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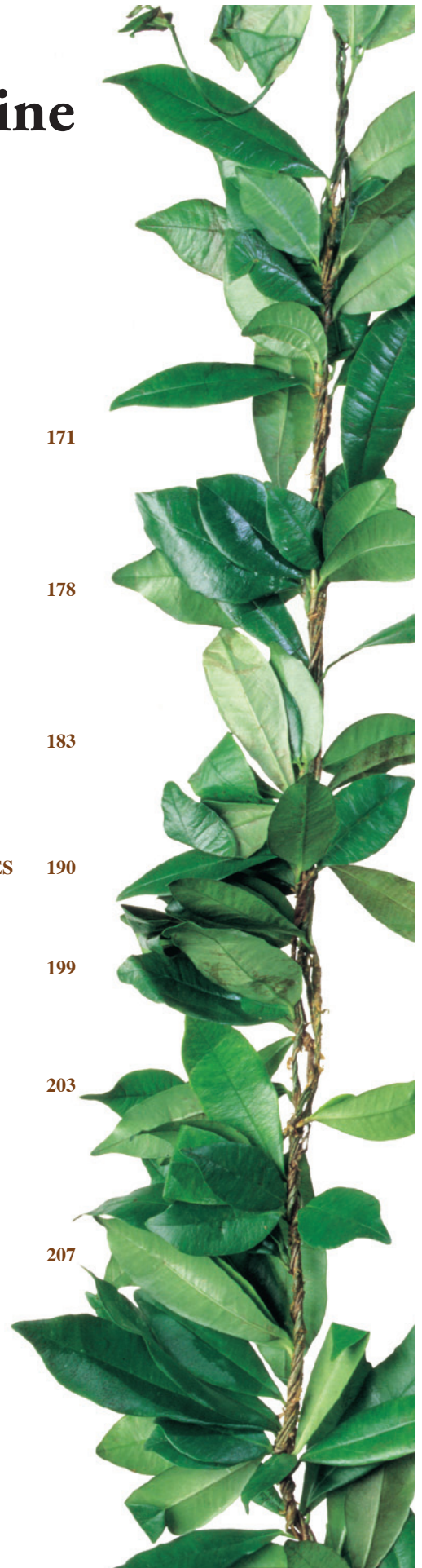
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A Pilot Study to Determine the Effect of an Educational DVD in Philippine Languages on Cancer Clinical Trial Participation among Filipinos in Hawai'i

Jamie Q. Felicitas-Perkins MPH; Melvin Paul Palalay MD; Charlene Cuaresma MPH; Reginald C.S. Ho MD; Moon S. Chen Jr., PhD, MPH; Julie Dang MPH, CHES; and William S. Loui MD, FACP

Abstract

We conducted an experimental pilot study in an oncology clinic in Honolulu, Hawai'i to determine the effect of a culturally-tailored educational DVD on cancer clinical trial participation among Filipino cancer patients. Thirty-seven patients participated in the study, with 17 randomized into the control group (ie, usual education) and 20 into the intervention group (ie, usual education plus educational DVD). Participants completed pre- and post-educational questionnaires with items asking about understanding of several cancer topics, behavioral outcomes, and attitudes regarding several treatment and physician related topics. A Fisher's exact test was conducted to explore the association between enrollment into a clinical trial and group assignment. General linear models were created to determine significant differences between study groups in post-education response scores for each questionnaire item after controlling for age, gender, education, and pre-education response scores. Two participants from the control group and three participants from the intervention group enrolled into clinical trials. Results showed no significant association between clinical trial enrollment and study group assignment ($P > .99$). A significant difference was found between study groups on surety of joining the clinical trial suggested to them ($P = .013$). A multilingual educational DVD to supplement clinical trial education may positively influence Filipino cancer patients to move forward with the decision to join a cancer clinical trial. However, health literacy may serve as a major barrier to actual enrollment into the particular clinical trial available to a patient.

Keywords

Filipino, Hawai'i, Cancer Clinical Trial, DVD, Language Barrier

Introduction

As the largest Asian ethnic group in the state of Hawai'i,¹ Filipinos are burdened by cancer disparities. Between 2003 and 2011, cancer was the leading cause of death among Filipino women and the second leading cause of death among Filipino men.² In Hawai'i, Filipino men and women have been shown to suffer disproportionately from particular cancers compared to other major ethnic groups. For example, Filipino men in Hawai'i exhibited the highest prostate cancer incidence (146.7 per 100,000) compared to other major ethnic groups, and Filipino women in Hawai'i have been shown to have the highest cervical cancer incidence (10.4 per 100,000) compared to women in other major ethnic groups.³

Despite the benefits of clinical trials, including finding innovative and effective cancer treatments, previous research has shown that approximately 2% of participants in cancer clinical trials in the United States were Asian Americans.^{4,5} The participation of Filipinos in cancer clinical trials is assumed to be even lower. Several factors may contribute to the lack of

participation among Asian Americans, such as lack of awareness and the view of clinical trials as an experiment.⁶ Limited English proficiency may further contribute to the disparities seen in cancer clinical trial participation among Filipinos and has been shown to negatively impact cancer screening,⁷ health care access,⁸ and quality of care.^{9,10} In Hawai'i, Filipinos make up not only the largest percentage of non-English speakers at home¹¹ but also the largest percentage of limited English proficient individuals.¹²

In order to address the negative impact limited English proficiency may have on the treatment and care of Filipino cancer patients, an educational DVD in two Philippine languages, Ilokano and Tagalog, was developed discussing common cancers, stories of survival, general cancer knowledge, and treatment options.¹³ As an extension of that endeavor, a second educational DVD about cancer clinical trials was developed. The purpose of this pilot study was to explore the effect of the DVD on clinical trial participation among Filipino cancer patients living in Hawai'i.

Methods

Cancer Clinical Trial Educational DVD in Two Philippine Languages

Drawing principles from Community Based Participatory Research practices,¹⁴ the DVD was developed with considerable input received from the Filipino community. The DVD's script and storyboard were developed and revised based on input received from bilingual Filipino community members and a Filipino oncologist. The DVD features Filipino health care professionals, cancer survivors, and their family members, as well as film locations strategically chosen due to their prominence within Hawai'i's Filipino community (eg, a neighborhood grocery store and a Filipino community center). The DVD includes six video sections presented in both Tagalog and Ilokano discussing the following topics:

1. What are clinical trials?
2. Clinical trials help to develop new and better treatments
3. Safety and safety measures for patients
4. Benefits of participation in clinical trials
5. Consent form
6. Talking to your doctor

Although the DVD also includes several lines spoken in English, all sections of the DVD include English subtitles. The DVD menu includes a feature that allows a user to jump to a particular section of interest.

Study Setting and Participants

We conducted this pilot study in a community-based oncology clinic in Honolulu, Hawai'i from January 2013 to December 2014. The study was approved by the University of Hawai'i Institutional Review Board.

Upon referral to the oncology clinic, all new patients were asked to complete a routine intake form consisting of questions about demographic information (eg, ethnicity) and health and medical history. Patients self-identifying as Filipino on the intake form were considered for potential inclusion in the present study. Additional inclusion criteria consisted of being an adult (ie, 18 years and older) and having a clinical trial available to them. Patients meeting these criteria were approached by physicians to participate in the study.

A sample size of 60 participants was established based on the study's timeframe and feasibility after considering previous enrollment numbers of the clinic.

Consent forms were available in English, Tagalog, and Ilokano. The English version of the consent forms was reviewed by Filipino community members and revised based on input received. Faculty members from the University of Hawai'i then translated the consent forms into Tagalog and Ilokano. The translated consent forms were reviewed by Tagalog and Ilokano native speakers from the community and revised based on input received.

Participants were randomized into either the control (ie, usual education) or intervention group (ie, usual education plus educational DVD). All participants were given a \$10 gift card for their time and contributions.

Control Group

Participants randomized into the control group were asked by a nurse practitioner to complete a pre-education questionnaire prior to receiving usual education about cancer treatments. Participants were then asked to complete and return a post-education questionnaire by their next visit. Participants in the control group were given the opportunity to view the educational DVD one month after submitting the post-education questionnaire.

Intervention Group

Participants randomized into the intervention group were asked to complete a pre-education questionnaire prior to receiving usual education from a nurse practitioner about cancer treatments. Participants were then given the DVD to watch. Participants had the option to either view the DVD in the physician's office at the time of visit or were given the DVD to view at home. After receiving usual education and watching the DVD, participants were asked to complete and return a post-education questionnaire by their next visit.

Measures

Primary Outcome. The number of participants enrolled into a clinical trial in the control group and intervention group were recorded.

Pre- and Post-education Questionnaires. A list of the 14 items included in the questionnaire, including response choices, is presented in Table 1. Questionnaire items 1 to 8 were formulated by study researchers in order to obtain information regarding participants' understanding of several cancer topics (eg, clinical trials) and behavioral outcomes (eg, likelihood of asking a physician if a clinical trial is right for them). Questionnaire items 9 to 14 were utilized in the evaluation of the first educational DVD¹³ and were included in the present study's questionnaire to obtain information about participants' attitudes regarding several treatment and physician related topics (eg, trust in doctors and their treatment plan).

Questionnaires were available in English, Tagalog, and Ilokano. English versions of the questionnaires were reviewed for face validity and comprehensibility by Filipino community members and subsequently revised based on input received. University of Hawai'i faculty members then translated the questionnaires into Tagalog and Ilokano. The translated questionnaires were reviewed by Ilokano and Tagalog native speakers from the community and were subsequently revised based on input received.

Reason for Non-enrollment. Clinicians were asked to record reasons as to why participants were not enrolled into the particular clinical trial available to them. Reasons for non-enrollment include: (1) physician decision, (2) language barrier, (3) not eligible, (4) trial closed, (5) poor performance status. "Physician decision" refers to the clinician's judgment of not enrolling a patient into a clinical trial. Such decisions can be made if a physician feels the risks of clinical trial participation outweigh the benefits or if newer treatments have become available. "Language barrier" refers to the patient's inability to fully understand the particular clinical trial available to them due to lack of English proficiency; therefore, informed consent was not obtainable. This determination was made by the clinical research assistant. "Not eligible" refers to the patient not meeting clinical trial criteria. "Trial closed" refers to clinical trials no longer recruiting participants. "Poor performance" refers to the general activity of the patient, which may render them ineligible to enroll into a clinical trial.

General Participant Characteristics. General characteristics included age, gender, education (some grade school to graduate or professional school), English proficiency (poor to excellent), immigration generation, and cancer diagnosis. Education was further collapsed into less than high school, high school graduate, some college, and college graduate. Participants were asked to self-identify their immigrant generation. Those in the first generation were defined as those who were born in the Philippines and immigrated to the United States. Those in

Table 1. Pre- and Post-education Questionnaire Items and Response Choices	
Questionnaire Item	Response Choices
(1) How well do you understand what cancer is?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(2) How well do you understand how cancer can be treated?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(3) How well do you understand what a clinical trial is?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(4) How well do you understand the benefits of clinical trials?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(5) How well do you understand the risks of clinical trials?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(6) How well do you understand the clinical trial your doctor suggests?	(1) I really understand; (2) I understand; (3) I don't really understand; (4) I don't understand
(7) How sure are you that you will ask your doctor if joining a clinical trial is right for you?	(1) Very sure; (2) Sure; (3) Not Sure; (4) I will not ask
(8) How sure are you that you will join the clinical trial that your doctor suggests?	(1) Very sure; (2) Sure; (3) Not Sure; (4) I will not join
(9) I trust that the doctors and other health professionals have my best interest at heart.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree
(10) I believe that my treatment plan will help to prevent my getting cancer again.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree
(11) I expect to be free of cancer in the future.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree
(12) The benefits of my treatment plan outweigh any difficulty I might have in following it.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree
(13) Members of my immediate family think I should follow my treatment plan.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree
(14) I am able to deal with any problem in following my treatment plan.	(1) Strongly agree; (2) Agree; (3) Neither agree nor disagree; (4) Disagree; (5) Strongly Disagree

the second generation were defined as those who were born in the US but whose parents were born in the Philippines. Those in the third generation were defined as those who were born in the US and whose parents were also born in the United States.

Statistical Analyses

Analyses were conducted using Statistical Analysis Software, version 9.3 (SAS Institute Inc., Cary, NC). Independent t-tests and Chi-square tests or Fisher's exact tests were conducted to compare differences in general characteristics between study groups for continuous (ie, age) and categorical variables (ie, gender, education, language proficiency, and immigrant generation), respectively.

Among the 37 participants included in the study, nine participants had incomplete pre-education questionnaires and/or post-education questionnaires. Independent t-tests and Chi-square tests or Fisher's exact tests were conducted to determine differences in general participant characteristics and pre-education item response scores between participants with complete questionnaires and those with incomplete questionnaires.

Item responses from the pre- and post-education questionnaires were reverse-coded, so higher response choices reflected more positive responses. General linear models were conducted to determine significant differences between the control group and intervention group in post-education response scores for each item after controlling for age, education, gender, and pre-education questionnaire item response score. If the group main effect term was found to be significant, additional models were conducted to examine the interaction between covariates and group assignment.

A Fisher's exact test was conducted to examine the relationship between study group assignment and clinical trial enrollment. It is to be noted that the test did not include participants, who did not enroll into a clinical trial due to reasons of ineligibility (N=7) and trial closures (N=7).

Results

Forty-four participants were recruited to participate. Study researchers identified three duplicate participants, who had been recruited twice to join the study. After ensuring consent forms were completed, a total of 37 participants were included in the present study. Seventeen participants were randomized into the control group, and twenty participants were randomized into the intervention group. Table 2 presents general characteristics among all 37 participants and by study group. No significant differences in general characteristics were found between study groups. The average age of participants was 59.37 ± 12.96 years, and 65% were women. Most participants were found to have at least some college education (55%). Approximately 37% of participants reported having poor or fair English proficiency. Most of the participants were found to be first generation immigrants (76%). The largest proportion of participants was diagnosed with breast cancer (35%).

Compared to those who fully answered the questionnaire (n=28), those with some missing questionnaire information (n=9) were found to be less educated ($P = .023$) and had lower English proficiency ($P < .001$). No significant differences were found in pre-education questionnaire item responses between those with missing cases and those without missing cases.

