan et al. (2015) and Hay et al. (2019) determined that patients' perceived quality of care was linked with their interpersonal interaction with the healthcare team, which significantly influenced the patients' responses to the HCAHPS survey. The HCAHPS data from the study revealed that respecting, listening to the needs, and explaining things thoroughly to patients strongly affect their satisfaction. Studies repeatedly validated the essential skill of interaction by nurses toward patients in improving patient education.

The role of a nurse as an educator is vital in a patient's understanding of the newly prescribed medication, its purpose, and the potential side effects. The Ask3Teach3 was based on the National Patient Safety Foundation Ask Me 3 to encourage patients to participate in their care. The Ask Me 3 was tailored in a New Zealand inpatient hospital setting was helpful in improving health literacy including medication knowledge (Lam et al., 2019). According to the

study of Grice et al. (2014), this approach was useful as a health literacy tool in increasing medication knowledge of senior population. The Association for Patient Experience (2013) utilized the Ask3Teach3 by using a scripted statement to answer the three questions: what is the name of the medication, what is the purpose of the medication, and what are the potential side effects of the medication. It is a structured program used by the healthcare provider to teach three essential components of the new medication. Every time a new medication is administered to the patient, the nurse will do the Teach3 by using the following script: this medication is (insert the medication name), this medication was prescribed for (insert purpose), and the potential side effects of this medication are (insert side-effects). The nurse will review with the patient the three aspects of the new medication by using the Ask3 scripting. Questions to ask the patient after teaching the patient on the new medication are the name, the purpose, and the potential side-effects of the medication every time the patient receives the new medication. The teach-back is integrated when the nurse asks those three questions every time a new medication is administered. The same concept, the Ask3Teach3 was expressed by Cartwright (2017) as supportive in the improvement in patient's understanding of medication in a medical-surgical telemetry unit. It was also focused on the three essential aspects of the medication the patient needed to know.

The Ask3Teach3 has been successful in increasing HCAHPS medication domain scores. The consistency of interaction with patients and the simplicity of this evidence-based practice in addressing specifically the purpose and side effects of new medication would be an appropriate quality improvement intervention on practice change. However, after conducting literature review, no single answer or intervention was found to improve patient satisfaction. Additional evidence-based approaches were needed when educating patients on new medication. Evidence-based interventions like Ask3Teach3 along with teach-back method, medication information sheet, and bedside reporting were all shown to improve patient satisfaction on new medication communication. The Ask3Teach3 approach enhanced patient education on new medication using the important components of consistent scripting, integrating teach-back, medication information sheet, and reinforcement at bedside reporting. Patient education that was engaging and simplified is an excellent concept towards the improvement of patient experience and understanding of new medication. Hence, this project was initiated using the health literacy tool, Ask3Teach3, to enhance patient education of newly prescribed medications during their hospital stay. The purpose of the study was to improve the HCAHPS satisfaction score on medication education of an Oncology unit by facilitating effective nurse-patient communication regarding new medication using Ask3Teach3.



## Methods

### Setting and Sample

The project was conducted in a 478 bed, acute care teaching hospital, centrally located in New Jersey delivering a wide variety of medical services with specialties in maternity and pediatrics services. The hospital has been recognized with Magnet designation six consecutive times. The Oncology unit has a 24-bed, private rooms. The unit admits adult and geriatric cancer patients, often with other medical conditions. Chemotherapy drugs and pain medications were commonly prescribed medications in the unit. The unit has 20 full-time registered nurses and a total of 39 part-time and per diem staff nurses. Full-time status nurses work 36 hours a week, and nurses with part-time status work 16 hours a week. Nurse to patient ratio is generally 1:6. All patients in the unit receiving new medication during their hospital stay were educated by the nurses utilizing the Ask3Teach3 approach. Patients discharged from the Oncology unit were randomly selected to receive the HCAHPS via mail. The project was approved by the hospital's Institutional Review Board.

