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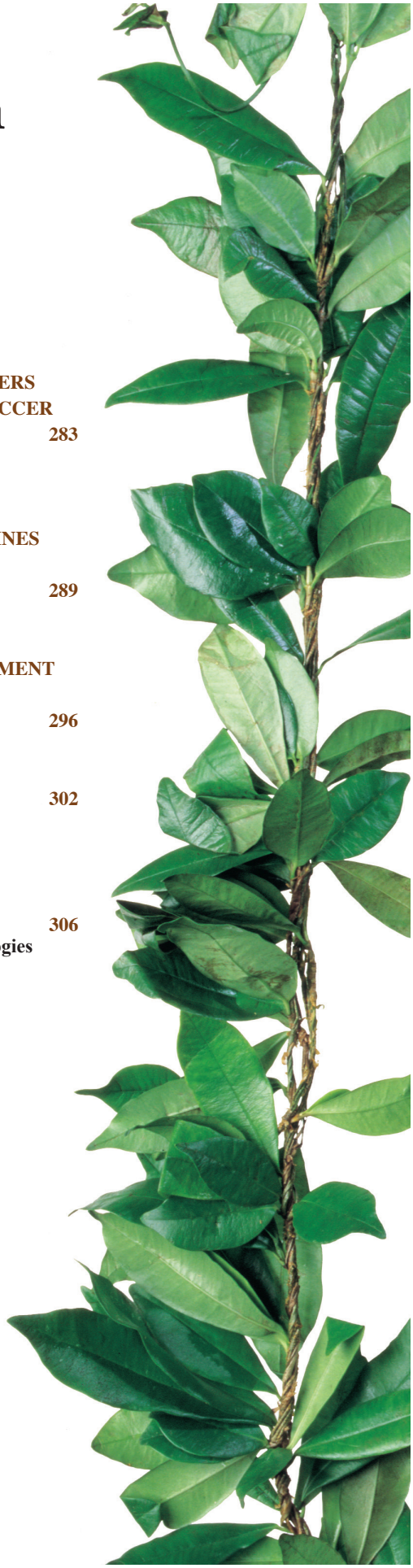

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Assessing Concussion Knowledge Among Recreational Surfers and Comparing Results to Concussion Knowledge Among Soccer Players: A Pilot Study

William J. Lew BS; Troy Furutani MS; Kyoko Shirahata PhD; Nathan Murata PhD; Hyeong Jun Ahn PhD

Abstract

Concussions are caused by physical trauma to the head, face, or neck and can be sustained while surfing, increasing the risk of drowning. The purpose of this pilot study was to establish a preliminary assessment of concussion knowledge in a group of adult recreational surfers. Using the standardized Concussion Knowledge Index, an anonymous survey was conducted with 55 surfers. The Concussion Knowledge Index and similar statistical measures were used in a previous study of adult soccer players in England. Data from these 2 groups were compared. The preliminary data suggests that the group of adult surfers demonstrate more concussion knowledge than the group of adult soccer players. Further study into surfers' knowledge of concussion with a larger sample size could increase the clinical utility and generalizability of this study.

Keywords

concussion knowledge index, concussion, soccer, surfing

Abbreviations

CKI = Concussion Knowledge Index
HCAMP = Hawai'i Concussion Awareness & Management Program

Introduction

Concussion, also known as mild traumatic brain injury, is caused by physical trauma to the head, face, neck, or torso.[1] Acceleration-deceleration forces cause the softer brain tissue to press on the hard skull, while stretching the connecting neurons within, resulting in temporary neurological dysfunction. Concussions sustained while surfing are common and potentially dangerous to those who experience them, especially due to the risk of drowning. Prior literature on surfing-related concussions focused primarily on incidence, including Swinney's article which evaluated 50 surfers, 35 of which reported sustaining a head injury.[2] Kozminski's national data from United States emergency departments showed that during their study period (2001-2016), while most surfers who presented to the emergency departments had lacerations, 16.1% of them sustained concussions. Additionally, the incidence of concussion significantly increased during their study period.[3]

This pilot study is aimed at establishing a preliminary assessment of concussion knowledge in a group of 55 recreational surfers in Hawai'i and California. It also compares the results to another group of athletes consisting of 26 adult soccer players from England who were previously assessed using the Concussion Knowledge Index (CKI) in a 2013 study by Williams.[4] The CKI is a validated, standardized measurement tool for knowledge of concussion.[5] Since surfers have the added risk of drowning after sustaining a concussion, which may necessitate a higher awareness of concussions, this study tested the hypothesis that adult surfers would have greater knowledge of concussions than adult soccer players.

Methods

The survey containing the CKI assessment was chosen for this study because it allows for the quantification of concussion knowledge into a numerical score that can be statistically analyzed, and has already been demonstrated to have internal validity and test-retest reliability.[5] The CKI survey link was disseminated to members in the recreational surfing community via social media posts shared publicly to Facebook and Instagram (Meta Platforms Inc, Menlo Park, CA; **Figure 1**). Participants were required to affirm their eligibility before taking the survey by clicking a checkbox indicating that they were 18 years of age or older to ensure compliance with age restrictions. None of the participants were paid to take the survey.

Words in the CKI survey that pertain to land sports were modified to fit the language of surfing, ie, "player" to "surfer."[5] The online survey was created using Alchemer Survey Software (Alchemer LLC, Louisville, CO) and responses recorded through the survey were uploaded onto a live Google Sheets spreadsheet (Alphabet Inc., Mountain View, CA). The survey consisted of 30 multiple-choice questions (**Table 1**). Age, ethnicity, sex, education, surfing experience, and previous history of head injuries and concussion education were collected from questions 1-12. The geographical location at which each respondent submitted the survey was collected by the survey software.

Questions 13-30 assessed concussion knowledge. Each respondent's CKI score was graded on a total scale of 0-25, where correct answers earned 1 point and incorrect answers earned 0 points. Question 30 assessed concussion symptom recognition and consisted of 8 true concussion symptoms and 8 symptoms not suggestive of concussion. Up to 8 points were

awarded to the overall CKI score from question 30 (8 of the 25 possible CKI points evaluated concussion symptom recognition), depending on how many true concussion symptoms were correctly identified and regardless of what was selected for the false concussion symptoms. The grading key is summarized in **Table 1**. A Wilcoxon signed-rank sum test was used to compare the median CKI score of surfers to the median CKI score of soccer players. All statistical analyses were conducted on SAS Software, version 9.4 (SAS Institute Inc., Cary, NC), and the significance level was set at .05.

Results

Out of 59 people who were recorded by the survey software to have viewed the shared link, a total of 55 of them completed the survey (response rate: 93%). The CKI median was 20.0 (mean: 18.9 ± 3.0, mode: 21.0, range: 9-23). Results obtained for recreational surfers are summarized and compared to soccer players in **Table 2**.[4] Since the data were left-skewed and thus the assumption that the data followed a normal distribution was not valid, a parametric 1-sample t-test could not be utilized to compare the surfers' knowledge to the soccer players' knowledge. A Wilcoxon signed-rank sum test using P=.05 indicated that the CKI median score of these adult recreational surfers surveyed (20.0) was significantly higher than that of adult soccer players (15.5).[4]

The demographic results are summarized in **Table 3** with each variable listed in the left column and their respective counts (n) and percentages in the right column. Fifty-one percent of participants who submitted the survey were in Hawai'i and 49% were in California. Most participants were male (71%), and the most common age category of the participants was 18-24 years old (38%), followed by 25-34 years old (24%). Overall, two-thirds of the participants had some higher level of education beyond a high school diploma (associates, bachelor, master, or doctoral/professional).

Most participants identified longboarding as their main surfing activity (58%). In all, 38% of participants reported having experienced previous surfing-related head injuries with 9% of those injuries resulting in diagnosed concussions. Nearly half

Figure 1. Social Media Graphic for Online Survey Shared with Surfers 18 Years and Older

of the participants (49%) answered that their attitudes towards surfing-related concussions were that they were afraid of them. Almost half (49%) of the participants had previously received concussion education, with the most common mode of education being in-person (38%).

Within the CKI, the 3 most common knowledge questions correctly identified were: (1) "Symptoms of a concussion can last for several weeks" (97%); (2) "In order to be diagnosed with a concussion, you do not have to be knocked out" (95%); and (3) "If you receive one concussion and you have never had a concussion before, you do not necessarily become less intelligent" (95%). The 3 most common misconceptions were: (1) "After a concussion occurs, brain imaging (eg, Magnetic Resonance Imaging, Computed Tomography Scan, X-Ray, etc) typically shows visible damage (eg, bruise, blood clot) to the brain" (30%); (2) "After a concussion, people can forget who they are and not recognize others but be perfect in every other way" (28%); and (3) "A surfer who gets knocked out after getting a concussion is not experiencing a coma" (16%).

Other commonly identified symptoms relevant to concussion were feeling in a "fog" (90%), headache (90%), and difficulty concentrating (86%). The most commonly missed symptom was drowsiness (72%).

Table 1. 31 Multiple Choice Questions for Online Survey Shared with Surfers

Survey Questions and Answer Choices (Answers Separated by Commas, Correct Answers in Bold)
1) Which of the following options describes you the best? Possible Answers: Professional surfer (ie, receives monetary compensation for surfing or from sponsors), Amateur / Recreational Surfer
2) Which type of surf activity do you spend the most time doing? Possible Answers: Shortboard, Longboard, Stand Up Paddle, Foil - Prone, Foil - Stand up paddle, Wind Surfing, Kite Surfing, Other - Write In
3) Have you had a head injury while surfing? Possible Answers: Yes, No, Not sure
4) How many head injuries have you sustained while surfing? Possible Answers: 0, 1, 2, 3, More
5) How many surfing-related concussions have you been diagnosed with? Possible Answers: 0, 1, 2, 3, More
6) Which of the following best describes your attitude toward concussions? Possible Answers: I'm afraid of them, They're part of the sport, Other
7) Have you ever received a concussion education? Possible Answers: Yes, No
8) If you answered yes to the previous question, how did you receive concussion education and information? (Select all that apply) Possible Answers: In-Person (ie, Presentation, Workshop, Video), Online / Web-based (E-Learning), Media (ie, Movies, News, Social Media), In-Print Informative Materials (ie, Brochure, Flyer, Handout), N/A
9) How old are you? Possible Answers: 18-24, 25-34, 35-44, 45-55, 56-64, 64 or above
10) What is your gender? Possible Answers: Male, Female, Other
11) What is your ethnicity? Possible Answers: Caucasian, Asian, American Indian or Alaska Native, African American, Native American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, Other
12) What is your highest education level? Possible Answers: High school, Associate degree, Bachelor's degree, Master's degree, Doctoral or Professional degree, Other
13) There is a possible risk of death if a second concussion occurs before the first one has healed. Possible Answers: **True**, False
14) People who have had one concussion are more likely to have another concussion. Possible Answers: **True**, False
15) In order to be diagnosed with a concussion, you have to be knocked out. Possible Answers: True, **False**
16) A concussion can only occur if there is a direct hit to the head. Possible Answers: True, **False**
17) Being knocked unconscious always causes permanent damage to the brain. Possible Answers: True, **False**
18) Symptoms of a concussion can last for several weeks. Possible Answers: **True**, False
19) Sometimes a second concussion can help a person remember things that were forgotten after the first concussion. Possible Answers: True, **False**