Table 3 presents general linear model results testing for significant differences in post-education item response scores between study groups. Results show a significant difference in post-education responses between groups for Item 8 ($P = .013$), which asked participants to provide their level of agreement on their surety of joining the clinical trial suggested to them by their physician. Compared to the adjusted mean post-education response scores for Item 8 among those in the control group

(adj mean=2.71, SE=0.15), the adjusted mean post-education response score among those in the intervention group was 3.20 (SE=0.11). Additional analyses showed a significant interaction between age and group assignment when modeling the post-education response scores for Item 8 ($\beta = -0.04$, SE=0.01, $P = .010$), suggesting that the DVD's effect reduces with increased age. No other significant differences were observed for the other

questionnaire items. However, it is to be noted that participants in both groups appeared to have a positive perception of their physicians and the treatment plans available to them. For example, the adjusted mean post-education response scores for Item 10, which asks about a participant's belief that his or her treatment plan will prevent recurrence of cancer, was 4.69 (SE=0.16) for the control group and 4.61 (SE=0.13) for the intervention group.

Table 2. General Characteristics among All Participants and by Study Group				
Characteristic	All participants (n=37)	Usual Education (n=17)	Usual Education Plus DVD (n=20)	P
Age (Mean \pm SD)	59.37 \pm 12.96	60.41 \pm 14.49	58.50 \pm 11.81	.66 ^a
Gender (n (%))				
Women	24 (65)	12 (71)	12 (60)	.50 ^b
Men	13 (35)	5 (29)	8 (40)	
Education (n (%))				
Less than high school	9 (26)	4 (25)	5 (26)	>.99 ^c
High school graduate	7 (20)	3 (19)	4 (21)	
Some college	10 (29)	5 (31)	5 (26)	
College graduate	9 (26)	4 (25)	5 (16)	
Missing cases (n)	2	1	1	
English Proficiency (n (%))				
Poor	4 (15)	1 (8)	3 (20)	.35 ^c
Fair	6 (22)	3 (25)	3 (20)	
Good	7 (26)	5 (42)	2 (13)	
Excellent	10 (37)	3 (25)	7 (47)	
Missing cases (n)	10	5	5	
Immigrant Generation (n (%))				
First	25 (76)	8 (57)	17 (89)	.081 ^c
Second	6 (18)	4 (29)	2 (11)	
Third	2 (6)	2 (14)	0 (0)	
Missing cases (n)	4	3	1	
Cancer Diagnosis (n (%))				
Melanoma	1 (3)	1 (6)	0 (0)	
Breast	13 (35)	7 (41)	6 (30)	
Myelodysplastic syndrome	1 (3)	0 (0)	1 (5)	
Colon	6 (16)	2 (12)	4 (20)	
Lung	2 (5)	0 (0)	2 (10)	
Prostate	2 (5)	1 (6)	1 (5)	
Pancreas	2 (5)	0 (0)	2 (10)	
Liver	1 (3)	1 (6)	0 (0)	
Myeloma	3 (8)	1 (6)	2 (10)	
Gastrointestinal stromal tumor	1 (3)	1 (6)	0 (0)	
Chronic lymphocytic leukemia	1 (3)	1 (6)	0 (0)	
Testicular	1 (3)	0 (0)	1 (5)	
Lymphoma	1 (3)	1 (6)	0 (0)	
Chronic myeloid leukemia	2 (5)	1 (6)	1 (5)	

SD=standard deviation

^aIndependent t-test conducted to determine differences between study groups

^bChi-square test conducted to determine differences between study groups

^cFisher's exact test conducted to determine differences between study group

Questionnaire Item	Usual Education (n=17)		Usual Education plus DVD (n=20)		P
	Adjusted Mean	SE	Adjusted Mean	SE	
(1) How well do you understand what cancer is?	3.35	0.10	3.36	0.09	.94
(2) How well do you understand how cancer can be treated?	3.34	0.13	3.28	0.11	.71
(3) How well do you understand what a clinical trial is?	3.17	0.15	3.25	0.12	.70
(4) How well do you understand the benefits of clinical trials?	3.15	0.12	3.44	0.10	.094
(5) How well do you understand the risks of clinical trials?	3.09	0.14	3.18	0.12	.60
(6) How well do you understand the clinical trial your doctor suggests?	3.19	0.13	3.52	0.12	.072
(7) How sure are you that you will ask your doctor if joining a clinical trial is right for you?	3.13	0.19	3.22	0.16	.71
(8) How sure are you that you will join the clinical trial that your doctor suggests?	2.71	0.15	3.20	0.11	.013
(9) I trust that the doctors and other health professionals have my best interest at heart.	4.58	0.09	4.77	0.07	.121
(10) I believe that my treatment plan will help to prevent my getting cancer again.	4.69	0.16	4.61	0.13	.68
(11) I expect to be free of cancer in the future.	4.66	0.10	4.75	0.09	.50
(12) The benefits of my treatment plan outweigh any difficulty I might have in following it.	4.72	0.17	4.43	0.14	.189
(13) Members of my immediate family think I should follow my treatment plan.	4.45	0.14	4.51	0.11	.72
(14) I am able to deal with any problem in following my treatment plan.	4.41	0.15	4.56	0.12	.44
All items	3.66	0.10	3.88	0.08	.089

SE = standard error. Covariates adjusted for include age, gender, education, and pre-education item response score. The number of observations used in each model may vary due to missing cases of covariates and pre-education and post-education item responses.

Table 4 presents the number of participants, who enrolled into clinical trials by study group. Six of the 17 control group participants and 8 of the 20 participants in the intervention group were excluded from analysis because they were deemed ineligible for a clinical trial, or no clinical trial was available to them at the time. Among those remaining in the control group (n=11), two enrolled into clinical trials (18%). Among those remaining in the intervention group (n=12), three enrolled into clinical trials (25%). Table 4 also presents physician recorded reasons as to why participants were not enrolled into the particular clinical trial recommended to them. In both the control and intervention groups, the largest proportion of participants was not enrolled into a clinical trial due to language barriers. No significant relationship was found between group assignment and clinical trial enrollment ($P>.99$).

	Usual Education (n=17)*	Usual Education Plus DVD (n=20)*	P
Enrolled into clinical trials (n (%))	2 (18%)	3 (25%)	>.99 ^a
Not enrolled into clinical trials (n (%))	9 (82%)	9 (75%)	
Ineligible for trial / trial closed (n)	6	8	
Reason for non-enrollment (n (%))			
Physician decision	0 (0)	1 (14)	
Language barrier	6 (100)	5 (71)	
Poor performance status	0 (0)	1 (14)	
Missing cases (n)	3	2	

*Proportions exclude participants who did not enroll into a clinical trial due to reasons of ineligibility and trial closures.

^aFisher's exact test conducted to determine relationship between study group assignment and clinical trial enrollment.

Discussion

This is one of the first studies to explore the effect of a culturally-tailored educational DVD on the enrollment of Filipino cancer patients into clinical trials. Results showed significant differences between study groups on surety of joining a clinical trial, suggesting that those in the intervention group may have been positively influenced by the educational DVD to move forward with their decision to join the clinical trial recommended to them. This study further provides lessons learned on the feasibility of implementing a research study within an oncology clinic and provides insight on barriers to clinical trial enrollment experienced by Filipino cancer patients, particularly language barriers.

Although participants in the intervention group presented higher post-education response scores regarding surety of joining a clinical trial, no significant association was found between group assignment and actual clinical trial participation. A possible explanation for this result could be the fact that participants were unable to join due to reasons beyond the scope of the present study; over a third of participants did not join a clinical trial due to reasons of ineligibility and trial closures. Therefore, it is possible that participants wanting to join a clinical trial may not have had the opportunity to do so. Interestingly, language barriers were found to be a major reason as to why participants in both the intervention and control groups did not enroll into a clinical trial. Because the educational DVD only discusses clinical trials in general terms, the language support needed to understand each unique protocol was beyond the scope of this study and identifies a larger systematic issue that must be addressed by clinics enrolling patients.

Although language barriers were found to be a major reason for non-enrollment among Filipino cancer patients, a large proportion of participants reported being excellent in English proficiency. This discrepancy may be explained by the unique historical relationship between the Philippines and the United States. After the start of the American colonial period in the Philippines, an English-based public school system was established.¹⁵ Presently, English remains as one of the major languages spoken in the Philippines. However, this proficiency may not include health literacy, which refers to one's capacity to utilize health information in order to make informed decisions regarding health.^{16,17} In order to address these barriers, clinicians and clinical trial researchers are encouraged to have access to interpretation resources as well as linguistic and culturally appropriate materials at all phases of treatment to ensure patients are fully informed of their treatment options. Moreover, patient navigation, either through lay navigators or clinicians, may be an effective approach to help cancer patients address barriers throughout the process of enrollment.¹⁸⁻²⁰

Results of this study further support existing research, which shows the significant impact age may have on clinical trial intervention research. Previous studies have shown significant age disparities, particularly among older cancer patients, in clinical trial enrollment.^{4,21,22} Over 60% of the total incidence of cancer occurs in the elderly (≥ 65 years). The effect of age on clinical

trial enrollment may be more apparent among immigrant, first generation Filipinos. Because Filipinos are part of a collectivist culture, older Filipinos may rely on their English-speaking family members to guide medical decisions.^{23,24} Clinicians are encouraged to ensure both patients and their family members receive comprehensive education about clinical trials.

This study further demonstrates the feasibility of conducting a research study within an oncology clinic. Not all recruited participants were included in analyses of the study due to several reasons, such as duplicate participants and incomplete consent forms. Because the clinicians are in a demanding work environment where the primary focus is patient treatment and care, it was also difficult for clinicians to recruit participants and conduct administrative research activities. Therefore, there may be a need for a research coordinator to be present in clinics to provide support and to ensure the fidelity of study design and administration. Moreover, in order to further support clinicians, the use of a checklist outlining fidelity criteria, such as completed questionnaires and validating that the video was viewed by participants, may be helpful to clinicians.²⁵ Despite these challenges, participants in both groups appeared to have positive perceptions of their physicians and treatment plans.

Due to several limitations, results of this study must be interpreted with caution. Due to constraints on resources and time, psychometric testing on questionnaire items was not conducted and therefore, issues of internal validity and reliability may bias results. A power analysis was not conducted a priori to determine the sample size for this study. Rather, a sample size of 60 participants was originally established based on the study's timeframe and the clinic's previous enrollment numbers. Because the number of participants included in this study falls below 60, limited statistical power due to small sample size should be considered when interpreting results. Given the observed proportions of participants enrolling into clinical trials in the present pilot study, a power analysis conducted using *G*Power*²⁶ indicated that a sample size of 1080 would be needed to achieve 80% power with a two-sided α level of 0.05. In order to maximize recruitment efforts and enhance study results, future studies are encouraged to establish a longer recruitment period and to collaborate with multiple sites to expand the reach to potential participants.

Additionally, nurse practitioners involved in the study were not blinded and were not trained to conduct a standardized curriculum. Therefore, experimenter bias may have been introduced into study results if nurse practitioners did not deliver usual education equally between control and intervention participants. The Hawthorne effect may further affect results if active engagement from nurse practitioners unduly influenced participant behavior. Selection bias could have also affected the results of the study, because participants' previous knowledge of clinical trials was not evaluated. Those with a previous understanding of clinical trials may have been more likely to participate in this study. Due to missing cases within variables, results should be interpreted with caution, particularly because significant differences in education and English proficiency

were found between those who completed the questionnaires and those who did not. Moreover, the study does not provide a comprehensive list of reasons for non-enrollment, such as patient refusal, which may have provided further insight on barriers to enrollment faced by Filipino cancer patients. Participants may have also been eligible to participate in multiple trials that were open. However, this study only captured the enrollment results from the first trial offered to them. Finally, the study's inclusion criteria did not consider cancer diagnosis during recruitment; therefore, it is possible that patients, who may have enrolled in a clinical trial, did not have the opportunity to do so because a trial may not have been available for their particular cancer. A future pilot study addressing these limitations is warranted.

Despite these limitations, this is one of the first pilot studies exclusively focused on clinical trial enrollment among Filipino cancer patients. The lessons learned and limitations observed from this pilot study will help to inform future health promotion interventions targeting this underserved and sometimes hard to reach population. Moreover, results of this study show promise in the utilization of a culturally-tailored DVD to improve clinical trial participation among Filipino cancer patients. Results also suggest that health literacy may serve as a barrier for Filipinos when enrolling in cancer clinical trials. Future research is needed to explore the effect of health literacy on cancer treatment outcomes, particularly among Filipinos. This study further shows the feasibility of conducting an intervention study in a community-based oncology clinic. On-site research coordinators in clinics may provide further support to clinicians and ensure the fidelity of study implementation.

Conflict of Interest

None of the authors identify any conflict of interest.

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From Kaua'i to Hawai'i Island: Interisland Differences in Emergency Contraceptive Pill Availability

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Abstract

Emergency contraceptive pills (ECPs) are medications used after unprotected intercourse, underprotected intercourse, or sexual assault to decrease the risk of pregnancy. Availability of ECPs in Hawai'i's retail pharmacies was last assessed in 2007, following over-the-counter access to levonorgestrel ECPs (LNG-ECP) for women age 18 years or older and prior to U.S. Food and Drug Administration (FDA) approval of prescription-only ulipristal acetate (UPA).

We conducted a county-by-county subanalysis from a larger observational population-based study on statewide availability of ECPs in Hawai'i's pharmacies. In the original study, researchers called all 198 unique retail pharmacies in Hawai'i between December 2013 and June 2014. Only 3% of pharmacies had UPA immediately available on-site in the state, with UPA available on Kaua'i and O'ahu only. At least one form of LNG-ECPs was available in 82% of pharmacies in 2013-2014, roughly the same as 2007 (81%) ($P=0.9$) when Lana'i and Moloka'i lacked access. Currently, only Moloka'i lacks retail pharmacy access to ECPs. When controlling for general inflation, the 2013-2014 mean price for name brand LNG-ECP fell within the reported range of 2007 prices. Generic LNG-ECPs were substantially lower in price than name brand LNG-ECPs in 2007 and 2013-2014.

Availability of UPA is limited and significantly lower compared to LNG-ECPs. Availability of LNG-ECPs statewide has remained stable and the arrival of generics has decreased prices.