### Intervention: Ask3Teach3

The Ask3Teach3 approach entailed a standard script to ensure consistency between nursing staff in conducting the Ask3Teach3 approach. A laminated script copy was attached to the nurse workstation on wheels. Licensed copies of pictograms representing medication side effects were used to enhance nurse-patient communication. The nurse completed the medication information sheet with the name and purpose of the medication obtained from the Micromedex medication database before educating the patient. While presenting the completed informational sheet to the patient, the nurse reviewed the name, purpose, and potential side effects of the medication as the Teach3 part of the Ask3Teach3 approach. The patient was encouraged to participate by completing the Ask3 part of the review process by stating the name, purpose, and potential side effects of the medication when asked by the nurse. The nurse repeated the procedure of the scripting, Ask3Teach3 each time a new medication is administered to the patient and during the bedside reporting in which the patient was asked to complete three statements that correspond to the three questions asked by the outgoing nurse in the presence of the oncoming nurse.

The project intervention was implemented after multiple educational sessions of the Oncology unit nursing staff have been completed. Each session lasted about an hour presenting the Ask3Teach3 with the standardized script as the communication tool for all new medications. A total of twenty-one nurses participated.

### Measures

The HCAHPS survey score was used to measure patient satisfaction of their healthcare experience. The HCAHPS sur-

vey has 32-item questions with a screening item question on communication about medication. The screening item question asks if the patient was given medicine not taken previously during the hospital stay. If it pertains to the patient, the survey recipient will proceed with the two questions specifically related to communication about new medication. The two questions related to the new medication domain is stated as "before giving you any new medicine, how often did hospital staff tell you what the medicine was for and how often did hospital staff describe possible side effects in a way you could understand" (HCAHPS survey, 2018). The HCAHPS medication domain questions are answered on a scale of always, sometimes, usually, and never which the survey participants corresponded based on their hospital experience. Responses of always to the two questions on new medication communication domain were considered as reflection of patient satisfaction (Ahrens & Winges, 2013). The scale response is calculated in percentages and the percent top box score is the highest response possible in the survey scale (Press Ganey, 2018). The descriptive statistics of percentages which the always responses on the communication on medication domain was calculated as the percent top box that was compared on the two months before and two months after implementation of Ask3Teach3.

### Data Analysis

The hospital used a third-party vendor, Press Ganey, to do the randomization of the survey recipients and gathering of the data. The vendor sent out the surveys via mail to patients within a week after discharged and collected responses from discharged patients who were admitted for at least 24 hours. The scores were compiled and were available for review from the hospital's Clinical Education and Nursing Research Coordinator. All data were deidentified and descriptive statistics of percentages were used to summarize HCAHPS scores on medication domain. The composite top box score percentage is the average of the top box percentage of the two specific HCAHPS questions on medication domain and viewed as patient satisfaction scores on communication on medication.

## Results

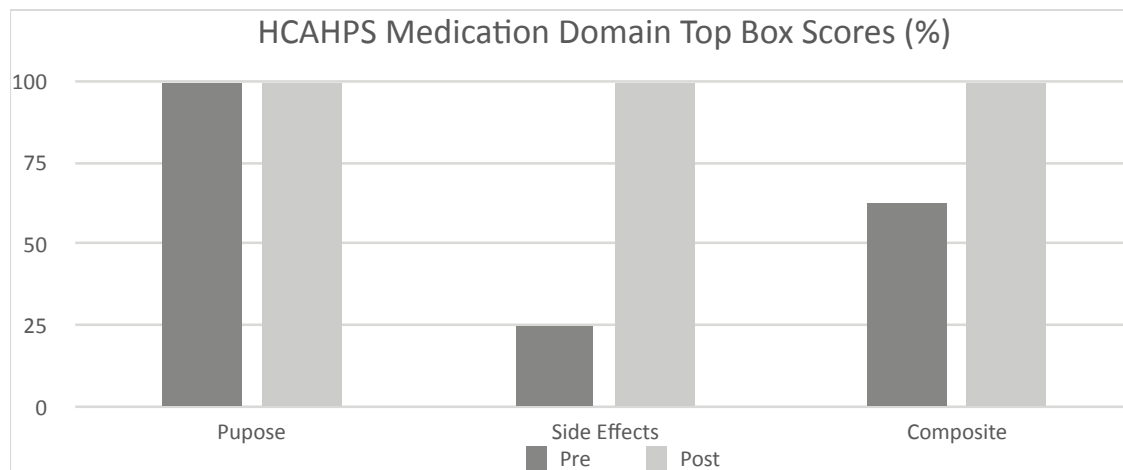
After two months of implementation of the Ask3Teach3 approach on the Oncology unit, the results showed a 37.5% improvement in overall patient satisfaction scores related to HCAHPS medication domain from 62.5% to 100%. More specifically, the side effects top box scores showed a 75% increased from 25% to 100%, post implementation. The purpose top box scores have no difference before and after implementation. See Figure 1.