Table 1. 31 Multiple Choice Questions for Online Survey Shared with Surfers (Continued)
20) After a concussion occurs, brain imaging (eg, CAT Scan, MRI, X-Ray, etc) typically shows visible physical damage (eg, bruise, blood clot) to the brain. Possible Answers: True, **False**
21) If you receive one concussion and you have never had a concussion before, you will become less intelligent. Possible Answers: True, **False**
22) After 10 days, symptoms of a concussion are usually completely gone. Possible Answers: **True**, False
23) After a concussion, people can forget who they are and not recognize others but be perfect in every other way. Possible Answers: True, **False**
24) Concussions can sometimes lead to emotional disruptions. Possible Answers: **True**, False
25) A surfer who gets knocked out after getting a concussion is experiencing a coma. Possible Answers: **True**, False
26) There is rarely a risk to long-term health and well-being from multiple concussions. Possible Answers: True, **False**
Scenario 1: While competing in a heat, John and Kelly collide with each other and each suffers a concussion. John has never had a concussion in the past. Kelly has had 4 concussions in the past. 27) It is likely that John's concussion will affect his long-term health and well-being. Possible Answers: True, **False**
Scenario 1: While competing in a heat, John and Kelly collide with each other and each suffers a concussion. John has never had a concussion in the past. Kelly has had 4 concussions in the past. 28) It is likely that Kelly's concussion will affect his long-term health and well-being. Possible Answers: **True**, False
Scenario 2: Lisa suffered a concussion in a contest. She continued to surf in the same heat despite the fact that she continued to feel the effects of the concussion. 29) Even though Lisa is still experiencing the effects of the concussion, her performance will be the same as it would be had she not suffered a concussion. Possible Answers: True, **False**
30) Think about someone who has had a concussion. Check off the following signs and symptoms that you believe someone may be likely to experience AFTER a concussion. (Select all that apply) Possible Answers: Hives, Feeling in a "Fog", Headache, Weight gain, Difficulty speaking, Feeling Slowed down, Arthritis, Reduced breathing rate, Sensitivity to light, Excessive studying, Difficulty remembering, Difficulty concentrating, Panic attacks, Dizziness, Drowsiness, Hair loss

Table 2. Summary of Concussion Knowledge Index (CKI) Scores of Surfers and Soccer Players Surveyed[a]

Population Sampled	CKI Score (0-25)
Recreational Surfers in Current Study (N = 55):	
Mean	18.9 ± 3.0
Median	20.0
Range	9-23
Mode	21.0
Soccer Players in 2013 Study (Williams; N = 26)[4]:	
Mean	15.5 ± 3.0
Median	15.5
Range	8-21
Mode	14.0

[a] A Wilcoxon signed-rank sum test comparing the CKI scores of the surfers and soccer players was statistically significant at $P<.05$.

Table 3. Demographics and Responses to Online Survey Shared with Surfers (N=55)

Variable	n (%)
Sex:	
Female	16 (29%)
Male	39 (71%)
Age:	
18-24	21 (38%)
25-34	13 (24%)
35-44	6 (11%)
45-55	5 (9%)
56-64	5 (9%)
64+	5 (9%)
Ethnicity:	
African American	1 (2%)
Asian	23 (42%)
Caucasian	18 (33%)
Hispanic of Latino	6 (11%)
Native Hawaiian/Other Pacific Islander	5 (9%)
Other	2 (4%)
Education level:	
High School	16 (29%)
Associate Degree	9 (16%)
Bachelor's Degree	16 (29%)
Master's Degree	11 (20%)
Doctoral or Professional Degree	3 (5%)
Location:	
Hawai'i	28 (51%)
California	27 (49%)
Most frequent surfing activity:	
Foil	1 (2%)
Longboard	32 (58%)
Shortboard	20 (36%)
Stand up Paddle	2 (4%)
Previous head injuries:	
Yes	21 (38%)
No	31 (56%)
Not Sure	3 (5%)
Number of surfing head injuries:	
>2	2 (4%)
2	8 (15%)
1	11 (20%)
0	34 (62%)
Number of surfing concussions:	
2	1 (2%)
1	4 (7%)
0	50 (91%)
Attitude toward concussions:	
Afraid of Concussions	27 (49%)
Concussions Are Part of the Sport	19 (35%)
None of These	9 (16%)
Previous concussion education:	
Yes	27 (49%)
No	28 (51%)
Mode of education (Select All That Apply):	
In-Person	21 (38%)
Online	12 (22%)
Media	8 (15%)
In-Print	7 (13%)
N/A	28 (51%)

Discussion

There appears to be a common misconception that concussions are accompanied by a noticeable wound or positive radiology finding. Thus, when delivering concussion education, it is important to emphasize that concussions are often invisible injuries that may not be evident on physical examination or in brain imaging (eg, magnetic resonance imaging, computed tomography scan, X-Ray, etc). In addition to temporary loss of consciousness and confusion, drowsiness was the most missed concussion symptom (72%), which should be included in concussion education.

In a 2022 study by Shafik et al, the CKI was also used to evaluate knowledge of concussion among women soccer players. Results showed that previous sports-related concussion education was associated with an increased knowledge of concussion. Thus, the authors suggested that concussion education should be mandated across the athletes to support their safety.[6] This recommendation is further emphasized in a 2020 clinical guideline on the management of concussion by Silverberg and colleagues, suggesting the importance of patient education as a pillar of concussion management in primary care.[7]

Overall, the surfers scored significantly higher on the CKI evaluation than the soccer players. This appeared to suggest that the surfers surveyed demonstrated greater knowledge of concussion than the soccer players surveyed. However, since the data from the surfers were collected in 2021, and the data from the soccer players were collected prior to 2013, it is possible that the efforts from organizations such as the Hawai‘i Concussion Awareness Management Program (HCAMP) to increase awareness of concussion in the past decade may have contributed to a potential difference in concussion knowledge.[8] In order to adequately support the hypothesis that surfers in general possess more concussion knowledge than soccer players, additional surveys should be conducted with larger, contemporaneous groups. Further efforts to increase concussion education among the surfing community could be beneficial to promote safer, informed actions taken by surfers after sustaining a concussion.

Conflict of Interest

None of the authors identify a conflict of interest.

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A Literature Review on the Adherence to Screening Guidelines for Latent Tuberculosis Infection Among Persons Living With HIV

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Abstract

Human immunodeficiency virus (HIV) infection increases the risk of reactivation of latent tuberculosis infection (LTBI). Although antiretroviral therapy decreases the progression of LTBI to tuberculosis disease (TBD), persons living with HIV (PLHIV) still have higher risk of TBD compared to the general population. LTBI screening is recommended for all newly diagnosed PLHIV to prevent TBD. However, several studies from low TBD incidence countries have reported sub-optimal implementation of these guidelines. This review aims to assess published studies on adherence to LTBI screening among PLHIV by identifying factors and determinants that affect the implementation of LTBI screening among PLHIV in low TBD incidence countries. Electronic databases were used to search for articles describing the adherence to LTBI screening guidelines. Fourteen studies were included in the final review. Ten studies assessed the frequency of PLHIV getting LTBI screening, and 4 studies assessed the compliance of health care providers in implementing the guidelines. PLHIV who were screened for LTBI ranged from 22.4% to 85%, of which 0.8% to 25.6% had positive results. Only 20% to 57.4% of surveyed physicians implemented the guidelines. Country of birth was an independent predictor of receiving LTBI screening. LTBI screening guidelines are inconsistently performed resulting in missed opportunities for TBD prevention. A comprehensive screening policy involving testing all PLHIV may be the best approach, rather than a targeted approach testing foreign-born individuals only. This will minimize missing domestic cases that can worsen disparity in HIV and tuberculosis infection among minority groups, including Asians, Native Hawaiians, and Pacific Islanders.

Keywords

Tuberculosis disease, tuberculosis infection, low TBD incidence countries, Human Immunodeficiency Virus (HIV) infection, Native Hawaiians, and Pacific Islanders

Abbreviations

AIDS = Acquired Immune-Deficiency Syndrome
ART = Antiretroviral therapy
BCG = Bacillus Calmette-Guerin
BHIVA = British HIV Association
CDC = Centers for Disease Control and Prevention
HIV = Human Immunodeficiency Virus
IDSA = Infectious Diseases Society of America
IGRA = Interferon-gamma release assay
LTBI = Latent tuberculosis infection
MSM = Men having sex with men
Mtb = Mycobacterium tuberculosis
NHPI = Native Hawaiians and Pacific Islanders
PLHIV = Persons living with HIV
TST = Tuberculin skin testing
TB = Tuberculosis
TBD = Tuberculosis disease
TBI = Tuberculosis infection
WHO = World Health Organization

Introduction

Tuberculosis disease (TBD), or active disease due to *Mycobacterium tuberculosis (Mtb)*, predominantly presents as an infection in the lungs and is a leading cause of mortality and morbidity among persons living with Human Immunodeficiency Virus (PLHIV).[1,2] Latent tuberculosis infection (LTBI), is a state of persistent immune response to *Mtb* with no evidence of active disease.[3] TB infection encompasses both LTBI and TBD. Compared with individuals without HIV, PLHIV have a 3-16% annual risk and 30% lifetime risk of LTBI progressing to TBD.[4,5] In 2019, an estimated 2 billion people worldwide had LTBI, and approximately 10 million were diagnosed with TBD. Of individuals with TBD, 8.2% were also living with HIV.[1] TBD is the most common opportunistic infection among PLHIV and often leads to death.[1]

In 2019, the US, a country with low TBD incidence, had 8 920 cases of TBD, and 13 million reported cases of LTBI. The prevalence of LTBI among PLHIV was 7.6%.[6,7] Seventy percent of TBD cases occurred among persons born outside the US, and the majority of cases were Asian immigrants with an incidence rate of 25.7 per 100 000 persons followed by Native Hawaiians and Pacific islanders (NHPI) with an incidence rate of 25.1 per 100 000 persons.[6] In the same year, there were 198 new cases of HIV-TBD coinfection in the country, including 2 cases in Hawai‘i.[6] In 2021, Hawai‘i reported 107 TBD cases with an incidence of 7.35 cases per 100 000 persons.[8] Although the incidence of TB infection in PLHIV overall is declining, new cases of foreign-born PLHIV and TBD have remained stable.[9]

TBD and HIV have disproportionately impacted NHPI in the US.[10] Among those who were born in the US, TBD were highest among NHPI population.[10] From 2010-2019, the annual incidence rates of TBD among NHPI born in the US and US Affiliated Pacific Islands (USAPI) were 6.5 cases and 150.7 cases per 100 000 persons, respectively, in comparison to the nationwide incidence rate of 2.2 cases per 100 000 persons.[11] The US populations consists of 0.4 percent of the NHPI race group, yet they are twice as likely to have TBD compared to the White population.[11,12] Moreover, NHPI are also 2.4 times more likely to have HIV compared to the White population.[11] Tuberculin skin test (TST) and interferon gamma release assay (IGRA) are 2 methods currently used to identify LTBI and TBD.[3] Both screening tools have a sensitivity greater than 90% when tested on the general population, but their sensitivities are decreased when used among PLHIV, particularly in subjects

with advanced immunosuppression.[13,14] Even with lower test sensitivities among PLHIV, use of the 2 screening methods is highly recommended by different LTBI screening guidelines.[15-18] LTBI treatment among PLHIV who have a positive TST reduces the risk of developing TBD by 62%.[19]

Clinical practice guidelines from the American Thoracic Society, the Infectious Diseases Society of America (IDSA), and Centers for Disease Control and Prevention (CDC) recommend screening populations who have increased risk of infection with *Mtb*, including PLHIV and immigrants from countries with high burden of TBD.[15] The US Preventive Services Task Force recommends LTBI testing of asymptomatic adults who were born in or previously lived-in countries with increased TBD prevalence or who live in or have lived in high-risk congregate settings, but no recommendations are given for PLHIV.[16] The Guidelines for Prevention and Treatment of Opportunistic Infections in HIV-infected Adults and Adolescents developed by the CDC, the National Institutes of Health (NIH), and the HIV Medicine Association (HIVMA) of the IDSA recommend that all PLHIV should be tested for LTBI at the time of HIV diagnosis regardless of the risk of TBD exposure; persons with negative diagnostic tests for LTBI, advanced HIV infection (CD4 count <200 cells/mm^3), and without indications for initiating empiric LTBI treatment should be retested for LTBI once they start antiretroviral therapy (ART) and attain a CD4 count ≥200 cells/mm^3.[17] In addition, annual testing for LTBI using TST is recommended for PLHIV who are at high risk of repeated or ongoing exposure to persons with TBD.[17]

LTBI screening guidelines are based on evidence-based medicine, but several studies from low TBD incidence countries, where there are fewer than 10 TBD cases per million population, reported sub-optimal implementation of these guidelines.[20-34] The objective of this article is to review published studies on adherence to LTBI screening on PLHIV and to identify factors and determinants that affect the implementation of LTBI screening in low TBD incidence countries.