Keywords

Ulipristal Acetate; Emergency Contraception; Pharmacies; Availability; United States; Hawai'i

Abbreviations

UPA- Ulipristal acetate

EC- Emergency contraception

LNG-ECP- Levonorgestrel emergency contraceptive pill

UPA-ECP – Ulipristal acetate emergency contraceptive pill

FDA- U.S. Food and Drug Administration

ECP- Emergency contraceptive pill

Introduction

The state of Hawai'i has a rate of unintended pregnancy of 61 per 1,000 women aged 15-44 years, higher than the national average of 47 per 1,000 women.¹ According to 2004-2008 state data from the Pregnancy Risk Assessment Monitoring System (PRAMS), the counties of Hawai'i (14.6 per 1,000 women) and Kaua'i (13.4 per 1,000) had higher rates of unwanted pregnancies (pregnancies that were not intended and are not desired) compared to Honolulu county (13.1 per 1,000). In addition, Hawai'i (35.9 of 1,000 women), Kaua'i (32.5 per 1,000), and Maui counties (32.8 per 1,000) had higher rates of mistimed pregnancies (pregnancies that were not intended, but the woman had intended pregnancy at some point in the future) compared to Honolulu County (31.6 per 1,000).² Use

of emergency contraceptive pills (ECPs) after unprotected intercourse, inadequately protected intercourse, or sexual assault can delay or prevent ovulation, reducing the risk of conception.^{3,4} Professional organizations including the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics recommend that adolescent and adult women receive advance prescription of ECPs so that the medication may be taken when needed with minimal delay.^{5,6}

Two types of dedicated ECPs are currently available in the United States (U.S.). Ulipristal acetate (UPA), approved by the U.S. Food and Drug Administration (FDA) in June 2010, requires a prescription for women of all ages and should be taken within 120 hours of intercourse to reduce the risk of pregnancy.^{7,8} The second type is a two-pill regimen of levonorgestrel ECPs (LNG-ECPs) which was made available behind-the-counter to women age 18 or older without a prescription in August 2006.^{9,10} In 2009 a single pill regimen of LNG-ECPs was made available over-the-counter to women age 17 or older, and age restrictions were lifted in 2013.¹¹ LNG-ECPs can be taken within 72 hours of unprotected sex though some efficacy is maintained up to 120 hours.^{11,12} A 2010 meta-analysis by Glasier, et al, found that UPA use compared to LNG-ECP use resulted in fewer pregnancies at 1, 3, and 5 days after unprotected sex.¹³ Both UPA and LNG-ECPs work by delaying ovulation, a physiologic event triggered by feedback loops of hormones. Early in the menstrual cycle, follicle stimulating hormone (FSH) and luteinizing hormone (LH) from the pituitary stimulate ovarian production of estradiol. Estradiol then suppresses further FSH and LH production. Once a particular level of estradiol is reached and maintained in the mid-portion of the cycle, a positive feedback mechanism causes the pre-ovulatory surges of FSH and LH necessary for release of the ovum from the dominant follicle. After the onset of the LH surge, ovulation will occur within 32-44 hours.¹⁴ When UPA is taken before the LH surge, it is nearly 100% effective in delaying ovulation, compared to the 79-86% effectiveness of LNG-ECPs.^{3,4} As body mass index (BMI) increases, the efficacy of both LNG and ulipristal ECPs decreases. For women with BMI above 26 kg/m², LNG-ECPs are no more effective than placebo in delaying ovulation and UPA may become ineffective in women with a BMI above 35 kg/m².¹⁵ With its greater efficacy in preventing pregnancy, the use of UPA is predicted to result in 37,589 fewer pregnancies per year in the U.S. if all women using ECPs took this formulation instead of LNG, which would lead to an estimated savings of over \$116.3 million in direct health care expenditures annually.^{13,16}

A small study of 110 pharmacies conducted in 2007 by the Healthy Mothers, Healthy Babies Coalition of Hawai'i assessed availability of LNG-ECPs statewide.¹⁷ A total of 110 retail pharmacies were contacted by a secret shopper posing as an 18 year old female seeking emergency contraception, asking scripted questions related to availability, cost, and age and identification requirements of LNG-ECPs. Across the state, the medication was available in 81% of pharmacies contacted, with prices ranging between \$37- \$50.¹⁷

Since 2007, accessibility of LNG-ECPs has improved with the removal of age restrictions for over-the-counter purchase and the introduction of generic LNG ECPs to the market. UPA, however, is more difficult to obtain. In 2013-2014, we conducted a secret shopper telephone study comparing secret shopper physicians' and patients' ability to obtain ECPs in Hawai'i. Only 3% of pharmacies had UPA immediately available, while 19% of patients and 31% of physicians were advised that the medication could be ordered.¹⁸ In this study, we compared the availability of UPA and LNG-ECPs on each inhabited Hawaiian island with at least one retail pharmacy. We also compared current LNG-ECP availability and costs to the historic baseline LNG-ECP data from 2007.

Methods

We performed a subanalysis of a data set from a larger observational population-based study assessing statewide availability of ECPs in Hawai'i's retail pharmacies, with full methodology published in the original paper.¹⁷ A listing of all unique retail pharmacies in Hawai'i was generated from two online phonebooks (yellowpages.com and onlineyellowpages.com) and cross-referenced with websites of identified pharmacy chains. We excluded pharmacies that do not serve the general public (such as pharmacies exclusively serving assisted living or nursing homes), were not accepting new patients, provide only specialty pharmaceuticals (such as chemotherapy or compounded medications), had invalid numbers (disconnected number, wrong number, were duplicate entries, or no longer had pharmacies at that store location) or were unreachable after 3 attempts. Calls were made between December 2013 and July 2014, Monday through Saturday from 8 am to 8 pm using cell phones with local or blocked numbers. Three unique attempts were made to each pharmacy, varying the time of day and day of the week each call was attempted.

Two trained female research assistants posed as uninsured, unemployed 18-year-old pharmacy customers attempting to fill a prescription. They used a semi-structured interview guide developed by the authors, pilot tested with individuals in the academic department, and beta-tested via phone with ten pharmacies in North Carolina.¹⁷ The research assistants underwent a three-hour training that included mock telephone interviews with study authors posing as pharmacy staff. Training concluded when the research assistants were able to consistently demonstrate correct use of the semi-structured interview guide and correctly record pharmacy responses. The trained secret shopper patient callers stated, "My doctor wrote me a prescription for ella®. If I bring it in to your pharmacy could

I get it filled today?" If the pharmacy staffer was unfamiliar with the medication, the secret shopper patient described it as "also called ulipristal acetate" and further as "a type of emergency birth control pill." If ulipristal acetate was unavailable, the researcher asked if it could be ordered, and if so, when it would be available. If UPA was available the same day or by order, the researcher asked when to take the medication after unprotected sex and the out-of-pocket price. The researcher also asked if the pharmacy had other emergency birth control pill options available, and if yes, what they were, if a prescription was needed, and the out-of-pocket pricing.¹⁷

Statistical analyses were performed using EPI Info 7 (CDC: Atlanta, Georgia).¹⁹ Descriptive statistics were performed to determine the percentage of pharmacies with UPA and LNG-ECPs available and the associated out-of-pocket costs. Chi-square and Fisher's Exact tests were used to assess differences in the percentage of pharmacies on the different islands stocking LNG-ECPs and the availability of ECPs in the state of Hawai'i's pharmacies over time.

Results

We identified 259 pharmacies through on-line phonebooks and cross-referenced by chain-pharmacy websites. Of these, 155 were on O'ahu, 42 on Hawai'i Island, 31 on Maui, 22 on Kaua'i, 3 on Moloka'i, and 1 on Lana'i. Of these, 61 were excluded due to: disconnected numbers (n=23), duplicate pharmacy entries (n=21), incorrect numbers (n=7), locations without pharmacies (n=6), specialty pharmacies (n=3), and inability to accept new patients (n=1). A total of 198 unique retail pharmacies statewide were eligible for inclusion and contacted. An additional five pharmacies were excluded as there was no answer after three unique call attempts (n=4) or the pharmacy declined to provide information to patients via telephone (n=1). Consequently, 193 secret shopper calls met criteria for analysis, including 122 pharmacies on O'ahu, 32 on Hawai'i Island, 22 on Maui, 15 on Kaua'i, and one pharmacy each on Moloka'i and Lana'i (Figure 1). Table 1 describes the proportion of pharmacies on each island in comparison to the population of each island. O'ahu is home to the largest percentage of the state's population (70%) and hosted the majority of eligible pharmacies (63%), while Lana'i and Moloka'i had only one eligible pharmacy each (Table 1).

UPA was immediately available on-site in only 2% (4/193) of patient calls to retail pharmacies statewide, with these pharmacies located on Kaua'i (1/15) and O'ahu (3/122) (Table 2). In all, 82% (159/193) of retail pharmacies statewide at the time of the secret shopper call in 2014 had LNG-ECPs in stock. At least one form of LNG-ECPs was immediately available on Kaua'i (10/15), O'ahu (100/122), Hawai'i Island (28/32), Maui (20/22), and Lana'i (1/1). The only retail pharmacy on Moloka'i (0/1) did not carry LNG-ECPs (Table 2). Statewide availability of LNG-ECPs in our study (82%, 159/193) was not significantly different from availability in 2007 (81%, 89/110, $P=0.9$).¹⁶ The 2007 study found both Moloka'i and Lana'i lacked retail pharmacy availability of ECPs.¹⁶ Since that time, a new retail pharmacy has been established on the island of Lana'i that carries LNG- ECPs.

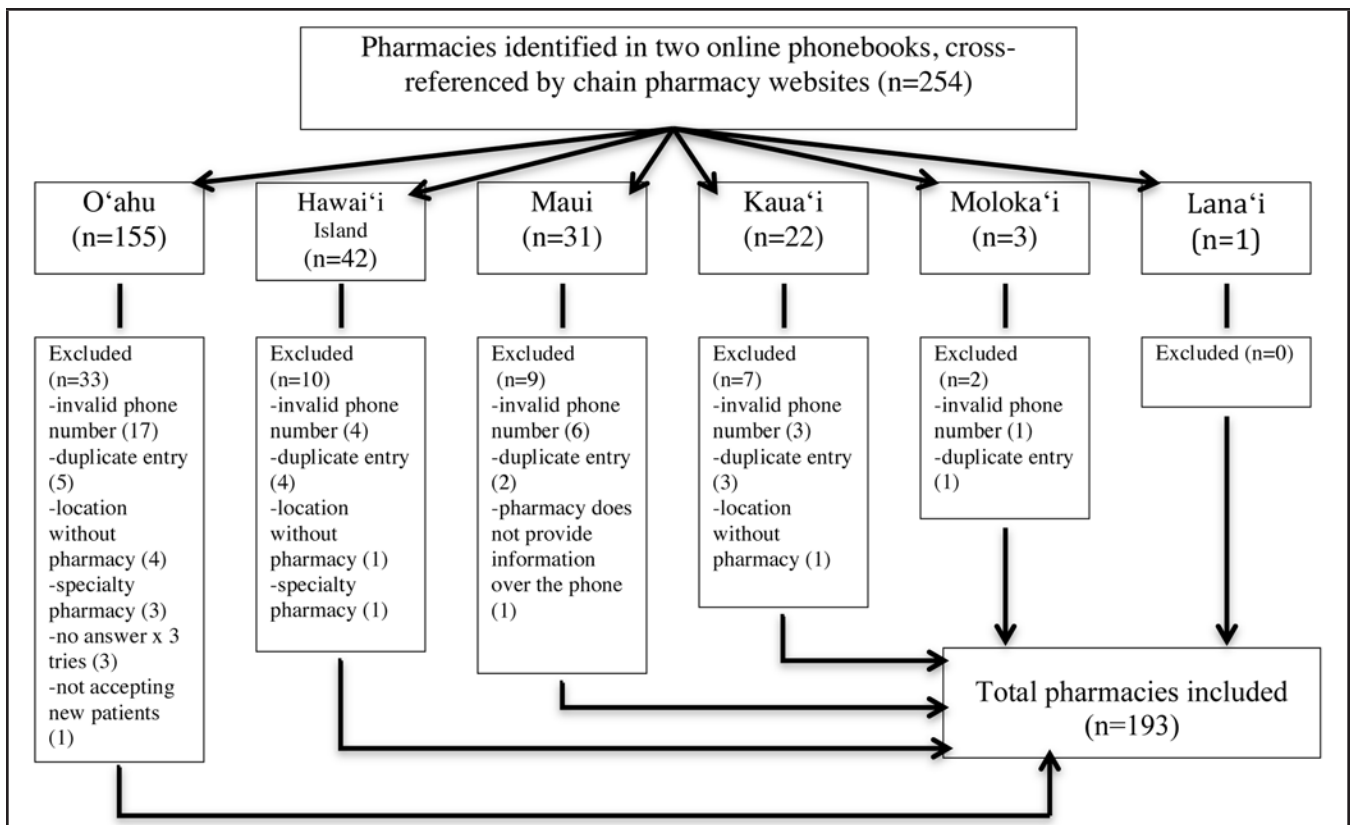


Figure 1. Pharmacy Inclusion and Exclusion Criteria.

Table 1. Pharmacy and Population Distribution by Island and State.

Location	Pharmacies (n, %)	2010 Census Population (n, %)*
Entire State	193 (100%)	1,360,301 (100%)
O'ahu	122 (63%)	953,207 (70.1%)
Hawai'i Island	32 (17%)	185,079 (13.6%)
Maui	22 (11%)	144,444 (10.6%)
Kaua'i	15 (8%)	66,921 (4.9%)
Moloka'i	1 (<1%)	7,404 (0.5%)
Lana'i	1 (<1%)	3,135 (0.2%)
Ni'ihau	0 (0%)	170 (0.01%)
Kaho'olawe	0 (0%)	0 (0%)

*Census data from State of Hawai'i¹⁸

Table 2. ECP Availability by Island, 2007 and 2014.