## Discussion

Nurses expressed favorable verbal feedback regarding Ask-Teach3 due to its simplicity and ease of implementation using a standardized script with only three essential compo-

## Figure 1

*Comparison of Preintervention and Postintervention HCAHPS Medication Domain Top Box Scores (%)*



nents of medication communication encouraged patients in their care. The elements of structuring and consistency in patient education increased patient's understanding of medication information and patient satisfaction. Despite there were uncontrolled variables such as low census count, days with no new medication administered, and the random selection of HCAHPS recipients to the small unit affecting the sample size, securing a 100% improvement on potential side effects was remarkable.

Patient satisfaction scores increased by 37.5% after implementation was significant however, some elements can be improved. The medication education reinforcement during bedside shift reporting remained unknown. The inclusion of verifying patient's medication knowledge in the bedside reporting could be time-consuming and intimidate patients. Another concern was the short staffing might interfere with the practice change. Nurses were receptive to the change, but the increased patient workload was expressed thus, limited the nurse's time on patient education.

There were also occasions that nurses felt uncomfortable discussing the potential side effects of the medication may scare the patient. Tailoring patient's education may require formal staff education to address learner's behavior. It may also promote nurses to continue completing the three medication essential components: name, purpose, and potential side effects of the medication which will help sustain the practice.

The patient's readiness to medication education may affect the patient's willingness to participate due to altered emotional and mental health state as one nurse had commented. The health condition of the patients served in this unit may receive complex anticancer drugs that may

be physically and emotionally difficult in the context of the patient's health condition. Bowen et al. (2017) cited time and complex medication information as common barriers to patient medication education.

Elements for improvement may include finding pictograms that would best represent common side effects of the medication. The pictograms were enlarged and placed strategically for easy access. However, patients or nurses' perspective were not collected to determine if the images are visually appropriate. In unspecified events, two nurses commented the pictograms assisted in communicating with patients who were speaking in different languages. Selecting the right visual images for a pictogram may enhance patient interest and can be used as a tool to enhance the communication where a language barrier exists. Another suggestion is adding a new medication alert feature in the patient's electronic chart to inform nurses that the patient requires medication education. According to Jones and Coke (2016), nurses save time when new medication alerts were in the patient's electronic health record to identify new medication requiring education.

The frequency of nurse-patient interaction increases the level of patient's understanding of the new medication. A reinforcement through teach-back method, pictograms, and patient's involvement at the bedside shift reporting were supportive of the Ask3Teach3 practice change.

The visual reminder and verification of patient's understanding of medication education during bedside shift reporting were parts of a multi-component medication education program that was successful in increasing patient knowledge of newly prescribed medications (Jones & Coke, 2016). The

Ask3Teach3 approach utilized with the partnership between nurse and patient has proven success in increasing HCAHPS scores on the medication domain.