Methods

The online databases used for this study were OneSearch, the search engine of John A. Burns School of Medicine Library, PubMed, and PubMed Central. The keywords used for all 3 search engines was "LTBI screening" AND "HIV." Hand searching of studies that were not indexed in the online databases was also done. Google search was performed for grey literature to extract data from CDC and World Health Organization (WHO) websites to compliment the literature. Peer-reviewed studies published in English between 1990 to 2021 were included in the study. Studies that assessed the adherence and implementation of LTBI screening among newly diagnosed PLHIV in low TBD incidence countries based on WHO's criteria (<10 TBD cases per million population) were included in the study.[20] Studies that merely reported on knowledge and perception of LTBI screening in HIV patients were not included. Studies that measured the predictive value, sensitivity, and specificity of LTBI screening tools used in PLHIV were also excluded from this study.

Titles and abstracts of all references were all screened by 1 reviewer. The title of the article was important for initial impressions of relevancy based on keywords and topic of interests. If the study seemed significant for the review, then the abstract was read to confirm the information within the article. Full text versions of potentially relevant articles were examined for eligibility. In order to prevent excluding relevant articles, results of the database searches were screened 3 times. The articles that were of interest for this study were organized using the Zotero version 6.0.20 (Corporation for Digital Scholarship, Vienna, VA).[35]

Results

A total of 471 articles were compiled through Zotero, of which 38 articles were duplicates. Three hundred seventy-six articles were excluded based on the relevance of their titles. Fifty-seven articles were then included for abstract and article review. Forty-five articles were excluded based on the exclusion criteria. Two articles cited by 1 study were hand-searched and included after reviewing the articles. A total of 14 articles were included in the final review (**Figure 1**). These studies were published from 1998 to 2019 and were conducted in low TBD incidence countries: USA, Switzerland, Canada, Belgium, the Netherlands, the United Kingdom (UK), New Zealand, and Italy.[21-34] These studies either focused mainly on implementation and adherence to LTBI screening among newly diagnosed PLHIV or included LTBI screening adherence as 1 of the objectives of the study. Ten studies assessed the implementation of LTBI screening among HIV patients through retrospective medical chart review (**Table 1**). They assessed the frequency of HIV patients getting LTBI screening, of which, 9 studies measured the positivity rate of HIV patients who were tested for LTBI. Nine studies reviewed protocol adherance to LTBI screening guidelines performed within the first 6 months or 12 months of HIV diagnosis. The LTBI screening method used by 6 studies was TST alone whereas 4 studies used IGRA and TST in their studies. Four studies assessed the compliance of physicians in implementing the LTBI screening guidelines through survey of medical practitioners (**Table 2**).

PLHIV who were screened for LTBI ranged from 22.4% to 85% of the screening population. It is important to note that while the study by Schulte et al in the US reported the highest adherence to LTBI screening with 85% adherence, the population used for the study was limited only to pregnant women.[23] On the other hand, the study by Kaplan et al reported an adherence percentage of 80%, but analyzed the general PLHIV population in Ryan White HIV/AIDS facilities.[22] Gow et al in New Zealand reported improvement of LTBI guideline adherence from 55% in 2011 to 93% in 2014.[29] TST and IGRA were both used as

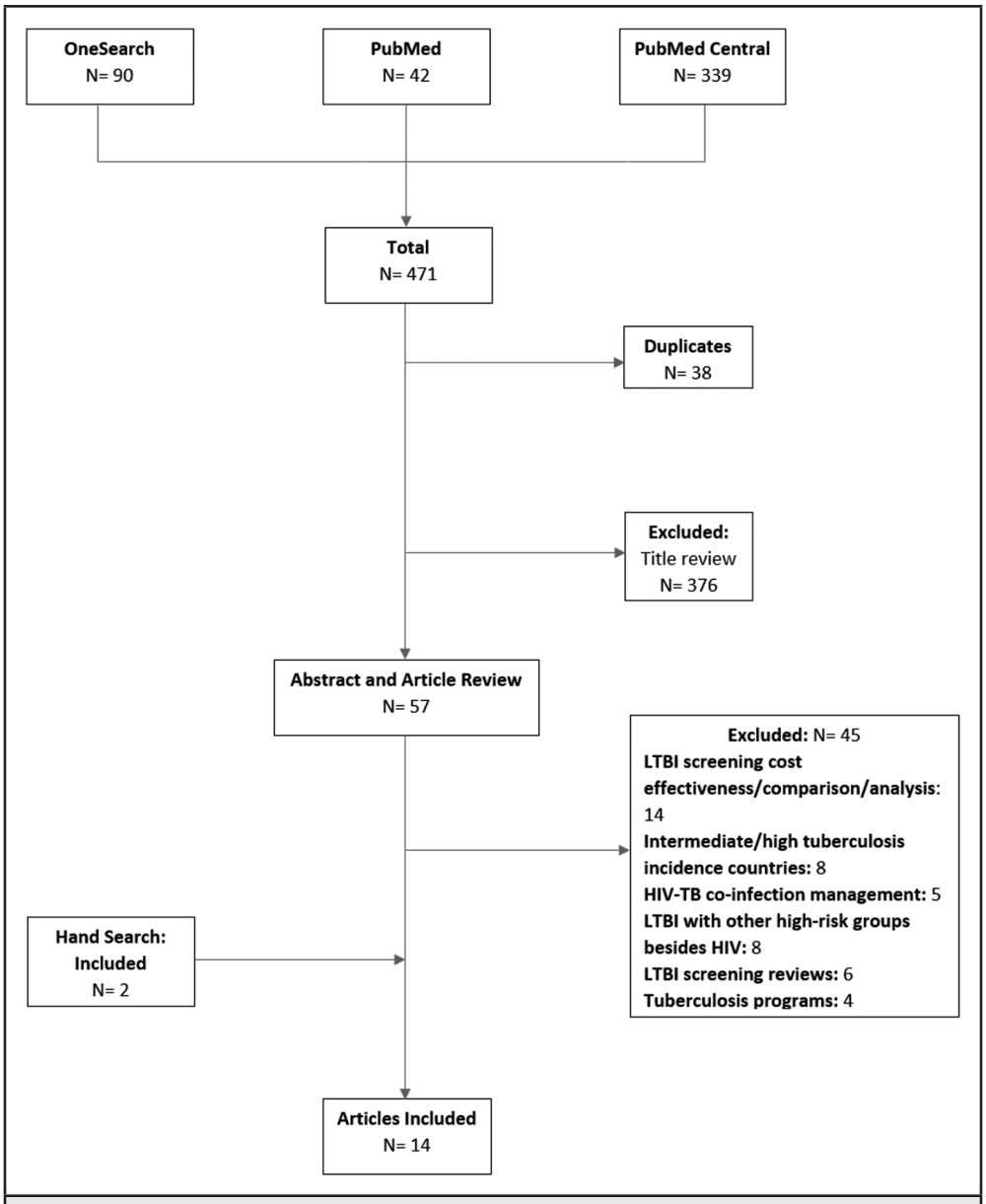

Figure 1. Flow Diagram of Study Selection for Review on Adherence to Latent Tuberculosis Infection (LTBI) Screening Guidelines Among People Living with HIV (PLHIV)

the screening tools in 2011, but the significant improvement in 2014 was noted when IGRA was used as the sole screening tool. Similar results were noted by Adams et al in the US, where an improvement from 28% to 37% was noted as the facility transitioned from TST to IGRA-based screening.[28]

Nine studies reported positive results ranging from 0.8% to 25.6% of PLHIV screened for LTBI.[21,23-30] The study by Schulte showed a 25.6% positive result in HIV-infected pregnant women, and the study by Brassard et al in Canada showed 14.1% positive results in all PLHIV.[23,25] LTBI treatment was initiated in 36.9% to 100% positive patients, but only 5 studies showed treatment completion that ranged between 22.6% to 74.3%.[21,25,26,29,30] Schulte reported that while LTBI treatment was initiated in all positive patients, completion and compliance among patients were not documented.[23] In the study by Elzi et al, among the 246 LTBI positive participants who did not receive preventive treatment, 16 (6.5%) developed TBD.[25] Missed opportunities to prevent TBD were also noted by Brassard et al in Canada where 4 (6%) subjects who tested positive but did not received treatment progressed to TBD.[26]

Seven studies assessed if CD4 count level was considered a factor in performing LTBI screening, and contrasting results