Island	Pharmacies with LNG-ECP in stock at time of call 2007 % (n/total pharmacies)	Pharmacies with LNG-ECP in stock at time of call 2014 % (n/total pharmacies)	P-value	Pharmacies with UPA in stock at time of call 2014 % (n/total pharmacies)
TOTAL	81% (89/110)	82% (159/193)		2% (4/193)
O'ahu	85% (44/52)	82% (100/122)	.7	2% (3/122)
Hawai'i Island	74% (17/23)	88% (28/32)	.2	0 (0/32)
Maui	95% (20/21)	91% (20/22)	1.0	0 (0/22)
Kaua'i	62% (8/13)	67% (10/15)	1.0	7% (1/15)
Lana'i	0 (0)	100% (1/1)	-	0 (0/1)
Moloka'i	0 (0/1)	0 (0/1)	-	0 (0/1)

Island	Pharmacies with LNG-ECP in stock at time of call % (n/total pharmacies)	Pharmacies Carrying Name Brand % (n/total pharmacies)	Pharmacies Carrying Generic Products Only % (n/total pharmacies)	Pharmacies Carrying Both Name and Generic Products % (n/total pharmacies)
TOTAL	82% (159/193)	67%(129/193)	29% (56/193)	21% (26/122)
O'ahu	82% (100/122)	69% (84/122)	27% (33/122)	14% (17/122)
Hawai'i Island	88% (28/32)	69% (22/32)	38% (12/32)	19% (6/32)
Maui	91% (20/22)	77% (17/22)	23% (5/22)	9% (2/22)
Kaua'i	67% (10/15)	33% (5/15)	40% (6/15)	7% (1/15)
Lana'i	100% (1/1)	100% (1/1)	0 (0/1)	0 (0/1)
Moloka'i	0 (0/1)	0 (0/1)	0 (0/1)	0 (0/1)

	Plan B Price Range 2007	Plan B® Price Range 2007 adjusted for inflation*	Plan B One-Step® Price Range 2014	Plan B One-Step® Mean Price 2014	Generic LNG- ECP Price Range 2014	Generic LNG-ECP Mean Price 2014
O'ahu	\$40.00 - \$45.00	\$46.59- \$52.41	\$32.59 - \$70.00	\$49.03	\$32.59 - \$60.49	\$42.33
Hawai'i Island	\$40.00 - \$45.00	\$46.59- \$52.41	\$45.00 - \$55.89	\$48.97	\$36.56 - \$56.00	\$44.78
Maui	\$37.00 - \$50.00	\$43.10- \$58.25	\$50.00 - \$65.00	\$57.50	\$34.00 - \$50.00	\$40.83
Kaua'i	\$47.00 - \$50.00	\$54.74- \$58.24	\$50.00 - \$52.86	\$51.05	\$36.00 - \$40.00	\$37.96
Lana'i	Not carried		\$84.64	\$84.64	Not carried	–
Moloka'i	Not carried		Not carried	–	Not carried	–

*Inflation calculations using Consumer Price Index in 2007 and 2014.²¹⁻²³

When a pharmacy had LNG-ECPs in stock, callers inquired about the availability of generic medications (Table 3). On O'ahu 82% (100/122) of pharmacies had LNG-ECPs in stock, with 69% (84/122) carrying name brands such as Plan B One-Step®, 27% (33/122) carrying generic brands (My Way®, Next Choice®, or Take Action®), and 14% (17/122) offering both name brand and generic products. On Hawai'i Island 88% (28/32) of pharmacies had LNG-ECPs in stock, with 69% (22/32) carrying name brand Plan B One-Step®, 38% (12/32) carrying generic brands, and 19% (6/32) offering both products. On Maui, 91% (20/22) of pharmacies had LNG-ECPs in stock, with 77% (17/22) carrying the name brand, 23% (5/22) featuring generics, and 9% (2/22) offering both products. On Kaua'i, 67% (10/15) of pharmacies had LNG-ECPs available at the time of call, with 33% (5/15) carrying name brand, 40% (6/15) offering generics, and 13% (2/15) providing both products. The one retail pharmacy on Lana'i had only the brand name Plan B One-Step® in stock at the time of call. The one retail pharmacy on Moloka'i had no LNG-ECPs available. There was no statistically significant difference between availability on each island when compared to the availability throughout the state, nor any statistically significant difference between ECP availability amongst the islands ($P > 0.9$).

The mean price for UPA was \$50.40 with a range \$42.04-\$72.29 (data not shown). The price of brand name Plan B One-Step® ranged from \$32.59 to \$84.64, with the highest price in our study reported on Lana'i (Table 4). There was no

statistically significant price difference between UPA and Plan B One-Step® ($P=0.9$). The price of generic brands ranged from \$32.59 to \$60.49, which was less expensive than the name brand product. The quoted price for LNG-ECPs in the 2007 study ranged from \$37 to \$50. Adjusted for generalized inflation this is equivalent to \$43.10 – \$58.24 in 2014 U.S. dollars.

Discussion

Despite reports that UPA-ECPs are more efficacious and cost-effective than LNG-ECPs, UPA has very limited immediate availability in retail pharmacies in the State of Hawai'i, with in store availability only on O'ahu and Kaua'i. Further, the availability of UPA in Hawai'i's pharmacies (2%) is even lower than the 7% same-day availability in two counties in Massachusetts, the only other published data on UPA availability in the U.S.²⁴

There has been no statistically significant change in the availability of LNG-ECPs statewide since 2007, despite the fact that, since 2007 all age restrictions on over-the-counter purchase have been lifted and generic versions have entered the market. When we look at individual islands, however, clinically significant changes are noted. The addition of a retail pharmacy on Lana'i is important, as it permits retail ECP access to the island's 3,135 inhabitants, as well as to visitors. Additionally, the introduction of generic ECP products on O'ahu, Hawai'i Island, Maui, and Kaua'i has increased access to lower priced LNG-ECP products. After 7 years, Moloka'i remains without access to ECPs in retail pharmacies for its 7,404 inhabitants.

Nationwide, there has been an increase in use of emergency contraception (EC). The National Survey of Family Growth has demonstrated an increase in patient reported use of ECPs, with 4% of respondents indicating at least one prior use in 2002, increasing to 9.7% with one prior use in 2006–2008.^{25,26} Daniels, et al, found that 5.8 million women in the U.S. used ECPs from 2006 to 2010.²⁷ Despite this increased use nationwide, we have no state-specific studies assessing ECP use. According to Hawai'i PRAMS data, amongst women identifying their pregnancy as unwanted, 51% reported conceiving while attempting to use contraception.² Additionally, of women in Hawai'i identifying their pregnancy as mistimed, 48% reported attempting to use contraception surrounding the time of conception.² Consequently, ECPs, if readily available and used correctly when indicated, have the potential to significantly decrease unintended pregnancies in the state.

This study included all retail pharmacies throughout the state, offering a comparison to the only previous Hawai'i data on ECP access in 2007. In an on-line survey of women who had ever taken ECPs after its behind-the-counter status change, 62% purchased the medication from a chain drug store, pharmacy, or "big box" store, while 30% obtained it from a health center.²⁸ Thus, a majority of women turn to their nearby pharmacies for their emergency contraceptive needs. Our study was not structured to evaluate ECP access through public health clinics, Planned Parenthood, private medical offices, or through on-line pharmacies.

Conclusion

Access to the LNG-ECPs has remained consistent in Hawai'i's more densely populated islands, and now less expensive generic methods are available. Given Hawai'i's geographic isolation, lack of access in retail pharmacies to the more effective UPA, even with an advanced prescription, is of concern. Systems based interventions to improve availability of UPA are vital to increase access to this medication as one component of efforts to decrease rates of unwanted and mistimed pregnancies across all islands.

Conflict of Interest

None of the authors identify a conflict of interest.

Disclosure

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2016 WRITING CONTEST UNDERGRADUATE WINNER

The Relationship Between Medication Adherence and Total Healthcare Expenditures by Race/Ethnicity in Patients with Diabetes in Hawai'i

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Cori X. Sutton

Cori Sutton is a sophomore at the University of Hawai'i at Manoa and is currently working toward her B.S. in Biology with a minor in Economics. In the summer of 2016, she worked as a research intern at the Department of Native Hawaiian Health under Deborah Taira ScD, Professor at the Daniel K. Inouye College of Pharmacy. She is a Doctor of Medicine Early Acceptance Program (DMEAP) scholar and will be attending the John A. Burns School of Medicine in 2019. She aspires to become a practicing internist in Hawai'i with a specialty in either allergy and immunology or nephrology.

Her manuscript, entitled "The Relationship Between Medication Adherence and Total Healthcare Expenditures by Race/Ethnicity in Patients with Diabetes in Hawai'i," compared total annual healthcare expenditures of patients with diabetes in Hawai'i by race and ethnicity and determined whether any existing differences persisted after controlling for medication adherence and demographic factors. Filipinos, Native Hawaiians, and Other Pacific Islanders were found to have significantly lower medication adherence rates compared to other groups. These ethnic groups also had the lowest median healthcare costs. Generalized linear regression models showed that after controlling for demographic factors and medication adherence, Japanese, Chinese, Filipinos,

and Native Hawaiians had significantly lower total healthcare costs compared to Caucasians. Costs for Other Pacific Islanders were not significantly different from those of Caucasians. This study provides evidence that total health-related cost is associated with a multitude of factors that further research may reveal.

Abstract

Diabetes is a costly, chronic disease that is becoming increasingly prevalent worldwide. Studies show that Native Hawaiians suffer from higher rates of diabetes and lower rates of medication adherence compared to Caucasians and Japanese. This study compared total annual healthcare expenditures of patients with diabetes in Hawai'i by race and ethnicity and determined whether any existing differences persisted after controlling for medication adherence and demographic factors. The study population consisted of 30,445 individuals, using administrative claims data from a large health plan in Hawai'i. Filipinos, Native Hawaiians, and Other Pacific Islanders had significantly lower medication adherence rates compared to other groups. These ethnic groups also had the lowest median healthcare costs. In contrast, Caucasians had one of the highest medication adherence rates coupled with the highest median annual healthcare expenditures at \$5,132. Generalized linear regression models showed that after controlling for demographic factors and medication adherence, Japanese (RR=0.86, 95%CI [0.78, 0.94]), Chinese (RR=0.83, 95%CI [0.73, 0.95]), Filipinos (RR=0.74, 95%CI [0.67, 0.82]), and Native Hawaiians (RR=0.74, 95%CI [0.67, 0.82]) had significantly lower total healthcare costs compared to Caucasians. Costs for Other Pacific Islanders were not significantly different from those of Caucasians. This study provides evidence that total health-related cost is associated with a multitude of factors that further research may reveal.

Keywords

Native Hawaiian health, diabetes, medication adherence, total healthcare cost, health disparities

Introduction

Diabetes is one of the most common chronic conditions in the United States, affecting nearly 29.1 million people nationwide with an annual cost, including direct medical costs and indirect costs from lost wages, of \$245 billion in 2014.¹ Between 2011 and 2015, 8.6% of individuals, or on average 93,560 people in Hawai'i, suffered from diabetes.² It is a debilitating disease that can lead to a variety of serious complications, including neuropathy, cardiovascular disease, and renal failure.³ Several studies have shown that important risk factors for diabetes include obesity and hypertension, which can also lead to an increased risk for comorbid conditions such as congestive heart failure (CHF) and coronary artery disease (CAD).⁴⁻¹⁰

Diabetes prevalence differs by race and ethnicity. The Behavioral Risk Factor Surveillance System (BRFSS) data shows that diabetes prevalence from 2011-2015 is higher among Native Hawaiians (10.7%), Other Pacific Islanders (9.1%), Filipinos (10.5%), Japanese (11.7%), and Chinese (8.8%), as compared to Caucasians (5.1%).¹¹ Historically, researchers grouped Asian Americans and Pacific Islanders into a single race category (Asian/Pacific Islanders [API]). However, several studies have shown that these populations exhibit significant disparities in diabetes prevalence.¹² For example, studies suggest that Native Hawaiians, Other Pacific Islanders, and Southeast Asians such as Filipinos have a higher prevalence of diabetes compared to

East Asian groups such as Japanese and Chinese. Caucasians generally have lower diabetes prevalence compared to all other racial and ethnic groups.¹³⁻¹⁴ These differences may be associated with demographic and environmental factors.¹⁵ For example, low socioeconomic status and education level have been linked to higher diabetes prevalence in multiple studies.¹⁶ Additionally, there are some factors such as higher medication adherence, that are associated with less serious complications and lower healthcare costs.¹⁸⁻²¹ Studies have shown that Native Hawaiians, Other Pacific Islanders, and Filipinos have lower rates of medication adherence compared to Caucasians and Japanese.¹⁷

To our knowledge, there are no published studies examining the impact of medication adherence on total healthcare costs for patients with diabetes by race/ethnicity.^{3,22} The goals of this study were to (1) examine differences in total health care costs by race and ethnicity in Hawai'i and (2) to determine the relationship between medication adherence and total overall health care costs. We hypothesize that total healthcare expenditures will vary between different races and ethnicities, and that higher medication adherence is associated with fewer negative health outcomes and lower cost of healthcare.

Methods

We analyzed administrative claims data from 2007-2010 for adults aged 18 years or older with diabetes enrolled in a large health insurance company in Hawai'i (N=30,445). Patients with diabetes were identified as anyone with a pharmacy claim for dispensed insulin or oral hypoglycemic or antihyperglycemics or at least two face-to-face encounters with a diagnosis of diabetes (ICD-9 codes 250, 357.2, 366.41, 648.0). Comorbid conditions CAD and CHF were also determined by the health plan using ICD-9 codes 414.01 and 428.0, respectively, and were included because they are known to be associated with higher costs of care for patients with diabetes. All-cause patient morbidity was estimated by the health plan using ICD-9-CM diagnostic codes according to the Johns Hopkins Adjusted Clinical Group methodology. A score of 4 or 5 on a 5-point scale was categorized as high morbidity. These scores were assigned by the health insurance company.²³

Race/ethnicity was based on self-report from member satisfaction surveys. Race/ethnicity was categorized for the six most common ethnic groups in Hawai'i (Japanese, Native Hawaiian, Caucasian, Filipino, Chinese, other Pacific Islanders). Other Pacific Islanders were defined as from a Pacific Island other than Hawai'i. If a patient reported more than one racial or ethnic group, they were considered "mixed race". The exception was Native Hawaiians; if individuals identified as Native Hawaiian along with another race or ethnicity, they were categorized as Native Hawaiian. Patients of "mixed" race or ethnicity who were not Native Hawaiian and those of other race were excluded from analyses.

Medication adherence was calculated based on medication possession ratios (MPR) for three types of medications (anti-diabetic, cholesterol lowering, anti-hypertensive). Using the medication name, days' supply, and date the medication was

filled for each prescription, the MPR was calculated as the ratio of the number of days for which a patient has medication in their possession divided by the total number of days a patient was enrolled in a drug plan. If a patient had data for more than one year, medication adherence was averaged to give a single MPR for each type of medication for every patient. The MPR ranges between 0 and 1, with 1 representing perfect adherence. For the purposes of this study, we defined adherence as an MPR of at least 0.8, or an 80% possession ratio. Thresholds between 75 and 80% are commonly used in literature when evaluating medication adherence.²⁴ The MPR has often been used to measure adherence for medications that require long-term use.²⁵

The primary outcome for this analysis was total annual health care costs. Total costs were calculated by summing inpatient, outpatient, and prescription costs and included the amount paid by the health plan and the patient copayment on an annual basis at the individual patient level. All costs were converted to 2010 dollars using the medical component of the consumer price index. Total health expenditures are also summarized in a violin plot that captures the range and distribution of costs by race and ethnicity.

Statistical Analyses

For descriptive analyses, the median total healthcare expenditures for each race/ethnicity were calculated and compared using Wilcoxon rank sum tests. Demographic characteristics, medication adherence rates, CAD and CHF prevalence, and number of hospital and emergency department (ED) visits were compared across race/ethnicities using chi-squared or t-tests, as appropriate. Multivariable generalized linear models with log-link function were used to estimate differences in health care costs related to race/ethnicity, assuming that health care cost variable is Gamma distributed. The first model included only race/ethnicity dichotomous variables, with Caucasians as the comparison group. The adjusted model added medication adherence and demographic characteristics including age, gender, region (by zip code), history of CAD or CHF, high morbidity, and whether or not the patient expired during the year. Rate ratios with 95% confidence intervals were calculated using STATA V13 (College Station, TX). The study was given exempt status by the University of Hawai'i Institutional Review Board.