### Implications for Nursing Practice

Providing medication information in a manner the patient can understand during the hospital stay is critical for promoting safe medication practices. The use of scripting, pictograms, and validating that the patient understood the information are all acceptable means of enhancing patient understanding. The implications of the practice change on nurse-patient communication to improve patient's knowledge of new medication is closing the gap towards the direction of patients becoming informed participants in their care. The patient satisfaction scores improved by 75% with Ask3Teach3 approach on the side effect of an administered medication suggested nurses were giving equal importance on educating patients on both the purpose of the new medication and the potential side effects. Patients were educated to make informed healthcare decisions and be active participant of their care.

The project recommended including the essential medication information such as the purpose and potential side effects in the Rights of Medication Administration before giving medication to every patient. The added information helps the patient better understand the use and effects of medication. The practice of increasing medication knowledge instills safety and patient-centered care as healthcare providers are competent in verifying patient understanding of the medication. A new practice could also transcend into validating patient knowledge on the medication purpose and potential side effects when patient being prepared to be discharged. The aim is to ensure that medication regimen is continued at the transition of care. The practice of Ask3Teach3 continued to be useful in various patient care settings in supporting the improvement of patient satisfaction on communication of new medication as evidenced by the improved HCAHPS medication domain scores on the Oncology unit. The Ask3Teach3 ensured that patients have knowledge and clear understanding of their new medication. Having the approach structured and consistent with multiple reinforcement was not only supportive of quality of care but knowing that patients understood their medication gave mutual satisfaction to both nurses and patients.

### Conclusions

The HCAHPS scores revealed a significant improvement of patient experience in communication on new medication specifically in understanding the potential side effects of the medication after implementation of Ask3Teach3 in an Oncology unit. The result suggested the positive impact of Ask3Teach3 in improving patient satisfaction is an approach to keep up with the demands of providing quality

healthcare. Though Ask3Teach3 was intentionally focused on improving health literacy, it has proven its effectiveness as a communication tool for various age populations in different settings. Because the scripted statements are simple and easy to use, nurses were more compliant in teaching focused, invaluable information to the patient who remember and better understand the newly prescribed medication.

The Ask3Teach3 became more effective when combined with other evidence-based practice methodologies. The teach-back method performed by the patient was integrated twice, during medication administration and bedside reporting. The three essential aspects of medication information encouraged patients to be empowered in their care. It was also important to provide written educational resources with images to enhance patient education. User-friendly, easy to read, and understand patient medication hand-outs were proven beneficial in remembering and understanding medications. The bedside shift reporting along with other evidence-based interventions have also improved the patient satisfaction and HCAHPS scores in medication domain. The value of multiple reinforcement and the collaboration between patient and nurse was relevant to the success of the limited practice change.

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**The Journal of Nursing Practice Applications & Reviews of Research (JNPARR)**, the official international, peer-reviewed publication of the Philippine Nurses Association of America, is calling for authors to submit manuscripts.

Indexed by EBSCOhost, including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), JNPARR publishes scholarly works around Nursing Practice, Education, Administration and Research. Types of manuscripts published include: Original Research Reports, Review Articles, Quality Improvement Manuscripts, Discussion Papers, and Case Reports.

JNPARR is listed in the Directory of Nursing Journals by the International Academy of Nursing Editors (INANE): <https://nursingeditors.com/journals-directory/>

Submission Dates: **Ongoing**

Publication Schedule: **Two times a year**

JNPARR welcomes the following types of manuscripts:

**Original Research Reports** include studies of all designs including quantitative, qualitative, and mixed methods studies. All research reports must contain a statement in the methods section about the protection of human subjects and approval by the appropriate institutional review board (IRB). In addition, submission of documented IRB approval is required. Suggested headings within the text include: Introduction, Objective(s), Methods, Results, Discussion, and Conclusions.

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JNPARR welcomes applications for Peer Reviewers. Please contact the Editor-in-Chief, Dr. Cynthia Ayres at [jnparr.eic@gmail.com](mailto:jnparr.eic@gmail.com)

*Prospective authors and peer reviewers are encouraged to review the JNPARR website at <http://myrnaa.org/JNPARR-Home> for additional information.*

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