Table 1. Characteristics of Studies on Adherence to Guidelines for Screening LTBI Among PLHIV Based on Medical Chart Review			
Source	**Year/ Country**	**Method of Screening and Adherence**	**Predictors of Having TST and/or IGRA Performed/Reasons of Low Adherence**
Sackoff, et al[21]	1998/USA	TST: 865/1342 (64%); Screened within 6 months of diagnosis; Positive: 48 (6%)	Numbers of visit, same sex behavior with men, >200 CD4 count
Kaplan, et al[22]	1999/Ryan White Title III facilities USA	TST: 1129/1411 (80%); Screened within 12 months of diagnosis	Male sex, injecting drug users, patients from urban area, more than 1 year at the facility, who had had > 1 CD4 count in the past year.
Schulte, et al[23]	2002/ Miami, FL USA	TST: 176/207 (85%); Positive: 45 (25.6%)	Foreign born, unknown HIV status at the first prenatal visit, history of drug use
Lee, et al[24]	2005/USA	TST: 436/841 (51.8%); Screened within 6 months of diagnosis; Positive: 27 (6.7%)	Additional risk factors for TB, history of HIV related preventive treatment, higher number of clinic visits, and attendance at facilities with a written policy to provide TST for all PLHIV
Elzi, et al[25]	2007/ Switzerland	TST: 4158/6018 (69%); Screened within 12 months of diagnosis; Positive: 390 (9.4%)	<200 CD4 count, patients not on HAART, female sex, country of birth
Brassard, et al[26]	2009/ Canada	TST: 476/2123 (22.4%); Screened within 6 months of diagnosis; Positive: 67 (14.1%)	Foreign born, having a first clinic visit during the HAART era, time between HIV diagnosis and first visit, and previous antiretroviral exposure.
Reaves, et al[27]	2017/USA	TST and IGRA: 1907/2772 (68.8%); Screened within 12 months of diagnosis; Positive: 131 (6.9%)	Foreign-born, Non-Hispanic Blacks or other race/ethnicities; lower educational attainment, household income at or below the federal poverty level; uninsured; currently prescribed ART; CD4 count<500 cells/mL; undetectable viral load
Adams, et al[28]	2017/Pennsylvania USA	TST: 61/158 (27.9%) IGRA: 57/96 (37.3%) Screened within 12 months of diagnosis; Positive: 1 (0.8%)	Male sex, transfer patient status, > 1 year of clinical attendance, >200 CD4 count
Gow, et al[29]	2017 New Zealand	TST and IGRA: Screened within 12 or more months of diagnosis 2011: 416/752 (55%); Positive: 74 (10%) 2014: 68/73 (93%); Positive: 2 (2%)	Reasons of low adherence: Perceived low probability of LTBI in PLHIV without a clear epidemiological risk.
Goletti, et al[30]	2019/Italy	TST and IGRA: Screened within 6 months of diagnosis 507/774 (65.5%); Positive: 32 (6.5%)	Foreign born, older population, and CD4 <100

Abbreviations: ART: antiretroviral therapy; HAART: highly active antiretroviral therapy; IGRA: interferon-gamma release assay; LTBI: latent tuberculosis infection; PLHIV: people living with HIV; TB: tuberculosis; TST: tuberculin skin testing.

Table 2. Characteristics of Studies on Adherence to Guidelines for Screening LTBI Among PLHIV Based on Health Care Provider Surveys			
Source	**Year/ Country**	**Adherence**	**Predictors of Having TST Performed/Reasons of Low Adherence**
DeRiemer et al[31]	1999/San Francisco, CA USA	139/350 (39.4%) physicians provide annual PPD testing	Reasons of low adherence: physicians were not aware of the standards of care for preventing tuberculosis among PLHIV even in a geographic area with a high prevalence of M. tuberculosis and HIV. Physicians with the least experience with PLHIV are the least familiar with current guidelines and standards of care for preventing tuberculosis.
Wyndham-Thomas, et al[32]	2015/ Belgium	7/34 (20%) AIDS physicians screened patients	Reasons of low adherence: lack of sensitivity of screening tools, risk associated with polypharmacy, toxicity of treatment.
Verbon, et al[33]	2016/ Netherland	12/51 (25%) physicians intended to screen patients as the guideline stipulate	Predictors of having TST/IGRA performed: foreign born (Liberians vs Dutch), alcohol intake, higher CD4 count Reasons of low adherence: perceived low a priori risk for LTBI in the Dutch population as the majority of PLHIV being Dutch gay men, the preventive effect of ART on the risk of TB, and the absence of actual TB diagnoses in their own practice in PLHIV who are under regular follow-up.
White, et al[34]	2017/UK	93/162 (57.4%) offered LTBI screening	Predictors of having TST/IGRA performed: CD4 count< 200 cells/mm3 and patients from high TB incidence countries Reasons of low adherence: cohort at low risk of LTBI, lack of confidence in the existing guidelines, unavailability and high cost of screening, and concern over chemoprophylaxis efficacy, toxicity/drug interactions, and conflicting local advice.

Abbreviations: ART: antiretroviral therapy; HAART: highly active antiretroviral therapy; IGRA: interferon-gamma release assay; LTBI: latent tuberculosis infection; PLHIV: people living with HIV; TB: tuberculosis; TST: tuberculin skin testing.

were noted. In Swiss and Italian studies, LTBI screening was performed more frequently among patients with CD4 <200 cells/mm^3 at registration.[25,30] In a study conducted by Sackoff et al in New York and by Adams et al in Philadelphia, CD4 level >200 cells/mm^3 was associated with likelihood of getting screened with TST.[21,28] In Canada, TST screening was done regardless of CD4 count level.[26]

Four survey studies among health care providers in the Netherlands, Belgium, USA, and UK were included in this review (**Table 2**).[31-34] These studies showed only 20% to 57.4% of health care providers and representatives adhere to and implement LTBI screening guidelines. The study by White et al in the UK showed that 57.4% of health care representatives from 162 UK geographical areas, consisting of English, Welsh, Irish, and Scottish HIV healthcare provider organizations, reported offering LTBI screening, but adherence to British HIV Association (BHIVA) and National Institute for Health Care Excellence guidelines was only 35.5% and 6.5%, respectively.[34] A study by Verbon et al in the Netherlands revealed that only 24% of physicians had the intention to screen PLHIV for LTBI; however, the Netherlands HIV-TB guidelines stipulate screening regardless of birth place, sex, and CD4 count.[33] Barriers noted for low implementation include lack of sensitivity of screening tools, lack of confidence in the existing guidelines, and belief of cohorts having low risk of LTBI.[31-34] Experience was a noted factor as physicians with the most encounters with HIV or TBD were more likely to adhere and implement the guideline.[31]

Thirteen studies assessed predictors of having TST and/or IGRA performed. Seven studies identified that PLHIV who were born from high TBD incidence countries were more likely to get screened for LTBI ranging from 40.4% to 82% compared to non-foreign-born patients, 15.3% to 68.9%.[23,25-27,30,33,34] Other noted factors for increased likelihood of being screened include male sex, men having sex with men (MSM), and multiple clinic visits. Determinants of having a positive LTBI screening included, foreign birth, higher than 100 cells/mm^3 CD 4 count baseline, and MSM.

Discussion

LTBI screening guidelines for PLHIV are developed to identify patients who should be evaluated for LTBI to reduce the morbidity and mortality of subsequent TBD and to prevent TBD transmission. However, LTBI screening guidelines among PLHIV in low TBD incidence countries is often not adhered to. Testing by TST involves a multistep process that requires 2 clinical encounters for administration and interpretation of TST reaction after 48 to 72 hours.[3] This creates an opportunity for both the health care provider and the patient to fail to complete the screening process. Failure to follow-up and noncompliance of patients may result in missed opportunities in preventing TBD, hence, strategies should be considered to improve the compliance of these patients, such as requiring counseling and advising for those who refused to be screened and treated. Another strategy that could improve the adherence to LTBI screening is the implementation of LTBI screening policy in HIV care facilities. High adherence as a result of having a TST implementation policy in HIV care clinics is supported by studies from Schulte and Lee who reported that PLHIV were more likely to get screened for LTBI if they were seen in a facility with a written policy or TST programs to provide LTBI screening for all PLHIV.[23,24] This approach may help reduce disparities in HIV and TBD among NHPI who are less likely to be screened for sexually transmitted diseases and opportunistic infections, including HIV and LTBI screening.[36-38]

A barrier identified for poor physician adherence to LTBI screening is the lack of sensitivity of the 2 recommended screening tools when used in PLHIV.[39] Anergic reaction and bacillus Calmette-Guerin (BCG) vaccination may induce false-positive screening test results in PLHIV, which may discourage healthcare providers from adhering to the LTBI screening guideline. In addition, both screening tests are inadequate to predict the progression of LTBI to TBD.[39,40] IGRA and TST have sensitivity of more than 90% when tested in non-HIV infected individuals, but sensitivity decreases in PLHIV to 72% and 61% for IGRA (TSPOT and QFT-GIT tests, respectively) and 64.3% and 71.2% for TST (at cut-off value of 10 mm and 5 mm, respectively).[41,42] However, IGRA has higher specificity and less cross-reactivity with BCG vaccination than TST in low TBD prevalence settings.[43-46] Therefore, testing by IGRA should be recommended as the diagnostic test of choice for patients who were born from high TBD incidence countries and those who received the BCG vaccination.

PLHIV who are on ART have significantly reduced hazard ratio (HR) of incident TBD (HR=.44), but their risk still remains higher than in general population.[24,47] Hence, TBD preventive therapy should be offered for its beneficial effects in reducing the reactivation of LTBI in PLHIV on ART. However, poor initiation and completion of LTBI treatment was noted in this review. The treatment was initiated in 36.9% to 100% positive patients, but only 22.6% to 74.3% completed the treatment.[21,23-26,29-30] Some of the low treatment initiation results may be attributed to physician decision making. Despite evidence of low isoniazid toxicity and the efficacy of isoniazid preventive therapy for 6 to 12 months in reducing TBD, some physicians are hesitant to follow the treatment guidelines due to fear and concerns of isoniazid toxicity and risks of polypharmacy treatment.[32,34,48-50] Continued training in LTBI care in PLHIV is needed to implement evidence-based therapeutic guidelines. Other possible reasons for incomplete LTBI treatment were noncompliance of patients, refusal to be treated, loss to follow-up, and adverse reaction to treatment. One factor that results in noncompliance of patients is the length of preventive treatment of LTBI. A 1-month regimen of rifapentine and isoniazid therapeutic regimen for prevention of LTBI in PLHIV was recently proposed, and implementing this therapeutic regimen could result in

better patient compliance and higher completion rate of LTBI treatment.[51,52] Shorter duration of treatment could also result in fewer adverse reactions. NHPI and Asians are less adherent to medications compared to other races, and a shorter treatment regimen will be beneficial in reducing health disparities among this group.[53,54]

An observational prospective study by Capocci in the UK showed that it is not cost-effective to screen for LTBI in PLHIV with high ART usage from countries with medium and high TBD incidence settings.[55] In this review, 6 studies advocated targeted LTBI screening among PLHIV who are born outside of low TBD incidence countries. All the European studies suggested adopting the BHIVA guidelines which recommends targeted screening of PLHIV who have the highest risk of developing TBD based on the country of origin, CD4 level, and length of time on ART. The BHIVA guideline also recommends screening PLHIV from low TBD incidence countries if they have additional TBD risk factors, including recent travel to high TBD incidence countries or close exposure to a known TBD case.[56] Although a targeted LTBI screening guideline among PLHIV in the US may be cost-effective, this approach will likely result in missed opportunities to detect both LTBI and TBD cases among PLHIV who were born in the US. The Canadian study by Brassard et al found that 55.6% cases of TBD in individuals who were not TST screened were born in Canada.[26]

In 2021, Asians and NHPI constitute two-thirds of population in Hawai‘i and include groups who experience notable health disparities in TBD and HIV infection due to social and demographic risk factors contributing to poorer health outcomes.[57,58] Some Asian ethnic groups and NHPI are less likely to be screened and tested for HIV compared to other racial groups resulting to late HIV diagnosis and having opportunistic infection at the time of diagnosis.[36-38] A targeted screening program, as advocated by several European countries, may miss domestic cases and create racial stereotypes. Triaging NHPI and Asians by country of birth could worsen the disparity in health care access and the prevalence of HIV infection and LTBI.

In conclusion, in a low-burden TBD country, such as the US, prevention among PLHIV is best accomplished through strict adherence to LTBI screening guidelines regardless of racial group and country of birth. Early detection and treatment of LTBI in high-risk populations can improve TBD control and decrease morbidity and mortality. As the US seeks to achieve the WHO TBD elimination goal, improving LTBI screening among PLHIV will be an important element of a comprehensive national strategy in TBD prevention.