Results

The study population consists of a total of 30,445 participants with diabetes, of which 44.3% are Japanese, 19.7% are Filipino, 18.4% are Native Hawaiian, 9.6% are Caucasian, 6.9% are Chinese, and 1.2% are Other Pacific Islanders. Table 1 summarizes the population demographics. Chinese had the highest mean age at 65.9 (SD=11.7) years. The mean average age for all other ethnicities ranged from 56.1 to 65.4 years. Caucasians had the highest overall patient morbidity from all-causes and CAD prevalence at 42.8% and 27.3%, respectively. In contrast, a lower proportion of Other Pacific Islanders had high morbidity (32.3%) and CAD prevalence (21.2%). Native Hawaiians had the highest CHF prevalence (15.8%), while Chinese had the lowest CHF prevalence (9.5%).

Medication Adherence

Figure 1 shows medication adherence by race/ethnicity and type of medication. Overall, individuals from each race/ethnicity were most adherent to anti-hypertensive medication, followed by anti-diabetic medication, and least adherent to cholesterol lowering medication. Japanese had the highest adherence to oral anti-diabetic medication at 60.4%, while Other Pacific Islanders had the lowest (43.2%). Native Hawaiians, Other Pacific Islanders, and Filipinos had significantly lower adherence rates for each medication compared to other groups.

Total Healthcare Expenditures

Figure 2 shows median annual total healthcare expenditures among patients with diabetes by race/ethnicity. Caucasians had the highest median healthcare cost at \$5,132 per year, followed by Chinese (\$4,243) and Japanese (\$4,121). Native Hawaiians, Other Pacific Islanders, and Filipinos had

significantly lower annual healthcare costs at \$4,115, \$3,360, and \$3,305, respectively. Figure 3 shows the total healthcare expenditures in a violin plot, adjusted for demographic factors, including age, sex, region of residence, CAD prevalence, CHF prevalence, and high morbidity prevalence. While Caucasians still have the highest adjusted median healthcare expenditures, the interquartile (25th to 75th) range of each race/ethnicity is relatively similar. There are a few Native Hawaiians with large total healthcare expenditures, compared to other groups, which is not evident in Figure 2.

Controlling for Medication Adherence

Table 2 summarizes the results of three generalized linear models. In the unadjusted model (model 1), Japanese (RR=0.82, 95% CI [0.74,0.90]), Chinese (RR=0.87, 95% CI [0.82,0.98]), and Filipinos (RR=0.69, 95% CI [0.62,0.76]) had significantly lower total health costs compared to Caucasians, while Native Hawaiians

	Japanese (n = 13,485)	Filipino (n = 5,989)	Chinese (n = 2,092)	Caucasian (n = 2,932)	Native Hawaiian (n = 5,588)	Other Pacific Islander (n = 359)	P-value
Mean Age (years) (SD)	65.4 (11.6)	62.0 (11.5)	65.9 (11.7)	62.4 (10.6)	60.2 (11.6)	56.1 (11.6)	<.001
Female	7,146 (53.0%)	3,430 (57.3%)	1,075 (51.4%)	1,305 (44.5%)	3,011 (53.9%)	176 (49.0%)	<.001
High Morbidity	4,864 (36.1%)	1,955 (32.6%)	772 (36.9%)	1,254 (42.8%)	2,064 (36.9%)	116 (32.3%)	<.001
CAD	3,350 (24.8%)	1,319 (22.0%)	647 (30.9%)	800 (27.3%)	1,497 (26.8%)	76 (21.2%)	<.001
CHF	1,259 (9.3%)	636 (10.6%)	198 (9.5%)	352 (12.0%)	882 (15.8%)	37 (10.3%)	<.001
>1 ED Visit	243 (1.8%)	53 (0.89%)	33 (1.6%)	44 (1.5%)	59 (1.1%)	2 (0.56%)	<.001
>1 Hospital Visit	778 (5.8%)	331 (5.5%)	111 (5.3%)	200 (6.8%)	397 (7.1%)	25 (7.0%)	<.001

CAD = coronary artery disease, CHF = congestive heart failure, ED = emergency department

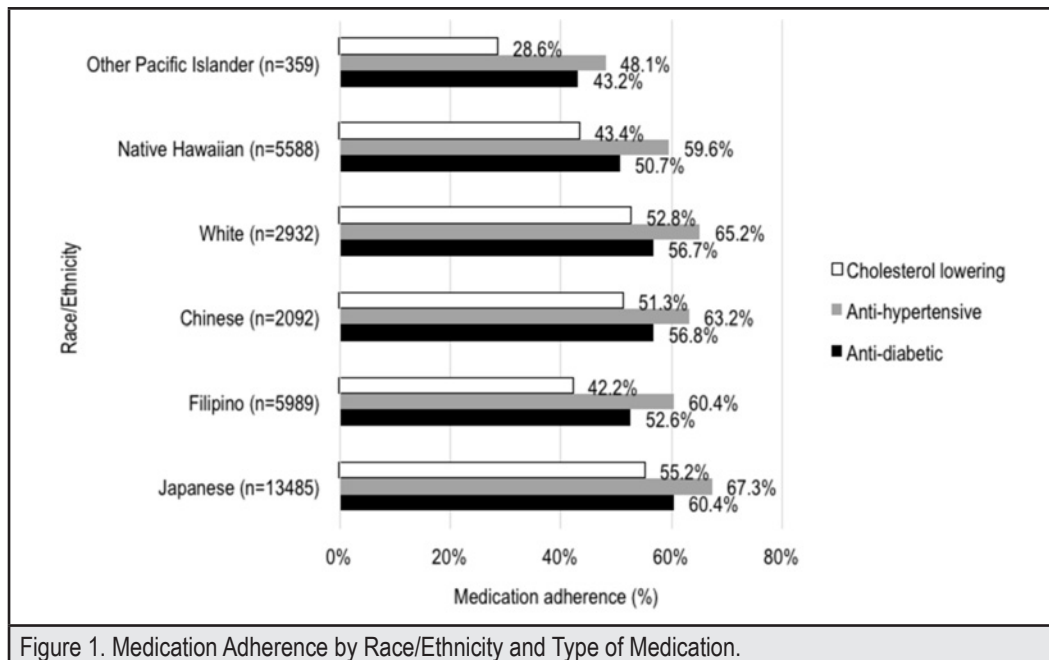


Figure 1. Medication Adherence by Race/Ethnicity and Type of Medication.

(RR=0.91, 95% CI [0.82, 1.02]) and Other Pacific Islanders (RR=1.1, 95% CI [0.79, 1.34]) did not significantly differ from Caucasians. In Model 2, demographic factors (specified above) were added to the model. In this model, Chinese, Japanese, and Filipinos still showed significantly lower total healthcare costs than Caucasians. Native Hawaiians had significantly lower total healthcare costs (RR=0.89, 95% CI [0.82, 0.98]). Other Pacific Islanders remained statistically non-significant from Caucasians in terms of healthcare costs. Model 3 includes the addition

of medication adherence. Total healthcare expenditures for Japanese, Chinese, Filipinos, and Native Hawaiians remained statistically lower compared to Caucasians. Adherence to cholesterol-lowering medication was significantly associated with total healthcare cost (RR=0.93, 95% CI [0.87, 0.99]), while adherence to oral anti-diabetic medication (RR=0.97, 95% CI [0.91, 1.03]) and anti-hypertension medication (RR=0.94, 95% CI [0.88, 1.00]) were not statistically associated.

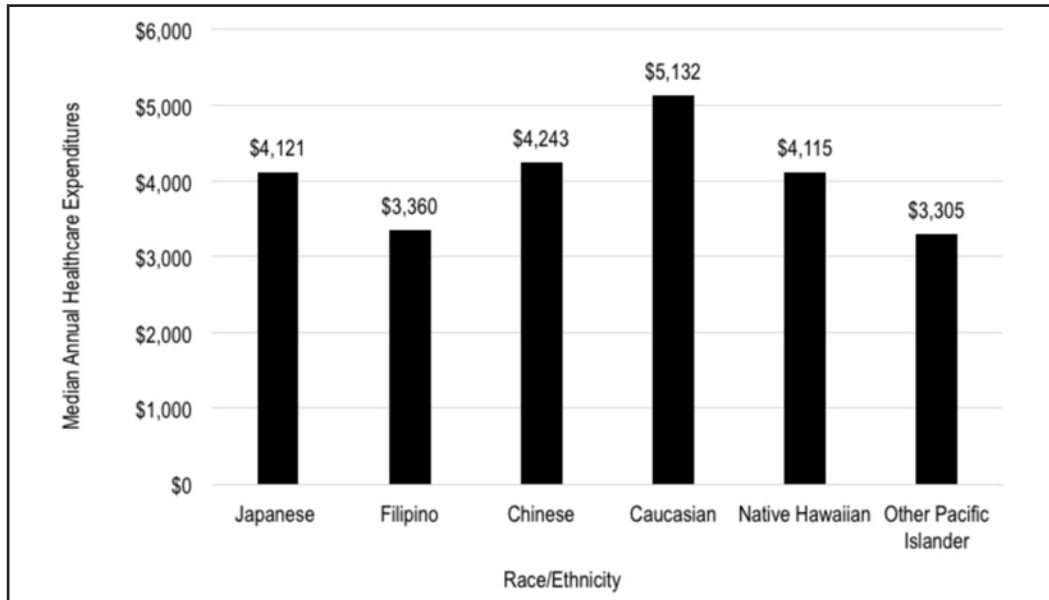


Figure 2. Median Total Healthcare Expenditures by Race/Ethnicity, Unadjusted.

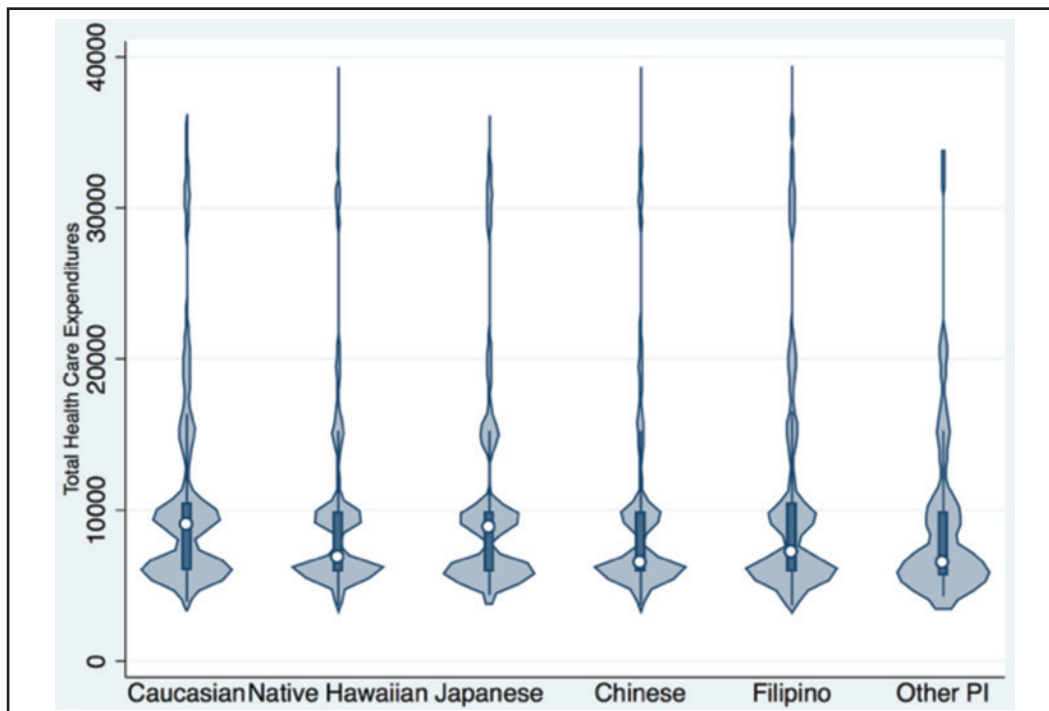


Figure 2. Median Total Healthcare Expenditures by Race/Ethnicity, Unadjusted.

Note: For this violin plot, the circle shows the median, the rectangle is the interquartile range, the lengths show the range, and the width is the estimated kernel density. PI = Pacific Islander.

Table 2. Total Healthcare Expenditures Related to Race and Ethnicity, Demographic Characteristics, and Medication Adherence.**

	Model 1 (Race/ethnicity only)	Model 2 (Race/ethnicity + demographics)	Model 3 (Race/ethnicity + demographics + medication adherence)
Race/ethnicity			
Caucasian	1	1	1
Japanese	0.82 [0.74,0.90]*	0.89 [0.82,0.98]*	0.86 [0.78,0.94]*
Chinese	0.87 [0.76,0.99]*	0.87 [0.77,0.98]*	0.83 [0.73,0.95]*
Filipino	0.69 [0.62,0.76]*	0.70 [0.64,0.77]*	0.74 [0.67,0.82]*
Native Hawaiian	0.91 [0.82,1.02]	0.89 [0.82,0.98]*	0.89 [0.80,0.99]*
Other Pacific Islander	1.1 [0.79,1.34]	1.1 [0.88,1.39]	1.0 [0.78,1.31]
Age			
<35		1	1
35-49		0.77 [0.61,0.96]*	0.77 [0.53,1.14]
50-64		0.98 [0.79,1.22]	0.96 [0.66,1.40]
65+		1.01 [0.81,1.26]	0.94 [0.64,1.37]
Female		0.94 [0.90,0.98]*	0.93 [0.89,0.98]*
Region			
Honolulu		1	1
East Hawai'i		0.92 [0.84,1.00]	0.94 [0.85,1.04]
West Hawai'i		1.03 [0.92,1.16]	1.00 [0.88,1.15]
Kaua'i		0.99 [0.90,1.09]	0.99 [0.89,1.10]
Maui		1.09 [0.99,1.20]	1.02 [0.92,1.13]
O'ahu other		1.07 [1.01,1.13]*	1.01 [0.95,1.08]
Other region		0.99 [0.81,1.22]	0.98 [0.79,1.22]
Coronary Artery Disease		1.58 [1.49,1.68]*	1.55 [1.45,1.65]*
Congestive Heart Failure		1.99 [1.84,2.16]*	1.93 [1.77,2.10]*
High morbidity		1.54 [1.47,1.62]*	1.43 [1.35,1.51]*
Deceased		3.07 [2.36,4.00]*	2.98 [2.24,3.96]*
Adherence			
Anti-diabetic			0.97 [0.91,1.03]
Anti-hypertensives			0.94 [0.88,1.00]
Cholesterol lowering			0.93 [0.87,0.99]*

*Indicates significance.

**Format: Rate Ratio (RR) [95% CI]

Discussion

This study provides further evidence that Native Hawaiians, Other Pacific Islanders, and Filipinos have significantly lower medication adherence rates compared to Caucasians, Chinese, and Japanese. Overall, average medication adherence for any race or ethnicity never exceeded 67.3%. Medication adherence has been cited as a major public health issue, especially for patients with chronic health problems.²⁶ Studies have shown a higher incidence of diabetes in lower socioeconomic groups, which could be related to lower medication adherence.¹⁴ Medication nonadherence is multifactorial and is related to an individual's socioeconomic status, as well as other environmental factors such as living area, education, and livelihood. Patients may forget to take their medication because they lead busy lives. In addition, some patients are not well educated about the risks associated with low medication adherence, so they do not take their medications. For several years, cholesterol medications were portrayed to have adverse side effects by the media, resulting in public wariness over statin drugs. This could account for the low rates of cholesterol lowering medication adherence in comparison to anti-hypertensive and anti-diabetic medication adherence.

Several studies have shown that decreased adherence can be associated with an increase in adverse events, which can lead to higher hospitalization rates, and therefore higher overall health-care expenditures.¹⁷⁻²⁰ Thus, we hypothesized that there would be a negative correlation between medication adherence and total health care costs. However, the results of this study showed that after controlling for demographic factors, Caucasians had the highest median total health care expenditures, despite this group having one of the highest medication adherence rates in the races/ethnicities studied. Filipinos had the lowest median total health care expenditures despite having the lowest medication adherence rates, along with Other Pacific Islanders.

Future studies are needed to identify other factors that may explain these ethnic disparities in total health care costs. These other factors may include variables such as quality of life or socioeconomic status.²⁷ For example, individuals in high socioeconomic groups are likely to have access to the most expensive insurance plans and are most likely to see their doctors regularly and pick up prescribed medication. In contrast, individuals in low socioeconomic groups may not go to the doctor regularly because they cannot afford it, and some may not pick up their medication because they do not live close to a pharmacy. Previous studies have shown that Native Hawaiians have high preventable hospitalization costs compared to Caucasians and Asian Americans.²⁸ These preventable costs are the result of Native Hawaiians, on average, visiting the doctor less regularly than other races/ethnicities, resulting in an increased chance of adverse health outcomes and hospitalization. Future studies are also needed to examine the impact of medication adherence on other important outcomes, including health-related quality of life.

This study had several limitations. It is a descriptive study with data taken from one insurance company in Hawai'i. Analyzing data from several different insurance companies would give a better description of the state's population. Medication adherence was measured through administrative claims data, with the assumption that individuals took the medications they picked up at the pharmacy. It is possible that individuals did not take these medications. This study also did not take into account free medication samples given out by physicians, the use of prescription drug coupons, or the impact of various medication adherence strategies employed by individuals, health care providers, or pharmacies.²⁹⁻³⁰ In addition, there was ambiguity in compiling the number of Emergency Department (ED) and hospital visits for each race/ethnicity. If a patient visited the ED and was discharged the same day, the visit was counted as an ED visit. However, if the patient visited the ED and was subsequently admitted into the hospital, the visit was counted only as a hospital visit. This method of data compilation could explain the very high Other Pacific Islander hospitalization rate compared to the low ED visit rate. It is possible that many of these hospitalizations were patients that initially presented in the ED and were later admitted into the hospital. Diabetes prevalence may have been underestimated for Native Hawaiians and Other Pacific Islanders because these groups are less likely to visit the doctor and are therefore less likely to be screened for diabetes. There is also the issue of timing. We examined health care costs in the same year as we measured medication adherence. It may be there is a lag in the negative effect of nonadherence, in that patients have higher health care costs a few years after they have low adherence. These higher costs would not have been captured in our study.

Conclusions

This study demonstrated racial and ethnic disparities in medication adherence and total health care expenditures. Filipinos, Native Hawaiians, and Other Pacific Islanders had significantly lower medication adherence than Caucasians, Japanese, and Chinese. Interestingly, Filipinos, Chinese, and Japanese had significantly lower total health care costs than Caucasians, Native Hawaiians, and Other Pacific Islanders. Differences in total health care expenditures persisted after controlling for medication adherence and other demographic factors. Future studies are needed to better understand the relationship between medication adherence and total health care expenditures. Given that total health care expenditures are not a definite indicator of quality of care or health, further research is needed to determine other influencing factors on total costs.

Conflict of Interest

None of the authors identify any conflict of interest.

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2016 WRITING CONTEST GRADUATE WINNER

Cardiovascular Disease Training for Community Health Workers Serving Native Hawaiians and Other Pacific Peoples

Chace D.I. Moleta MS; Mele A. Look MBA; Mililani K. Trask-Batti MPH;
Tricia Mabellos DrPH; and Marjorie L. Mau MD



Chace D.I. Moleta

Chace Moleta was born and raised on Maui and is a third-year student in the M.D. program at Oregon Health and Science University. He received his B.A. in Economics and M.S. in Developmental and Reproductive Biology from the University of Hawai'i at Manoa. Chace's research interests relate to establishing health equity for Native Hawaiians and other First Peoples, as well as issues of rural health access.

His winning manuscript, "Cardiovascular Disease Training for Community Health Workers Serving Native Hawaiians and other Pacific Peoples," describes and evaluates a cardiovascular disease training seminar for paraprofessional health care workers from federally qualified community health centers and Native Hawaiian health care systems. Under the mentorship of Mele Look, Director of Community Engagement at the UH-JABSOM Department of Native Hawaiian Health, this research investigates the effectiveness of a novel educational training designed and rooted in the principles of community-based participatory research, culture-based education, and adult learning theory. The data analysis showed statistically significant gains in cardiovascular disease knowledge from pre- to post-seminar among participants, as well as long-term cardiovascular disease competency measured at six months post-seminar. Findings of this research provide an evidence-based approach for capacity building and workforce development of a class of health care workers with increasing importance to the well-being of Hawai'i's most health disparate populations.

Abstract

To help community health workers (CHW) meet increased demand for their services, it is essential to have data supported strategies for approaches to their training and capacity development. The objective of this paper is to report on the development, implementation, and evaluation of "Heart 101," a cardiovascular disease (CVD) training program, conducted among CHW in Hawai'i who serve Native Hawaiians and other Pacific Peoples (NHPP). Principles from Community-Based Participatory Research provided a framework to develop and implement the 5-hour training curriculum. Developers incorporated teaching strategies shown to be effective among learners that represent the majority of CHW, and included principles of adult learning theory and culture-based education. Training participants completed pre-, post-, and 6-months post-training knowledge tests, as well as demographic and participant satisfaction surveys. Data analysis based on pre- and post-training knowledge tests ($n=30$) indicated that Heart 101 significantly increased CVD knowledge by 32% ($P < .001$, t test). Long-term CVD competency measured at six-months post-training ($n = 20$) was also shown to be significant ($P < .001$, t test). Analysis of knowledge by subtopic suggested CHW strengths in clinical aspects of CVD and weaknesses in medical terminology and basic science aspects. These results, along with positive participant satisfaction, suggest that a culturally relevant and interactive course is a strong approach for CVD information dissemination to CHW serving NHPP communities, and provides insight on potential areas for special focus in their training. The demonstrated success of Heart 101 has positive implications for the standardization of CHW education and for their professional development.

Keywords

Community Health Workers, Native Hawaiians, Pacific Islanders, Cardiovascular Disease, Culture-Based Education, Health Disparities

Abbreviations and Acronyms

CVD = Cardiovascular Disease
NHPP = Native Hawaiians and other Pacific People
NHOPI = Native Hawaiians and other Pacific Islanders
CHW = Community health workers
DNHH = Department of Native Hawaiian Health
Center = Center for Native and Pacific Health Disparities Research
HCIE = Hawaiian Cultural Influence in Education
CBE = Culture-Based Education

Introduction

Cardiovascular disease (CVD), including ischemic heart disease and stroke, continues to be the leading cause of death worldwide.¹ In the United States, disproportionate prevalence of CVD is particularly notable in racial/ethnic minorities.² Among the most disparately affected are Native Hawaiians and other Pacific People (NHPP), who have some of the highest CVD mortality rates in the United States and experience earlier disease onset compared to nearly all other groups.³⁻⁶ The US Federal Government uses the designation "Native Hawaiian and other Pacific Islanders" (NHOPI) to refer to persons of heritage in any of the original peoples of the islands of Polynesia, Micronesia, and Melanesia.⁷ Here, the term NHPP is used to broaden our scope so as to include Filipinos, who represent the third largest ethnic group in Hawai'i and experience cardiometabolic health challenges more similar to NHOPI than that of other Asian subgroups with which they are typically aggregated by federal standards.^{3,8}

National and public health interest in the utilization of community health workers (CHW) as extenders of healthcare delivery has in recent years been an area of significant promise and continues to grow.⁹⁻¹² One reason for this has been the demonstrated success of CHW initiatives for addressing health disparities, particularly those of medically underserved populations such as NHPP.¹³ As a specific class of allied health professionals, CHW are often utilized as peer counselors, outreach workers, and case managers—areas where their strong interpersonal skills, knowledge of cultural preferences, and community networks are particularly well suited.¹⁴⁻¹⁶ The effectiveness of CHW in helping to provide chronic disease self-management education, screening, and care has been established in numerous studies.¹⁷⁻²¹ Recent CVD studies utilizing CHW to deliver interventions in minority and at-risk populations have also reported consistent clinical improvements.²²⁻²⁴

A significant barrier, however, to expanding the utilization of CHW in clinical initiatives is the recognition of their generally limited health and medical training, particularly in knowledge of chronic diseases including CVD.²⁵ Presently there is a lack of published studies describing effective CVD education and training approaches for these health professionals. An important consideration in training efforts is the fact that most CHW are considered “non-traditional students,”²⁵ defined as having delayed enrollment in a post-secondary education, maintaining a part-time course load, having a full-time job, having dependents other than a spouse, or not possessing a high school diploma.^{25,26}

In this paper the development, implementation, and evaluation of a CVD training seminar for CHW serving NHPP is reported. The primary aim was to determine if an interactive and culturally relevant CVD program for training CHW who serve NHPP would lead to an increase in CDV knowledge and long-term information competency over six months.

Methods

This study was determined exempt from review by the Institutional Review Board at the University of Hawai‘i and followed the tenets of the Declaration of Helsinki. Participants were in full-disclosure to the research component of the training and gave written consent to participate.

Planning and Strategy Development

In 2003, the Department of Native Hawaiian Health (DNHH) at the University of Hawai‘i John A. Burns School of Medicine facilitated creation of the Ulu Network, a coalition of community-based organizations committed to improve the cardiometabolic health of NHOPI. Since that time the Ulu Network has grown to include 30 organizations with over 70 sites in Hawai‘i and into the continental US (Figure 1). Ulu Network members participate in research, training, information dissemination, and health policy advocacy. An initial needs assessment with Ulu Network organizations involving 64 clinical and administrative leaders identified improved chronic disease knowledge of their CHW as a top priority.²⁷ Subsequently, the Center for Native and Pacific Health Disparities Research (Center), which is a part of

the DNHH, committed to grow CHW chronic disease knowledge through capacity-building seminars. Using a Community-Based Participatory Research approach, seminars for diabetes mellitus and chronic kidney disease were developed and implemented and found to be successful in increasing CHW knowledge about disease causes, treatment, and management.²⁸

Building on this foundation, a multidisciplinary team of curriculum developers composed of Center staff, Ulu Network-associated CHW, and community clinicians set forth to develop “Heart 101,” a CVD training for CHW serving NHPP. The group recognized that participants could be resistant to a purely didactic format for new and complex material, such as the pathophysiology of diseases and drug therapies associated with CVD. Further, the curriculum developers concluded that a teaching team of multidisciplinary community-based instructors would: (1) provide multiple professional perspectives, (2) increase awareness of community-based resources, (3) provide exposure to role models, and (4) improve attention with a rotation of speakers. PowerPoint was chosen as the presentation media because of its potential to allow for strong visuals and its ability to be readily formatted for easy distribution.

Consistent with the Hawaiian Cultural Influence in Education (HCIE) theoretical model, curriculum development prioritized materials and delivery strategies that were: (1) interactive, (2) facilitated the delivery and long-term information competency, and (3) relevant to NHPP cultural and community activities.²⁹ The HCIE model describes an approach to Culture-Based Education (CBE) specific to Native Hawaiians, who experience disparities in educational achievements that mirror those of Indigenous peoples worldwide. Scholars of CBE identify the incongruity of the dominant and minority culture of the Indigenous student as a major determinant of low educational attainment.³⁰ Heart 101 implements aspects of HCIE (eg, language, cultural content, cultural context, and family and community) to connect the learner’s perspectives with institutional values, knowledge, and practices of CVD (Table 1).

Development of Heart 101 Curriculum and Training Materials

The Heart 101 seminar is a 5-hour long training delivered in three modules over two days. Module 1 - *Introduction to the Cardiovascular System and Cardiovascular Disease*, is taught by a health educator; Module 2 - *Types of Cardiovascular Disease and Treatments*, is taught by a clinician such as a NHPP physician, nurse, or nutritionist; and Module 3 - *Successful Strategies in Treatment and Management of Cardiovascular Disease*, is taught by a senior CHW.

Class lectures are augmented with stories and examples from instructors’ field experience, interactive group CVD knowledge games, small group and class discussions, and role-play scenarios. A student workbook is provided to all attendees containing lecture slides, a glossary of medical terminology, nutritional and dietary information, scientific and general public articles, culturally relevant brochures, and a reference list of other resources for CVD information.