Conflict of Interest

None of the authors identify a conflict of interest.

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Prevalence and Risk Factors of Self-reported Vision Impairment among Native Hawaiians and Pacific Islanders in the United States

John C. Lin ScB; Ingrid U. Scott MD, MPH; Paul B. Greenberg MD, MPH

Abstract

Racial disparities in vision impairment have been reported among Black, Hispanic, and White Americans. However, there is a paucity of research on vision impairment among Native Hawaiians and Pacific Islanders (NHPIs). The objective of this study was to determine the prevalence of, and risk factors for, self-reported visual impairment in NHPI adults in the United States (US). Data from the NHPI and 2014 National Health Interview Surveys were analyzed using sample weights and variance estimates. Prevalence was calculated for vision impairment and blindness for the NHPI and overall US populations. Sociodemographic and clinical risk factors of vision impairment were explored using descriptive statistics, χ^2 tests, and simple and multiple logistic regression. In total, 2 586 NHPIs and 36 673 individuals in the US were included. The prevalence of vision impairment was 8.8% among NHPIs and 9.1% for the overall US population, and the prevalence of blindness was 0.72% for NHPIs and 0.35% for the overall population. Independent risk factors associated with vision impairment were having a Charlson Comorbidity Index over 1 [OR: 2.89, 95% CI: (1.42–5.88)] and having a family income below $35 000 [OR: 2.03, 95% CI: (1.06–3.89)]. In summary, the rate of blindness is higher among NHPIs than the overall US population, especially for older and unemployed individuals with more comorbidities. Higher comorbidity burden, lower family income, and recent eye care were risk factors for vision impairment. More research is necessary to develop targeted and culturally sensitive interventions to promote NHPI eye health.

Keywords

Vision loss, epidemiology, Native Hawaiians and Pacific Islanders, National Health Interview Survey

Abbreviations

CDC = Centers for Disease Control and Prevention
CCI = Charlson Comorbidity Index
NHPIs = Native Hawaiians and Pacific Islanders

Introduction

Racial disparities in vision impairment have been identified among Black, Hispanic, and White Americans based on large, publicly accessible databases.[1-2] Differences in income, education, and insurance have been proposed as explanatory factors.[1-2] Comorbidities associated with vision impairment include diabetes, hypertension, arthritis, hyperthyroidism, neurodegenerative disorders, hematologic cancers, and other systemic infections.[3] However, there is limited information on vision impairment among Native Hawaiians and Pacific Islanders (NHPIs). Based on a digitized search of the PubMed literature databases from inception to January 7, 2023, the only published study result on vision impairment among NHPIs in the United States (US) was a survey of 124 adults on Ta'u Island, American Samoa, which found a prevalence of 10.5%.[4]

Although NHPIs represent 0.4 percent (1.4 million) of the US population, they have historically been aggregated with Native Americans or Asian Americans,[5] leading to their underrepresentation in health research.[6] A recent study using the NHPI National Health Interview Survey (NHIS) showed that NHPIs have a lower rate of eye care utilization than the overall US population, raising concerns about potential disparities in vision impairment.[7] Predictors of eye care utilization among NHPIs were higher family income, older age, and vision impairment.[7]

To address the paucity of public health data for NHPIs, the US Centers for Disease Control and Prevention (CDC) National Center for Health Statistics conducted the overall NHIS and the NHPI NHIS in 2014 using trained interviewers.[8] Using the NHIS data, this study compared the prevalence of self-reported vision impairment among NHPI and overall US populations and investigated socioeconomic and health risk factors for vision impairment in NHPI adults.

Methods

The Rhode Island Hospital Institutional Review Board reviewed this study and determined that this research did not involve human subjects.

The CDC defines an NHPI individual as having origins in any of the original inhabitants of Hawai'i, Guam, Samoa, or other Pacific Islands.[8] Participants were classified as visually impaired if they answered yes to the question: "Do you have any trouble seeing, even when wearing glasses or contact lenses?". Nonrespondents were excluded from the analysis. Blindness was based on the response to the question, "Are you blind or unable to see at all?".

The NHIS is a large-scale household interview survey collecting demographic and health information that has been conducted each year since 1957. [8,9] The NHIS involves a statistically representative sample, randomly selected via simple random sampling from households in all 50 states and the District of Columbia but did not include other US territories or residents of institutional group quarters such as university dormitories.[8,9] The 2014 NHPI NHIS was the first and only NHIS focused exclusively on the NHPI population.[8,9]

In this study, the authors calculated Charlson Comorbidity Index (CCI) as a measure of health status, ranging from a minimum score of 0 to 17 (indicating a more severe level of comorbidities) based on the presence of myocardial infarction, cerebrovascular disease, chronic pulmonary disease, ulcer disease, cancer, diabetes, renal disease, liver disease, connective tissue disease, and dementia, using methodologies from previous studies of NHIS data.[10,11] The CCI is a commonly used tool for summarizing comorbid disease statuses in public health research, substituting for individual comorbidity measures.[12,13]

Sample adult record weights, strata, and cluster information provided in CDC data were used to produce estimates representative of the NHPI and overall US populations. Weighted percentages were used and, therefore, may not precisely reflect the survey sample. Descriptive statistics were used to characterize both populations. Prevalence was calculated for vision impairment and blindness of the NHPI and overall US populations.[8,9] Characteristics of NHPIs with and without vision impairment were compared using descriptive statistics and Rao-Scott χ^2 tests. Simple logistic regression was used to identify factors associated with vision impairment in NHPIs, including age, sex, race, ethnicity, employment, marital status, family income, CCI, eye care utilization, functional limitations, health insurance, routine care, and delayed medical care. Following sensitivity analysis to identify collinear variables, odds ratios were calculated using multiple logistic regression based on significant factors in simple regression and adjusting for prior eye care utilization, which has been predictive of vision impairment in previous studies.[7] All analyses were conducted with α=0.05 in Stata SE 17 (StataCorp, College Station, TX); relationships with P<.05 were considered statistically significant.

Results

Nearly all respondents completed the question about vision impairment for the NHPI NHIS (99.9%; 2 586/2 590) and overall NHIS (99.9%; 36 673/365 697). Initial estimates indicated that 10.0% (259/2 586) and 10.0% (3 707/36 673) of the NHPI and overall samples, respectively, had vision impairment. After weighting, 8.8% and 9.1% of the NHPI and overall US population, respectively, had vision impairment (**Table 1**). The mean ages of the NHPI and overall US study populations were 40.4 (SD: 15.7) and 47.0 (SD: 18.0) years, respectively. Both populations were mostly female, married, and members of families earning less than $75 000.

Approximately 8.2% of NHPIs with vision loss reported blindness compared with 3.9% in the overall US population (data not shown). NHPIs with vision impairment were significantly more likely than those without impairment to be older or unemployed, to have a higher CCI and a functional limitation, and to have visited an eye doctor in the past year and delayed medical care due to cost or other reasons (**Table 2**).

In simple logistic regression, age, employment status, family income, CCI, recent eye care, functional limitations, and delayed medical care were identified as correlates of vision impairment in NHPIs (**Table 3**). After sensitivity analysis, multiple regression analysis identified 2 independent risk factors for vision impairment in NHPIs: a CCI over 1 (Odds Ratio [OR]: 2.89, 95% Confidence Interval [CI]: 1.42–5.88) and family income below $35 000 (OR: 2.03, 95% CI: 1.06–3.89).

Discussion

This study investigated the epidemiology of self-reported vision impairment and blindness among NHPI adults using the first national survey designed to assess the health of NHPIs in the US. Significant disparities in blindness were identified between the NHPI and overall US populations.

The prevalence of vision impairment was similar for the NHPI and overall US population. However, the prevalence of blindness in NHPIs was nearly twice that of the overall US population. This finding may be related in part to the lower rates of eye care utilization in the NHPI population.[7] In the present study, however, lack of recent eye care utilization did not fully explain the association of low family income with vision impairment; lower family income may be linked to longer-term lack of eye care among NHPIs, possibly due to high costs or other barriers to access.[7]

This study's findings align with previous research on self-reported and measured vision impairment. The World Health Organization Study on Global Aging and Adult Health similarly identified comorbidities (a variable constructed by study authors indicating self-reported arthritis, stroke, angina, diabetes, chronic lung disease, asthma, depression, and hypertension) and low household wealth as risk factors for self-reported vision impairment in nationally representative samples of 6 developing countries (China, Ghana, India, Mexico, Russia, and South Africa).[14] Additionally, receiving eye care was associated with impaired vision in previous studies.[15-17] Based on surveys of older Americans, the most common reason for not visiting an eye doctor was that there was no reason to go (i.e., they did not have vision loss).[18] This may explain why people who reported vision loss were more likely to see an eye doctor in the past year in this study.

Epidemiological studies of vision impairment of Pacific Islanders outside the US have found different rates of vision impairment and blindness. The Global Burden of Disease, Injuries, and Risk Factors Vision Loss Project estimated that the age-standardized prevalence of measured moderate-to-severe vision impairment in Southeast Asia and Oceania was approximately 4.93% in 2020.[19] However, the age standardization was based on demographics of the global population, which is younger than the US population.[20,21] Prevalence of blindness varied from 0.47%

Table 1. Prevalence of Vision Impairment Among NHPI Adults in the US Compared with Overall US Adult Population

Population	NHPI[a], weighted %[c] (N=2586)	Overall[b], weighted %[c] (N=36 673)
Total vision impairment	8.8	9.1
Blindness	0.7	0.4
Age (years)		
≤30	7.1	5.4
31-50	6.3	7.6
51-64	12.6	11.2
≥65	18	13.5
Sex		
Male	8.7	7.8
Female	8.8	10.2
Race		
NHPI only	7.6	N/A
Multiracial	10.2	9.8
AIAN only	N/A	17.1
Asian only	N/A	5.3
Black only	N/A	11.1
White only	N/A	8.9
Ethnicity		
Not Hispanic	8.9	9.2
Hispanic	7.7	8.1
Employment Status		
Unemployed	11.8	12.9
Employed	7.3	6.7
Marital Status		
Married	7.7	8.4
Unmarried	9.9	9.8
Family Income		
≤$34,999	12.9	12.6
$35,000-$74,999	8.4	8.9
$75,000-$99,999	6.8	7
≥$100,000	7.2	6.4
Charlson Comorbidity Index		
0	4.9	4.3
1	7.9	8.7
≥2	15.7	14.2
Eye Doctor Visit in Past 12 Months		
Yes	14.7	11.9
No	7.6	7.4
Functional Limitations		
Yes	17	17.9
No	5.5	4.6
Health Insurance in Past 3 Years		
Yes	8.1	8.9
No	16.3	14.5
Usual Place of Routine Care		
No routine care	5.9	8.7
Clinic or hospital	9	9.4
Delayed Medical Care for Reasons Other than Cost		
No	7.4	8
Yes	19.7	19.6
Delayed Medical Care Due to Cost		
No	6.6	7
Yes	18.7	19.5

AIAN, American Indian and Alaska Native; NHPI, Native Hawaiian and Pacific Islander.

[a] Data was obtained from the NHPI National Health Interview Survey.[8]

[b] Data was obtained from the overall National Health Interview Survey.[8]

[c] Proportions were calculated using sample weights and therefore do not precisely reflect sample sizes.