Ulu Network

LEGEND:

- ▲ Ulu Network Organization Main Site
- Ulu Network Organization Satellite

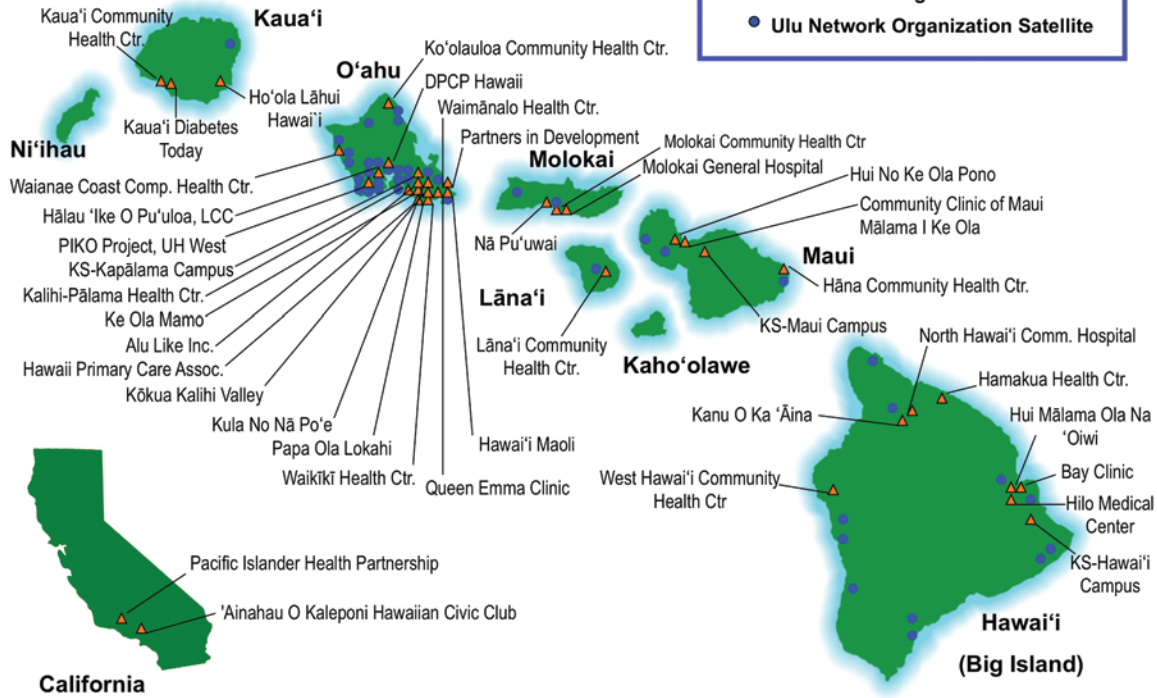


Figure 1: Ulu Network Organizations in the State of Hawai'i, 2016. SOURCE: Look & Furubayashi, 2004.

Today the Ulu Network consists of 30 community organizations. The membership includes 14 federally qualified community health centers in Hawai'i; five federally established Native Hawaiian Health Care System organizations; two partners in California; and several rural community hospitals, non-profit organizations, educational institutions, and Hawaiian Civic Clubs that serve Native Hawaiians and other Pacific Peoples.

Table 1. Examples of CBE Strategies Incorporated into Heart 101.

CBE Principles	Strategies and Examples
Language	<ul style="list-style-type: none"> • Use of commonly spoken Hawaiian and Hawai'i Creole English words and phrases both in colloquial conversations with participants and also in articulating otherwise complicated scientific concepts.
CULTURAL Context	<ul style="list-style-type: none"> • Warmly greeting and embracing each participant individually in the traditional Hawai'i manner. • Establishing group cohesiveness by sharing personal and emotional connections to CVD. • Acknowledging the importance of group wellbeing with the incorporation of team challenges and small-group discussions. • Addressing and referring to well-known and highly respected senior authority figures from the community with culturally appropriate titles (eg, Aunty, Uncle, Papa, Kumu, Kahu, Kauka, etc.) • Presenting lei to invited speakers and other special guests.
CULTURAL Content	<ul style="list-style-type: none"> • Incorporation of Pacific-oriented graphics that emphasize NHPP engaged in traditional NHPP activities in an island setting. • Discussions that illustrate health disparities experienced by NHPP and the significance of it in comparison to other ethnic groups. • Providing historical perspectives that dispel negative modern stereotypes about NHPP such as NHPP being overweight by nature. • Referencing and emphasizing traditional and cultural NHPP diets and forms of physical activities in discussing the importance of maintaining a heart healthy lifestyles. • Illustrating CVD risk factors with special attention to those most significant within NHPP communities. • Incorporation of specific strategies for working with NHPP clients that promote lifestyle modifications, such as familial, communal, and cultural motivations.

CBE=Culture-Based Education; CVD=Cardiovascular Disease; NHPP=Native Hawaiian and other Pacific Peoples

CBE strategies were consistently utilized to incorporate language, images, and concepts familiar and endearing to NHPP throughout the curriculum and training material. For example, PowerPoint slides discussing the importance of physical exercise in maintaining cardiovascular health featured images of NHPP engaged in traditional and cultural activities like canoe paddling and hula dancing. The same approach was extended to the topic of keeping a heart healthy diet, which also incorporated the use of locally produced nutritional fact sheets for foods unique to Hawai'i and portion appropriate food models of items important in NHPP diets as teaching tools.³¹

Implementation of CVD Training for Community Health Workers

Flyers, mailers, and email announcements were sent to Ulu Network clinical and administrative leadership to solicit enrollment in the Heart 101 training seminars. Community-based, typically NHPP, instructors were recruited and encouraged to incorporate community-specific and NHPP cultural practices to establish personal, familial, and geographic connections to students. A relaxed and informal learning atmosphere was established early in the training by individually greeting each participant in the customary Hawai'i/Pacific manner as they entered the seminar space. This would typically include a warm physical embrace (such as a hug, kiss on the cheek, or handshake), a self-introduction, and some light, playful chatting. Rapport among the participants and with the training facilitator was further built through the sharing of personal and emotional connections to CVD in a self-introduction at the start of the seminar. Testimonials about working with patients and loved ones afflicted with CVD were also encouraged during group discussions around related case studies. In NHPP culture, collectivism is often emphasized over individualism;³² therefore, motivating participants through group challenges for increasing the level of cognitive engagement was a key strategy.

The seminars were conducted at rural and urban locations typically at an Ulu Network organization site or a University of Hawai'i facility. Seminar enrollment was limited to 20 participants to ensure an appropriate classroom size to facilitate discussions and interactive group activities.

Knowledge Assessments and Satisfaction Evaluations

CVD knowledge assessments were administered to participants at three time points: baseline (T1) was assessed immediately prior to the Heart 101 seminar, the first of two post-tests was administered immediately post-seminar (T2), and a final assessment was given 6-months post seminar (T3). All three evaluations were identical in content and consisted of 16 multiple-choice questions on cardiovascular physiology, disease, and treatment selected from two validated instruments: the Dutch Heart Failure Knowledge Scale and the Coronary Heart Disease Knowledge Test.^{33,34} A two-part participant satisfaction evaluation was given at the conclusion of the seminar and included: (1) a preference assessment with four open-ended questions probing attendees on the most and least liked aspects of the seminar, ideas for

improvements to curriculum delivery and subject matter, and suggestions on other areas of CVD education of interest; and 2) a performance and delivery assessment with nine 3-point Likert scale questions on instructors communication abilities, length of training, content, scope, and complexity of seminar material.

Data Collection and Management

CVD knowledge assessment results were examined from three Heart 101 seminars held in rural and urban sites across the State of Hawai'i between January and May of 2010. All participants were consented before each seminar and a demographic questionnaire was administered in addition to the knowledge assessment. Of the 46 participants who attended all five hours of the training, 30 completed all necessary forms and assessments to be considered for analysis (eg, consent form, pre- and post-training knowledge tests, and demographic and satisfaction surveys). Twelve participants were inadvertently given a defective version of the test, while the remaining four exclusions were due to failure to obtain either a post-test or consent form.

To measure immediate knowledge changes from pre- to post-seminar, the CVD knowledge assessment was given before any education was delivered and again at the very end of the seminar. Participants were encouraged to finish the tests within 15 minutes of starting and were instructed not to discuss questions or share answers. For long-term information competency, six-month post-training assessment tests were sent electronically via email to all 30 participants included in the pre- to post-seminar analysis. Up to three reminder emails were sent to participants who were non-responsive, with a final hard copy mailed 26-weeks post-training. Twenty participants ultimately responded and each received a small gift card incentive upon return of the 6-month post-training follow-up assessments.

Data Analysis

For the CVD knowledge assessment analyses, a unique number was assigned to each participant and used as the only identifying marker for matching of all pre- and post-assessment forms. Assessments were reviewed and scored by project staff and JMP software, a SAS-FSP (Cary, North Carolina) based statistical analysis software program, was used in all analyses. Paired t-tests determined differences in the mean values between T1 and T2 to measure knowledge changes during the training, and between T1 and T3 for long-term information competency gained from baseline. A question-by-question analysis was performed to assess changes in knowledge by cardiovascular health subtopics using paired t-tests to compare the proportion of correct responses for each assessment question between T1 and T2 periods.

Responses to the open-ended participant preferences assessment were coded for general theme and tallies of the most frequent answers were noted. Frequencies of whether participants agreed with, were not sure, or disagreed with the prompts to assess satisfaction content delivery and facilitator performance were also recorded.

Results

Demographic Characteristics

Most participants identified their current employment position as a CHW or outreach worker (63%). Medical assistants, peer counselors, and health educators were among the most frequently specified job positions of those remaining. The majority of CHW were women (67%), and many were over 50 years of age (43%). Native Hawaiians (61%) were the largest ethnic/racial group represented, while other Pacific Islanders and Filipinos comprised 6% and 9% of participants, respectively (Table 2).

Cardiovascular Health Knowledge Gained and Long-Term Information Competency

There was a statistically significant improvement ($P < .001$) in mean scores by 3.5 ± 2.6 correct answers between T1 and T2, an overall 32% increase. Similarly, assessment of long-term information competency showed that participants maintained a statistically significant improvement ($P < .001$) in CVD knowledge from T1 to T3 of 2.2 ± 2.3 correct answers (Table 3).

A question-by-question analysis of knowledge change found that the frequency of correct answers increased from T1 to T2 for all test questions. These improvements were statistically significant for 12 of the 16 assessment questions ($P = .04$ to $P < .001$). All 16 test questions had a correct answer frequency of 83% or higher at T2. As such, there were also improvements from T1 to T2 in each of the six subtopic areas: (1) CHD signs, symptoms, & medications, (2) risk factors, (3) exercise, (4) diet, (5) stress, and (6) CVD physiology. The questions with the greatest proportional increase in knowledge were in the subtopic areas of risk factors, exercise, and stress (Table 4).

Participant Satisfaction Evaluations

Analysis of the satisfaction evaluations revealed that participants found the most favorable aspects of the training to be (1) good information, (2) presentation format, and (3) interactive team games and other group activities. The results of the performance rating section were overwhelmingly positive, with more than 95% of respondents selecting the highest degree of satisfaction. The short duration of the training for the amount of material covered was the most frequently identified area of greatest dissatisfaction. Participants also noted that they desired more information on alternative and traditional medicine practices, as well as strategies for helping clients without health insurance coverage.

Table 2. Demographic Characteristics of Heart 101 Participants, 2010.

Characteristics	N=46, all participants Count (%)
Sex	
Male	15 (33)
Female	31 (67)
Age	
19-30 years	8 (17)
30-50 years	18 (39)
Over 50 years	20 (44)
Years of Experience	
0-1 years	5 (11)
1-2 years	2 (4)
2-5 years	7 (15)
5 or more years	32 (70)
Ethnicity	
Native Hawaiian	28 (61)
White	6 (13)
Asian	5 (11)
Filipino	4 (9)
Other Pacific Islander	3 (6)

Table 3. CVD Knowledge Test Scores.

	n	Pre-seminar score (Mean \pm SD)	Post-seminar score (Mean \pm SD)	6 month post-seminar score (Mean \pm SD)	Change in Test Score (Mean \pm SD)
Pre-Seminar to Post-seminar	30	11.1 \pm 3.0	14.6 \pm 2.0	N/A	3.5 \pm 2.6*
Pre-Seminar to 6-months Post-Seminar	20	12.1 \pm 2.6	N/A	14.2 \pm 1.2	2.2 \pm 2.3**

* $P < .0001$; ** $P < .0004$. SD=Standard Deviation

Table 4. Frequency and Proportion of Correct Answers on CVD Knowledge Tests (N=30). ^{33,34}					
CVD Subtopic	Question	Pre-Test n (%)	Post-Test n (%)	Percent Change	P-value
CHD Signs, Symptoms, & Medications	2. The most common disease of the circulatory system among people in the United States is: a. Heart attack b. Stroke c. High blood pressure d. A blood clot in blood vessels of the heart	22 (73%)	29 (97%)	+32%	.01
	6. The condition in which the pumping power of the heart is reduced to the point where fluids begin to collect in the lungs and extremities is known as: a. Arrhythmias b. Congestive heart failure c. Coronary spasms d. Tachycardia	26 (87%)	28 (93%)	+8%	.33
	8. Beta-blockers are drugs that: a. Reduce heart rate & blood pressure b. Improve heart-muscle contractibility c. Interfere with blood-clotting ability d. Are used to reduce blood lipids	21 (70%)	27 (90%)	+29%	.03
	12. An occlusive blood clot that results in a small area of dead heart muscle is called: a. A myocardial infarction b. A stroke c. Endocarditis d. A pulmonary infarction	20 (67%)	28 (93%)	+40%	.01
Risk Factors	4. A risk factor of coronary artery disease that you CANNOT change is: a. Lack of exercise b. Heredity c. Obesity d. Stress	29 (97%)	30 (100%)	+3%	.33
	7. The single most preventable cause of death and disease in the United States is: a. Drug abuse b. Environmental pollution c. Poor nutrition d. Smoking	17 (57%)	30 (100%)	+76%	<.001
	15. Which of the following blood fats is thought to lower your risk of coronary artery disease: a. High density lipoprotein b. Low density lipoprotein c. Cholesterol d. Triglycerides	18 (60%)	27 (90%)	+50%	<.001
Exercise	11. Which of the following is a direct benefit of exercise: a. Reduced work of heart for a given workload b. Reduction of fat cells c. Enlarged lungs d. Increasing resting heart rate	14 (47%)	26 (87%)	+86%	<.001
	14. The best type of physical activity to maintain cardiovascular fitness is _____ exercise: a. Anaerobic b. Aerobic c. Non-aerobic d. Dynamic	26 (87%)	30 (100%)	+15%	.04
	16. The symptoms of angina pectoris after physical exertion include: a. Numbness of the legs b. Prolonged, severe chest pain c. Pain in the right arm d. Temporary chest pain	16 (53%)	25 (83%)	+56%	.001

Table 4. Frequency and Proportion of Correct Answers on CVD Knowledge Tests (N=30). ^{33,34} Con't.					
Diet	5. Most Americans could benefit from diets: a. Lower in complex carbohydrates and higher in protein b. Lower in complex carbohydrates and lower in fat c. Higher in complex carbohydrates and higher in fat <u>d. Higher in complex carbohydrates and lower in fat</u>	17 (57%)	26 (87%)	+53%	.001
	10. The type of fat that is solid at room temperature is called: <u>a. Saturated</u> b. Monosaturated c. Polyunsaturated d. Unsaturated	21 (70%)	29 (97%)	+38%	.003
	13. A reasonable weight loss goal is: a. 1 pound a day b. 2 pounds a day <u>c. 2 pounds a week</u> d. 5 pounds a week	25 (83%)	27 (90%)	+8%	.49
Stress	3. Which of the following is a physiologic response to stress: a. Feeling hungry b. Slower heart rate c. Decreased metabolism <u>d. Increased blood pressure</u>	29 (97%)	29 (97%)	0%	–
	9. What is the relationship between stress and atherosclerosis: a. Atherosclerosis is a major cause of stress b. Elasticity of the arterial walls will increase with atherosclerosis <u>c. A single stress, by itself, is both necessary and sufficient to cause atherosclerosis</u> d. The stress response causes cholesterol to be circulated in the bloodstream to aid in muscle activity	9 (30%)	25 (83%)	+178%	<.001
Normal Cardio-vascular Physiology	*1. What is the main function of the heart: a. To absorb nutrients from the blood <u>b. To pump blood around the body</u> c. To provide the blood with oxygen d. To remove wastes from the body	24 (80%)	29 (97%)	+21%	.02

The questions here are numbered as they appear on the actual knowledge tests provided to training participants included in our analyses. Correct answers are denoted by the underlined corresponding letter choice. An asterisk identifies the sole question taken from the "Dutch Heart Failure Knowledge Scale," while all others were compiled from the "Coronary Heart Disease Knowledge Test."