Table 2. Baseline Characteristics of NHPI Adults in the US with and without Vision Impairment[a]

NHPI Population	Vision impairment, weighted %	No vision impairment, weighted %	*P*-value[b]
Age (years)			
≤30	26.5	33.2	**.004**
31-50	28.8	41.1	
51-64	26.4	17.7	
≥65	18.3	8	
Sex			
Male	48.2	49.4	.95
Female	51.8	50.6	
Race			
NHPI only	47.3	55.3	.197
Multiracial	52.7	44.7	
Ethnicity			
Not Hispanic	93.3	92.3	.61
Hispanic	6.7	7.7	
Employment Status			
Unemployed	43.6	31.4	**.014**
Employed	56.4	68.6	
Marital Status			
Married	44.1	51	.22
Unmarried	55.9	49	
Family Income			
≤$34,999	35.9	23.9	.091
$35,000-$74,999	31.3	33.7	
$75,000-$99,999	10	13.5	
≥$100,000	22.8	28.9	
Charlson Comorbidity Index			
0	27.1	50.5	**<.001**
1	19.5	22	
≥2	53.5	27.6	
Eye Doctor Visit in Past 12 Months			
Yes	44.4	29.2	**.006**
No	55.6	70.8	
Functional Limitations			
Yes	55.7	26.2	**<.001**
No	44.3	73.8	
Health Insurance in Past 3 Years			
Yes	37.9	57.3	.198
No	62.1	42.7	
Usual Place of Routine Care			
No routine care	48.2	59.4	.29
Clinic or hospital	51.8	40.6	
Delayed Medical Care for Reasons Other than Cost			
Yes	25.2	9.9	**<.001**
No	74.8	90.1	
Delayed Medical Care Due to Cost			
Yes	38.4	16.1	**<.001**
No	61.6	83.9	

NHPI, Native Hawaiian and Pacific Islander; US, United States.

[a] Data was obtained from the NHPI National Health Interview Survey.[8]

[b] *P*-values were calculated using Rao-Scott $\chi 2$ tests. All statistically significant relationships (defined as $P \leq .05$) are bolded. Proportions were calculated using sample weights and therefore do not precisely reflect sample sizes. *P*-values compared respondents with and without vision impairment.

Table 3. Characteristics Associated with Vision Impairment in NHPIs in the US in Simple and Multiple Logistic Regression

Characteristics	Simple odds ratio (95% CI)	*P*-value	Multiple adjusted odds ratio[a] (95% CI)	*P*-value
Age (years)				
18-30	1 [reference]		Omitted[b]	
31-50	0.88 (0.44–1.75)	.7		
51-64	1.87 (0.83–4.22)	.126		
≥65	**2.86 (1.56–5.26)**	**.001**		
Sex				
Male	1 [reference]			
Female	1.02 (0.61–1.70)	.95		
Race				
NHPI only	1 [reference]			
Multiracial	1.38 (0.84–2.28)	.198		

Table 3. Characteristics Associated with Vision Impairment in NHPIs in the US in Simple and Multiple Logistic Regression (Con't)				
Characteristics	**Simple odds ratio (95% CI)**	***P*-value**	**Multiple adjusted odds ratio[a] (95% CI)**	***P*-value**
Ethnicity				
Not Hispanic	1 [reference]			
Hispanic	0.86 (0.48–1.56)	.61		
Employment Status				
Unemployed	1 [reference]		1 [reference]	
Employed	**0.59 (0.39–0.89)**	**.014**	0.77 (0.47–1.27)	.29
Marital Status				
Married	1 [reference]			
Unmarried	1.32 (0.83–2.09)	.23		
Family Income				
<$34,999	**1.91 (1.09–3.38)**	**.026**	**2.03 (1.06–3.89)**	.035
$35,000-$74,999	1.17 (0.62–2.24)	.61	1.26 (0.62–2.57)	.5
$75,000-$99,999	0.93 (0.32–2.72)	.89	0.94 (0.32–2.77)	.9
≥$100,000	1 [reference]		1 [reference]	
Charlson Comorbidity Index				
0	1 [reference]		1 [reference]	
1	1.65 (0.84–3.26)	.141	1.58 (0.72–3.49)	.25
≥2	**3.62 (2.01–6.53)**	**<.001**	**2.89 (1.42–5.87)**	.005
Eye Doctor Visit in Past 12 Months				
Yes	1 [reference]		**1.81 (1.03–3.18)**	.04
No	**0.52 (0.33–0.82)**	**.007**	1 [reference]	
Functional Limitations				
Yes	1 [reference]		Omitted[b]	
No	**0.28 (0.18–0.43)**	**<.001**		
Health Insurance in Past 3 Years				
Yes	1 [reference]			
No	0.46 (0.13–1.58)	.21		
Usual Place of Routine Care				
No routine care	1 [reference]			
Clinic or hospital	1.57 (0.66–3.73)	.29		
Delayed Medical Care for Reasons Other than Cost				
No	1 [reference]		Omitted[b]	
Yes	**0.33 (0.21–0.51)**	**<.001**		
Delayed Medical Care Due to Cost				
No	1 [reference]		Omitted[b]	
Yes	**0.31 (0.20–0.47)**	**<.001**		

NH, Native Hawaiian; PI, Pacific Islander. All statistically significant relationships (defined as **P**≤0.05) are bolded.

[a] Adjusted for employment status, family income, comorbidities, and eye care utilization.

[b] Omitted due to collinearity in sensitivity analysis. Age and functional limitations were collinear with Charlson Comorbidity Index; delaying care due to cost or other reasons were collinear with family income.

to 0.63% in the Pacific region, which was higher than that in the overall US population but lower than that in the US NHPI population.[19]

This study has several limitations. First, all data were self-reported and, therefore, subject to recall and response bias. However, all NHIS interviewers were extensively trained, and the survey had been prepared and tested for both populations, which limited misunderstanding of terminology.[13] Second, the CCI was calculated based on self-reported NHIS data rather than hospital administrative data, although this methodology was previously validated.[9,10] The CCI has been frequently used in clinical prognosis and comorbidity adjustment in analyses due to its mathematical and clinical validity.[22] Although the CCI includes diabetes, its coverage of 19 pre-defined comorbid conditions may neglect a specific focus on diabetes, which is more common among NHPIs.[23] Third, the NHPI NHIS contains data that is nearly 10 years old, although this remains the only national source of NHPI-specific health data. Finally, the NHIS was subject to the inherent limitations of cross-sectional study design, but population surveys are essential for public health surveillance.

In sum, major disparities exist in self-reported blindness between the NHPI and overall US populations, possibly due to a lower rate of seeing an eye doctor and receiving treatment among NHPIs.[7] Consequently, improving eye care utilization among NHPIs, particularly among lower-income NHPIs, may help mitigate the impact of these disparities. Culturally sensitive interventions for health education for NHPIs may be delivered in-person, by mail, or by video; cultural traditions such as storytelling and group discussions should be integrated, and lay community members should be recruited.[24] Future studies are needed to develop targeted interventions to optimize NHPI eye health.

Conflict of Interest

None of the authors identify a conflict of interest.

Disclaimer

The views expressed here are those of the authors and do not necessarily reflect the position or policy of the US Department of Veterans Affairs or the US government.

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Artificial Intelligence in Nursing Education: Opportunities and Challenges

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The Spotlight on Nursing is a recurring column from the University of Hawai'i at Mānoa Nancy Atmospera-Walch School of Nursing (NAWSON). It is edited by Holly B. Fontenot PhD, APRN, WHNP-BC, FAAN; Associate Dean for Research, Frances A. Matsuda Chair in Women's Health, and Professor for NAWSON, and HJH&SW Contributing Editor; and Joanne R. Loos PhD, Science Writer for NAWSON.

Acronyms

AI = Artificial Intelligence
AACN = American Academy of Colleges of Nursing
ANA = American Nurses' Association
EHR = Electronic health records
ICMJE = International Committee of Medical Journal Editors
NAIL = Nursing and Artificial Intelligence Leadership

The rapid growth of Artificial Intelligence (AI) has generated excitement and concern in both health care and higher education. The potential benefits of AI in the health care arena promise to revolutionize the approach to some of the most vexing care and systems problems. These include improved diagnosis and treatment; enhanced health research and drug development; and additional aid with the public health interventions, such as disease surveillance, outbreak response, and health systems management.[1] Health education is also poised for major shifts in the way health professionals are trained for a future in which AI is ubiquitous. Health professional educators enthusiastic about AI innovations anticipate an era of "precision education," analogous to "precision medicine," where data can be leveraged to provide students with individualized training and assessment.[2] However, others are concerned about the rapid pace of AI innovation and the lack of knowledge related to the potential risks and unintended consequences associated with these nascent technologies.

AI is the theory and development of computer systems that perform specific tasks that in the past only a human could do, such as visual perception, speech recognition, decision-making, and language translation.[3] Generative AI is a form of AI that can create text or media from prompts written by a human. OpenAI's ChatGPT (OpenAI, L.L.C., San Francisco, CA) and Google's Bard (Google Inc., Mountain View, CA) are examples of generative AI that use natural language processing, or the ability to interpret, manipulate, and take in human language to process and respond to user prompts.[4] Generative AI with natural language processing capabilities allows users to analyze and create content with a few keystrokes, making them popular in classrooms and workplaces.

Transforming Nursing Care

AI has the potential to transform the way that nurses provide individualized evidence-based care that aligns with patients' needs and priorities. For example, AI is rapidly demonstrating its versatility in secondary and tertiary prevention, including an increase in accurate screening, reducing medical errors, and improving health service providers' productivity and efficiency.[5] Benefits may also occur in primary care nursing with AI-augmented primary care settings, where new tools may fuel enhanced individualized patient care and population health tools, such as personalized patient digital health coaching, real-time identification of health and illness trends using data from wearable devices, and improved population health management through patient-centered information systems that more effectively promote healthy behaviors.[5,6] While AI will influence nursing practice, the inverse is also true: nurses will directly inform future AI tools.[6] Nurses generate voluminous data in health systems via the documentation they produce during routine practice, and this data will then be used to inform AI-driven health care system innovations.

Guidance for Nursing Professionals and Educators

Sources for practical guidance for the use of AI in nursing education are sparse but becoming more widely available. The American Nurses Association (ANA)[7] recently published a position paper on the ethical use of AI in nursing practice that emphasizes the need for ensuring transparency, eliminating bias, preventing health disparities, and protecting patient privacy and confidentiality. Most importantly, nurses must ensure AI does not compromise the caring, compassion, and human relationships that are central to nursing. The Nursing

and Artificial Intelligence Leadership (NAIL) Collaborative is another group that has developed strategies for nurses to take leadership roles in shaping the use of AI in health systems and nursing practice. Priorities outlined by NAIL include improving nurses' understanding of the relationship between the data they generate and the AI technologies they use.[6]

Navigating the sea change related to AI in nursing education requires educators to share strategies that keep the well-being of students, patients, and populations at the heart of nursing care. Some examples of foreseeable opportunities and challenges related to AI and nursing education are discussed in the following section.

Opportunities to Enhance Nursing Education

Simulation and Virtual Learning

Simulation is integral to nursing education and practice. It is commonly used as an instructional method to enhance technical patient care skills, decision-making, and interpersonal and communication skills, and is frequently relied upon to explore difficult subjects such as end-of-life issues, critical illness, and cultural sensitivity.[8] AI has the potential to supercharge simulation by offering scenarios that are realistic and tailored to students' individual learning needs. Some examples of AI-enriched simulation include the use of AI-enhanced robots that can interact with nursing students in a way that is more realistic than current high-fidelity mannequins.[9] AI is also being integrated into virtual reality and augmented reality to develop immersive virtual simulation experiences.[10] One potential application of this technology would be to simulate settings that are difficult to access in the real-world. For instance, simulation scenarios might include medical emergencies where nursing students could practice skills that might otherwise be hard to reproduce in traditional education settings.

Another application could be virtual exploration of various social determinants of health to illuminate challenges that individuals and populations may encounter (eg, access to health care, nutritious food, and safe housing). AI may also bring to life diverse voices, cultures, and histories to amplify learning related to cultural influences on health. This presents an exciting opportunity for nurse educators in Hawai'i. Nurse educators can work with community and cultural leaders to develop AI-enriched videos where students can immerse themselves in different locales to gain unique regional and cultural perspectives in the state. Students could also visit historical points in time or meet important historical figures. Imagine a community health nursing simulation where students visit Kalaupapa to conduct a key informant interview with Father Damien to gain insight on how to care for Hansen's Disease patients in a low-resource environment. Such experiences can be powerful influences on the way nursing students provide holistic care to people in Hawai'i.

Enhanced Clinical Judgment Tools

Nurse educators see promise in AI as a tool to enhance the development of students' clinical judgement. This application of AI is already in use in clinical practice, allowing nurses to provide more timely and appropriate interventions informed by AI-generated predictions and clinical care suggestions. For example, new AI-enhanced clinical decision support tools rapidly generate nursing diagnoses, calculate patient fall risk predictions, and develop decision trees to prevent catheter-associated urinary tract infections.[11] While nurses can carry out these functions without AI, new AI clinical tools have the advantage of being able to rapidly analyze large volumes of data and automate the adjustment of risk-calculations to provide more accurate predictions. Faculty trained to use these new AI-based patient care support tools will be able to guide students on the effective and efficient use of these technologies.

Personalized Learning

AI has the potential to transform education as an individualized tutor for students. AI tutors, such as the Khanmigo model developed by the Khan Academy,[12] are currently available though still experimental. Providing individualized tutoring for students can significantly augment nursing educators' capacity to adapt lessons to students specific learning needs. For example, AI tutors could walk students through a simulated patient interviews or provide instantaneous feedback on assignments such as drafting succinct clinical documentation or calculating medication dosages.[13]

Challenges for Nursing Education

Overreliance on Technology

With the wide availability of chat-based AI tools, nurse educators are increasingly worried that nursing students will rely too heavily on AI tools, neglecting critical thinking, relationship building, and communication skills. Plagiarism is also a major area of concern. While AI tools like ChatGPT can enhance learning and engagement, their ability to rapidly generate text may facilitate student plagiarism, undermining academic integrity. One preliminary strategy being adopted at universities is to outline acceptable use of AI in the course syllabus, with various approaches being discussed ranging from prohibitive to permissive.[14] Nurse educators will need to adopt strategies for incorporating AI into the learning environment in ways that promote ethics and original thinking, while exploring and highlighting its limitations.

AI Algorithm Bias

Bias in AI models are a major concern, especially for programs preparing nurses to work in areas with large minority and Indig-

enous populations. AI uses algorithms to assess data and make inferences. Current AI systems may perpetuate biases inherited from training data that may compound existing inequities based on race/ethnic background, socioeconomic status, gender or sexual orientation, thereby entrenching disparities in health care systems and possibly even exacerbating them.[15] For example, algorithms trained using data aggregated from White patients may not have the same accuracy as when applied to other races, and may prioritize White patients with less severe illnesses over sicker patients of other racial groups.[6] Health care systems may not have the adequate data infrastructure needed to collect the data to optimally train algorithms to fit their local population and/or the practice patterns, and may not be able to identify bias to assure that AI algorithms perform consistently across patient cohorts.[15] AI models trained on Indigenous populations' health data exist,[16–18] but they are sparse.[19] This is of great concern for nurse educators, and will require greater understanding of how to identify algorithmic bias in health care and use their clinical expertise to serve as advocates when providing health services to Hawai'i's extremely diverse student and patient populations.

Privacy and Security

Generative AI poses several privacy concerns for nursing educators and students. Personal identifiable information, such as names, addresses, and contact information, as well as health information, may be collected during interactions with AI tools. This may result in unintended exposure or misuse of sensitive information.[20] Privacy advocates, educators, and administrators have yet to create or finalize policies that put human interests before that of machines. The White House Office of Science and Technology Policy has issued an *AI Bill of Rights* handbook.[21] In its report, *AI and the Future of Teaching and Learning,* the US Department of Education advocates for educators to have a voice in AI development for educational use.[22] Educators who are early adopters wishing to utilize AI in the classroom should adhere to current institutional-level recommendations. Current AI platforms may not be fully compliant with the Family Educational Rights Act (FERPA), a policy that was created to protect students' privacy and data, especially when used by third parties to provide educational services.

Nursing Scholarship and AI Co-authorship

Nursing faculty have used AI tools to contribute content to publications by interpreting data and generating written responses based on prompts. ChatGPT is listed as a co-author of a *Nurse Education in Practice* editorial, which features 5 paragraphs written by ChatGPT.[23] This provocative article showcased how generative AI can be used to write scientific articles. While some argue that ChatGPT cannot be considered a co-author because it does not currently meet the International Committee of Medical Journal Editors' (ICMJE) authorship criteria, [24] authorship criteria may change in the future, allowing AI tools to meet ICMJE's standards.[25] Authors will need to carefully reflect on the implications of acknowledging AI tools as co-authors of publications and continually monitor changes in authorship guidelines.

Preparing Students for AI-enhanced Healthcare Workplaces

AI can be integrated in nursing programs to prepare students for the AI-related skills needed in the workplace. This may take varied forms such as teaching students how to engineer generative AI prompts for research, conducting literature reviews, or practicing how to use AI clinical tools. With the increasing prevalence of AI use in the classroom and workplace, it will be important to maintain communication between academic institutions and potential employers so that students are equipped to meet workplace needs. Research efforts to examine AI in education is occurring on a global scale with a principal objective to prepare students for the future workforce.[26] Greater understanding of students' use of generative AI for coursework is needed to appropriately guide them toward best practices. Such information will help inform academic policies related to AI use.

While AI offers tremendous opportunities to transform nursing education, there are still serious challenges that will need to be considered and addressed. To best position nursing practice for the changes that AI will bring to the health system and patient care, nurse educators must proactively examine ways AI will influence nursing education in a responsible manner. Nurse educators will play a crucial role in assuring that AI will serve as a tool to prepare compassionate, competent, and technologically adept nurses now and in the future.

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Hawai'i Interprofessional Education: Publications on Distance Learning Technologies

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Acronyms

HIPE = Hawai'i Interprofessional Education Workgroup
IPE = Interprofessional education
DKICP = University of Hawai'i at Hilo Daniel K. Inouye College of Pharmacy
UH= University of Hawai'i

Introduction

The Hawai'i Interprofessional Education Workgroup (HIPE) was formed to prepare University of Hawai'i (UH) health professional students to collaborate to provide a safe, effective, and sustainable patient/consumer-centered and community/population-oriented health care system.[1] HIPE brings students together to learn with and about one another's discipline through simulations. The group also conducts research and program assessments to disseminate new knowledge. HIPE includes representatives from the UH Nancy Atmospera-Walch School of Nursing (NAWSON), the UH John A. Burns School of Medicine (JABSOM), the UH Office of Public Health Studies, the UH Thompson School of Social Work & Public Health, and University of Hawai'i at Hilo Daniel K. Inouye College of Pharmacy (DKICP). The authors of this article are HIPE faculty members.

Initially, publications focused on outcomes of the simulations, but more recently the focus has shifted to distance education and telehealth initiatives. Although several of HIPE's member schools are on the island of O'ahu, one member school, DKICP, is located on Hawai'i Island. The geographic separation allowed HIPE to engage in distance education long before the COVID-19 pandemic forced the *en masse* switch to online education. HIPE has discovered many benefits of distance education initiatives including: connecting geographically diverse students, allowing access for additional facilitators, and building experience with distance technologies. Overall, students have been very receptive to distance education, with an increased number of students, especially from neighbor islands, participating in interprofessional education (IPE) after the pandemic hit. HIPE is working on increasing inclusivity by offering opportunities to participate on different dates and times, and reaching students in remote areas who have limited distance education opportunities. For example, HIPE is looking into ways to include students in Guam, whose time zone has presented challenges previously.

Highlights of HIPE research into the outcomes of these distance technologies through the years include the following published articles:

2019

An Interprofessional Team Simulation Exercise About a Complex Geriatric Patient[2]

We created the Hawai'i Interprofessional Team Collaboration Simulation (HIPTCS) exercise in 2014 for UH students in medicine, nursing, pharmacy, and social work. Pharmacy students were located on Hawai'i island, and participated via video conference.

In October 2014, the pilot test included 2 separate scenarios: a pediatric oncology case, and the hospital discharge of a complex geriatric patient. The simulation exercise was revised in February 2015, and included only 1 case, the hospital discharge of a complex geriatric patient. Students completed structured pre-work which included watching a video about teamwork and reviewing the patient case.

The simulation included: (1) an icebreaker exercise, (2) students from different disciplines collaborating to create a discharge plan, (3) a simulated family meeting with a theater student, and (4) a structured debriefing about effective teamwork provided in an interdisciplinary manner. Analysis of both qualitative and quantitative evaluations from the first 2 HIPTCS simula-

tions found that this exercise was well received and effective in improving students' self-perceived interprofessional skills. Students also reported satisfaction with the use of distance technology.

2020

From a Distance: Nursing and Pharmacy Students Use Teamwork and Telehealth Technology to Provide Interprofessional Care in a Simulation with Telepresence Robots[3]

Pharmacy students and nursing students utilized a telepresence robot to communicate interprofessionally in an acute care scenario. The simulation center and high-fidelity manikin were on 1 island with the nursing students, and the pharmacy students were on another island controlling the robot. The pharmacy student's voice and video were projected from the robot.

The learners focused on role understanding, communication, and team collaboration while using this telehealth technology. Pre- and post-exericse self-assessment scores were compared. The learners reported improvement in their interprofessional team skills, communication, and collaboration. Responses to the open-ended questionnaire showed that students appreciated the ability to practice team communication and collaboration when working on a realistic simulation. Future directions for this learning experience include streamlining the pre-work, ensuring small group sizes, and including a validated tool to evaluate collaboration.

Evaluation of Distance Facilitation and Technology in an Interprofessional Simulation Exercise[4]

University of Hawai'i health professional students have participated in a twice annual interprofessional simulation exercise focused on hospital discharge planning for a complex geriatric patient. As students from the medical, nursing, and social work programs are located on O'ahu, but pharmacy students are on the island of Hawai'i, a distance education strategy was developed to allow students to work collaboratively in real time with audio and visual connections, onsite and distance faculty co-facilitators, and an actor portraying the patient's family member.

This article was an update of the 2019 publication on the simulation exercise involving a complex geriatric patient. An analysis of 3 years of data led by Carolyn Ma PharmD, former dean of the DKICP, revealed that both students and facilitators were satisfied with working through this distance education simulation exercise, and that interprofessional simulation exercises can be successfully run with both onsite and distant site facilitators.

2021

The Healthcast Program: Interdisciplinary, Simulated-Patient Education with Health Care and Theatre Students[5]

The HealthCAST (Collaboratively Acted Simulation Training) program, which is a simulated patient program developed by experts in simulation, health care, and theatre, models how multiple departments collaborated to create an interprofessional, simulated-patient program. The program allows health care students to participate in simulated patient encounters, with theatre students playing the roles of patients. All students, whether provider, patient, participant, or observer, can enhance their skills and receive feedback from faculty. While HealthCAST began with in-person simulations, the COVID-19 pandemic forced simulations online. This article described the process used to create the program, including an analysis of the HealthCAST results, which showed that the program was a positive experience for health care and theatre students.

2022

Interprofessional Disaster Simulation During the Covid-19 Pandemic: Adapting to Fully Online Learning[6]

Originally developed as an in-person simulation among interprofessional learners from fields of public health, nursing, and social work, the Disaster Aftermath Interprofessional Simulation (DAIS) allowed participants to immerse themselves in the aftermath environment of a natural disaster.[7] In 2020, however, the COVID-19 pandemic forced campus closures that led to the rapid conversion of this exercise into a fully online format.

The online DAIS used internet tools that enabled real-time collaboration among learners. They participated in team exercises including disaster triage, disease outbreak investigation, and disaster response. Participants completed surveys after the simulation measuring various interprofessional skills and simulation-learning outcomes (SLO). Results were compared with those from the in-person format and indicated that interprofessional skills were higher for the online participants versus those in-person. All SLOs were met. This study demonstrated that online tools can be effective mechanisms for conducting interprofessional simulations, and in some instances may even be more effective than in-person formats.

Efficacy of Interprofessional Sport Concussion Simulation Training for Healthcare Students and Teacher Candidates[8]

The faculty from the Doctor of Nursing Practice (DNP), Master of Science in Athletic Training (MSAT), and Master of Education Teaching (MEdT) programs recognized that youth athletes participating in school athletics are at risk for a variety of injuries resulting in post-concussion symptoms. An online interprofessional (IP) simulation was developed for students from these programs to collaborate to create a plan for the student athlete to return to learn in the classroom and return to the sport. The Interprofessional Collaborative Competency Attainment Survey (ICCAS) tool was utilized to measure students' self-efficacy related to IP competencies. Pre-post ICCAS results demonstrated significant improvement in student IP competencies. Additional open-ended survey questions showed that students felt the most helpful part of the simulation was the ability to work with other professionals that they historically have not worked with.

2023

Interprofessional Telehealth Simulations for Pharmacy and Nursing Students: Comparison of In-Person and Online Experiences[9]

Originally designed as an in-person telehealth simulation, the in-person format in 2019 was compared to the online format in 2020 in achieving the core competencies. In 2019, as detailed above, pharmacy students on one island controlled a telepresence robot and collaborated with nursing students on another island in the simulation center with a high-fidelity manikin.[3] In 2020, the session was moved to a fully online telehealth simulation using a video conferencing system and a virtual patient. The objectives and unfolding scenarios were kept the same, however, the learners were unable to interact with the manikin and telepresence robots during the COVID-19 related campus closures.

Learners and faculty completed the questionnaires in both formats, but in 2020 they also incorporated the use of an observational tool to assess the students during the patient care simulation. The questionnaire results indicated statistically significant improvements in IPE domains (eg, communication, collaboration, roles and responsibilities, collaborative patient/family-centered approach, conflict management, and team functioning skills) in 2019 and in 2020. The observational tool from 2020 allowed facilitators and learners to score individual team members during the encounter and resulted in all scores (in 4 areas including collaboration, roles and responsibilities, collaborative patient-family centered approach, and conflict management resolution) at or above the expected level. Although the pandemic forced the exercise to take place online and include a virtual patient instead of a manikin, participants were still able to improve on measured domains. Thus, the authors concluded that the online format was successful and remains a viable option should the need for complete online learning present itself again.

Comparing In-Person and Online Formats of Pediatric Interprofessional Team Training to Facilitate End-Of-Life Discussions. Accepted By Clinical Simulation in Nursing[10]

This study involved an exercise that was originally developed to be an in-person simulation focused on providing learners from medicine, nursing, social work, and chaplaincy an opportunity to work together to learn how to facilitate end-of-life discussions with a family with a dying child. In 2021, the simulation was converted to an online format. The study population consisted of simulation participants (n=118) from a 4-year period who had participated via both the in-person and online formats. Participants completed 2 retrospective pre-post questionnaires: 1 related to end-of-life professional caregiving and the other related to self-efficacy. They also responded to open-ended questions regarding the simulation experience. Statistically significant changes were found between pre and post scores for both scales across training settings, indicating that the change to an online format did not affect the effectiveness of the exericse. With the increased use of online training platforms, the authors stated that more challenging simulations could be developed and directed at practicing professionals to build competency in this area.

Improving Interprofessional Collaboration Between Social Work and Pharmacy Through Hybrid and Virtual Learning Experiences

When it comes to patient care, pharmacy and social work professionals are not typically viewed as directly collaborative. However, the professions can be complementary, and improved patient health and wellbeing have been documented as outcomes when they work together. Thus, pharmacy and social work faculty developed an online IPE activity aimed at integrative student learning. Participants included faculty and students who were based on various islands throughout the state of Hawai‘i and the US territory of Guam. The patient case encouraged interprofessional teamwork and collaboration while challenging students to share profession-specific knowledge with one another. Results indicated statistically significant improvements related to interprofessional collaborative competencies. When hybrid training and fully online training were compared, there were no significant differences in pre scores, but post-training scores were significantly higher for students who experienced only online training. This interprofessional case-based activity successfully promoted interprofessional learning and collaboration. Introducing learners to this type of collaborative practice while in school is critical for future collaboration in the workforce.

Next Steps

HIPE research, much like the workgroup itself, has evolved since its inception. Looking ahead, the group plans to expand methodology for evaluating HIPE activities so that it goes beyond student self-report. Some of these next steps are already underway. For instance, HIPE is implementing objective measures to complement the subjective data contained in self-reports. This is evident in a previously published study[9] and in an ongoing study in which we evaluate a training activity created for simulation faculty and facilitators that allows an objective observational assessment of simulation participants. Another research project in-progress is the development, testing, and validation of a new tool that will allow evaluation of the simulation activities in relation to Healthcare Simulation Standards of Best Practice.[11] HIPE is also exploring ways to measure longitudinal outcomes, in order to assess how HIPE activities correlate with practice.

The evolution of HIPE through the years shows the promise of the group to achieve IPE at a time when interprofessional collaboration is of the utmost importance. The activities described here are essential, not only to contribute to IPE research and practice, but also for accreditation purposes for the schools in the University of Hawai‘i Council of Health Sciences.

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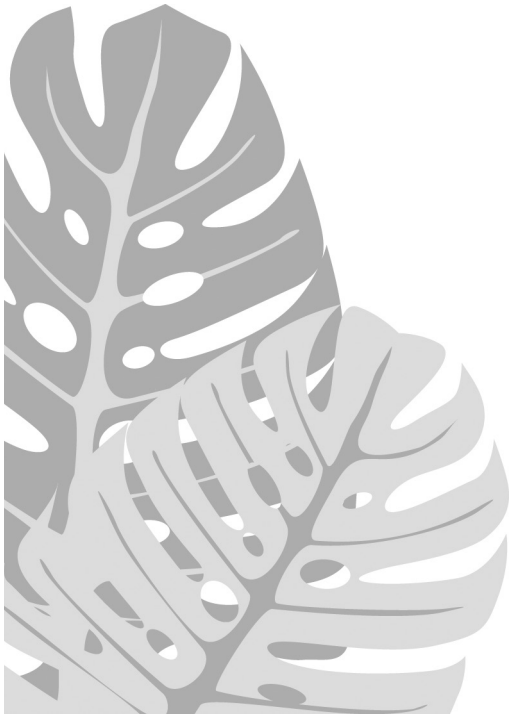
Hawai'i Journal of Health & Social Welfare
Instructions for Authors of Research Articles

The Hawai'i Journal of Health & Social Welfare (HJH&SW) publishes original research, reviews, balanced viewpoints (ie, point/ counterpoint articles), editorials, and other categories of articles. Topics of interest include medicine, nursing, public health, social work, dental hygiene, and pharmacology, with a focus on the unique, multicultural and environmental aspects of the Hawaiian Islands and Pacific Rim region. Some frequently published types of articles are described herein. Authors interested in publishing other types of articles may contact the journal.

Original articles are usually research-related, quantitative or qualitative papers. Research articles are limited to 3000 words. Reviews summarize the literature, address current practice or issues within the medical or public health communities, and are intended to promote a discussion of different viewpoints. Reviews are limited to 3000 words.

Case Reports are original and interesting reports that contribute significantly to medical knowledge. They generally describe unreported or unusual side effects, unexpected or unusual presentations of a disease, diagnoses and/or management of new and emerging diseases, unexpected events during treatment, or observations that highlight the need for new practice standards in the management of certain disease conditions. Case reports are limited 1500 words.



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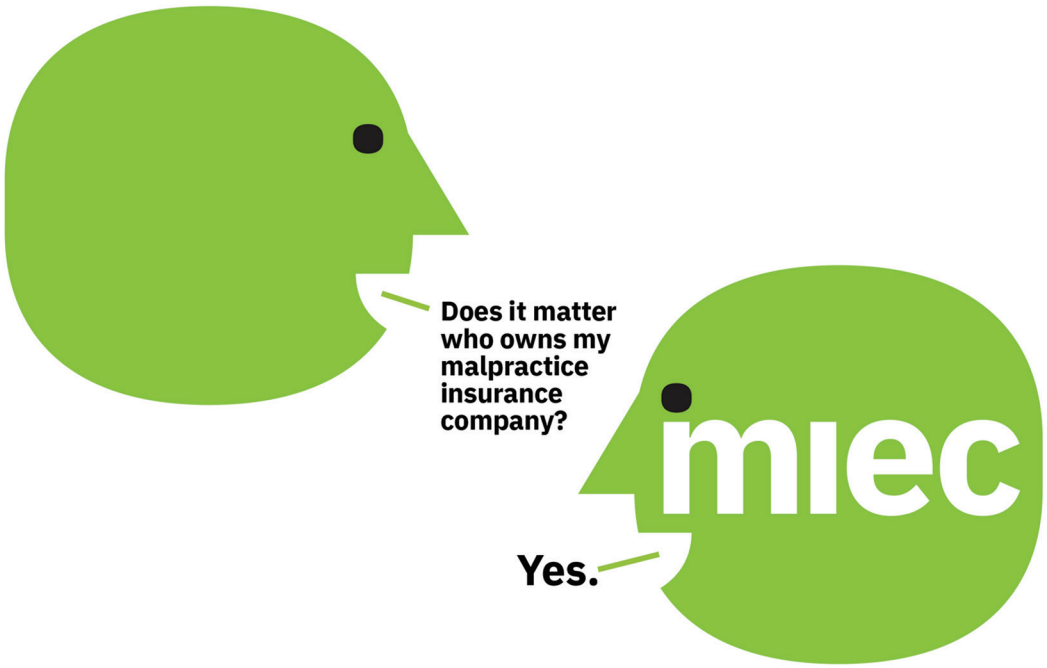

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