Discussion

As an effective culturally relevant and capacity-building training, Heart 101 serves as a model for educating CHW in cardiovascular health. The significant increases in mean test scores from T1 to T2 demonstrate significant gains in knowledge, while the increase in mean test score from T1 to T3 indicate meaningful long-term information competency.

Emerging research findings on Indigenous and culture-based education (CBE) identify specific strategies that may have contributed to the success of the training. Heart 101 utilized specific aspects of CBE, such as language, context, and content (Table 4).³⁵ Findings from other minority communities implementing CBE elements have also demonstrated the success of culturally relevant CHW training programs.³⁶ A notable example in another Indigenous community was a 5-day wellness course on health promotion and disease prevention delivered to CHW in an Alaskan village. The training incorporated Alaska Native cultural values and traditions that emphasize the interconnected relationships of family, community, and the land, as well as art and storytelling. By the end of the training, 98% of participants felt more confident in their knowledge and ability to present community wellness information.³⁷

Principles of adult learning theory may have also influenced the assessment outcomes. Adult education research reports that unlike children and traditional post-secondary students, adult learners have different motivators and values related to educational processes. For example, adults have a higher need to understand the purpose of their learning, and prefer being self-directed. They participate in learning activities with a greater volume and quality of experience and enter into a learning environment with a task-centered orientation.³⁸ Therefore, the format of the Heart 101 training suits these non-traditional adult learners well. The use of culturally and community relevant teaching approaches, such as role-playing scenarios and case studies, likely reinforce the real world relevance and applicability important to adult learning.

Implications of Knowledge Test Results for the Heart 101 Curriculum

While results improved in all CVD health subtopics, a broader categorical review indicated baseline understanding to be higher on questions dealing with clinical knowledge (eg, medication, signs and symptoms, etc), as opposed to those testing basic science principles of cardiovascular health (eg, physiology, pathophysiology). In addition, questions that included medical terminology like “hypertension” (rather than “high blood pressure”) had greatest improvement, highlighting a key focus area for training of CHW. More broadly, this indicates that a stronger foundation in basic science aspects of chronic disease and in medical terminology would benefit CHW by providing more tools for influencing patients towards improved lifestyle measures. Additionally, this would help to improve CHW communication with clinicians and other health care team members.

Study Limitations

Because of the restricted scope of this analysis, a quantifiable measure on how cultural competency and interactivity specifically contributed to improvements in results cannot be reported at this time. Our modest sample sizes and the lack of randomization are other notable limitations to the statistical power of our findings. A practical alternative to excluding participants with defective tests would be to include only questions common to both test versions from all eligible participants. While this would allow for a larger sample size, it would also diminish the scope of our inquiry into CHW knowledge by CVD sub-topic. Finally, there is uncertainty in whether our long-term knowledge review reflects an actual long-term information competency or is the result of repeated use of the same instrument for all assessments, as well as the impact of higher scores at T1 among the subset of participants who also submitted tests at T3.

The positive responses of the participant satisfaction survey may reflect the overall positive attitude of CHW, and perhaps a general reluctance to provide negative critiques. Lastly, all classes were held in Hawai‘i with Native Hawaiians as the majority of attendees. This may restrict the generalizability of our findings.

Summary

CHW represent a diverse class of health services professional of growing importance. Although most often reflective of the communities they serve, CHW demographics, skills and knowledge base, as well as work roles and responsibilities vary greatly. Current trends in US healthcare delivery that aim to address health inequities and identify efficient means of healthcare implementation call for the skills and services that CHW are uniquely equipped to provide. This increased reliance on CHW necessitates a better understanding of ways to help CHW increase their capacity to be contributing members of the healthcare team. The CVD seminars and subsequent knowledge assessments revealed insight on strength and weakness in foundational and operational knowledge of CHW serving Hawai‘i’s most health disparate populations. These findings also demonstrate that a culturally relevant and interactive course, such as Heart 101, is a strong approach for cardiovascular health information dissemination to CHW serving NHPP communities. The success of the training can be measured in the overall improvement of scores and key areas of CVD knowledge, as well as long-term competency in CVD information. The positive feedback received in participant satisfaction surveys offer additional support for the methods used.

From this study, it is believed that a training program modeled on CBPR and culturally competent principles could serve as a standardized model for CHW health education training. Achieving this might not only lead to improved patient care and capacity building within the Hawai‘i’s community health systems, but could also offer benefits for career development and advancement for this important member of the healthcare team.

Conflict of Interest

None of the authors identify any conflict of interest.

Acknowledgement

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MEDICAL SCHOOL HOTLINE

John A. Burns School of Medicine University of Hawai'i at Manoa, Convocation Ceremony Keynote Address, May 14, 2017

Vice Admiral Raquel C. Bono MD, MBA

The Medical School Hotline is a monthly column from the University of Hawai'i John A. Burns School of Medicine and is edited by Satoru Izutsu PhD and Kathleen Kihmm Connolly PhD; HJMPH Contributing Editors. Dr. Izutsu is the vice-dean of the University of Hawai'i John A. Burns School of Medicine and has been the Medical School Hotline editor since 1993.

Dr. Hedges, faculty, and staff, thank you for your invitation today, and for all you have done to bring these new physicians into the practice of medicine.

As a daughter of the Pacific and an up-close admirer of the work this school does, I am honored to be here. I'm especially honored to help welcome two of you into my two chosen professions—not just medicine but military medicine!

To the parents, mentors, family, and friends gathered here, congratulations to you as well. I can tell you from my own experience that no physician—no successful person in any field—can achieve without the support of people like you.

And to you, the new physicians of the John A. Burns School's Class of 2017, my heartfelt congratulations.

You are now doctors of medicine.

Let that sink in.

That M.D. behind your name tells a story in just two letters: It conveys to everyone you will meet, something about your dedication. Your willingness to work hard. Your knowledge and ability to learn, your commitment to a life of service to others.

And it speaks of the trust that this institution has placed in you. And the trust that everyone who comes into contact with you will have as well.

You will wear that trust as long as you are a physician, just as surely as you will wear scrubs and a lab coat. Everyone you meet—and especially, the patients you treat—will read those two letters and place special trust in you—in your competence, your knowledge, and your compassion.

Physicians carry special responsibility in our society. You have spent a large portion of your life getting to this point, with the help of those who surround you to day. Revel in that—and also, reflect on the responsibility that you take on.

You come into this profession at a unique time and place—a time and place that I think offers you tremendous opportunities to lead. On top of your responsibilities to your patients and your profession, many of you can and will choose to take on the responsibility of leadership. This is a time of great change, in the world of medicine and the great, wide world beyond it. And your unique position offers the chance, and the responsibility, to use the great gifts you possess to help navigate that change.

What do I mean when I say this time and place are unique?

Well, to begin with, we are early yet in what many have called the “Pacific Century.” In medicine, in global security, in economics, in culture and more, the Asia-Pacific is where the future of billions is being decided. Living and studying in Hawaii, you are steeped in the diversity that is increasingly a feature not just of Hawaii's cultural environment, but America's. Here in Hawaii, America's crucial link to the Asia-Pacific, and at a school that so clearly values its role as an agent of change in the region, you begin your professional lives at the heart of this region of change.

And this is especially important for new physicians. You have an important opportunity to help address the health consequences of the great global security challenges of our time—terrorism and trauma, the health effects of climate change, the spread of infectious disease in a connected globe. The health of nations affects the stability of nations—and you, as physicians, can help shape the response to these challenges.

This is a big deal! And yes, I want you to take these challenges seriously. But I also want you to know that you are exceptionally well equipped to handle it all. The gifts you possess—your knowledge, your skill, the help of the people surrounding you today—all those gifts position you for leadership.

So do the fundamentals of the medical profession. We are an ancient crew, we doctors. “Do no harm” is tried and true. Whether in the clinic or in administration or in public policy, it's a rule to depend upon.

Now, I have tackled some of the same challenges laid out before you—change in the Asia-Pacific, in medicine, in technology and security. And there are some lessons I've picked up that can perhaps help you navigate these tides as well. They are leadership fundamentals that have helped me, and I believe can help you.

First: Leadership in a changing world demands leaders willing to challenge conventional wisdom. I learned that lesson very early, from my father, who also was a physician. Watching him as a young girl practice with his team, I asked if it was possible that I might, some day, become a nurse. He looked at me and asked: “Why not be a doctor?” My younger self had

absorbed the traditional roles – men are doctors, women are nurses. My father demonstrated to me the value of challenging that traditional thinking. And it's a lesson I've carried with me ever since. While you might think of the military as an institution resistant to change – and it can be – the truly successful leaders, in the military and elsewhere, aren't satisfied with the status quo.

I've also learned the value of authenticity. Trying to be someone you are not will not make you a more effective physician or a more effective leader. Authenticity is currency for leaders – it is the price of asking others to follow your lead. If you try to play a role other than that of your true self, people will know it and they will treat you accordingly. Cultivate your authentic self, and value authenticity in others.

That authenticity is especially important because, today more than ever, informal influence is often more effective than exercising formal authority. Maybe you emerge from medical school bursting with ideas about medicine, public policy, administration. Believe me: You will almost certainly never have all of the formal authority to make your ideas happen on your own. Even the most senior leaders bump up against the limits of their authority. But while that formal authority will always be constrained, your ability to influence others is potentially

limitless. If you can take the time and make the effort to learn to understand the world through the eyes of others, to see the viewpoint of those around you, and to bring them along rather than order them around – then you will exercise the best and most effective kind of leadership.

So, you leave medical school with tremendous gifts. You have your intellect, the benefits of a top-flight education, and the unique respect that comes with being a doctor. You have the good fortune to enter the profession at a unique time and place in history. And I hope my reminders about the value of challenging conventional wisdom, of authenticity, and of the value of informal influence can be my small gift to you as well.

I know you will take advantage of these gifts. I know you will remain conscious of the call to service – to your patients, to your institutions and to your country. Whatever path you choose, you begin your journey with more than a degree in hand – you have been elevated in society and given a unique and respected platform for leadership. I know you will accept that opportunity. My best wishes go with each of you.

Author's Affiliation:
Director, Defense Health Agency Medical Corps, United States Navy;
Robert T. Wong, MD Endowed Lecturer



John A. Burns School of Medicine
University of Hawai'i at Mānoa

CONVOCATION CEREMONY

Honoring the

CLASS OF 2017



Hawai'i Theatre Center
1130 Bethel Street
Honolulu, Hawai'i 96813

Sunday, May 14, 2017
9:30 am

Vice Admiral Raquel C. Bono, MD, MBA
*Director, Defense Health Agency Medical
Corps, United States Navy*

Commissioned in June 1979, Vice Admiral Raquel Bono obtained her baccalaureate degree from the University of Texas at Austin and attended medical school at Texas Tech University.



She completed a surgical internship and a general surgery residency at Naval Medical Center Portsmouth, and a trauma and critical care fellowship at the Eastern Virginia Graduate School of Medicine in Norfolk.

Vice Admiral Bono is a diplomat of the American Board of Surgery and has an Executive MBA from the Carson College of Business at Washington State University. Her personal decorations include Defense Superior Service Medal (three), Legion of Merit Medal (four), Meritorious Service Medal (two) and the Navy and Marine Corps Commendation medal (two).



Program

Processional

Welcome Chant—"Oli"

Kalani Brady, MD, MPH

Master of Ceremonies

Richard Smerz, DO, PhD, MTM&H

Opening Remarks

Richard Kasuya, MD, MSED

Presentation of the Class of 2017

Richard Smerz, DO, PhD, MTM&H

Jerris R. Hedges, MD, MS, MMM

Commissioning Oath

Captain Ariel Dunn, MD

Captain Michael Tanael, MD

Captain Courtney Kandler, MD

Keynote Address

Vice Admiral Raquel C. Bono, MD, MBA

Director, Defense Health Agency Medical

Corps, United States Navy

*Robert T. Wong, MD Endowed Lecturer**

Welcome from the Class of 2017

Nash Witten, MD

Class President

Awards

Richard Smerz, DO, PhD, MTM&H

Satoru Izutsu, PhD

Jerris R. Hedges, MD, MS, MMM

Charge to the Class

Jerris R. Hedges, MD, MS, MMM

Oath of Hippocrates

William Haning, III, MD

Closing Remarks

Damon Sakai, MD

Recessional

*** Robert T. Wong, MD Endowed Lectureship:**

Established by Jean Chow Wong in memory of her friend, Dr. Robert T. Wong. This lectureship invites individuals who have made major contributions in medicine to share their new ideas in research and clinical medicine with the people of Hawai'i.

Capacity Building Using a Bi-Directional Model: University of Hawai'i at Manoa and the Federal University of Rio Grande do Norte - Santa Cruz Campus

Jessica Filippoli MPH; Cristiano dos Santos Gomes PhD; Ingrid Guerra PhD; Juliana Fernandes de Souza Barbosa PhD; Catherine Pirkle PhD; and Saionara Camara PhD

Insights in Public Health is a monthly solicited column from the public health community and is coordinated by HJMPH Contributing Editors Tetine L. Sentell PhD from the Office of Public Health Studies at the University of Hawai'i at Manoa and Donald Hayes MD, MPH from the Hawai'i Department of Health in collaboration with HJMPH Associate Editors Lance K. Ching PhD, MPH and Ranjani R. Starr MPH from the Hawai'i Department of Health.

Health research is essential to improving population health, including by improving health service organization and delivery. However, global inequalities in health research capacity exist. In countries where there is substantial need for health improvements and health services, there is often insufficient infrastructure, money, and human capacity to develop such research assets.¹ This phenomenon is known as the 90/10 gap, where 90% of the health research products are from countries with 10% of the world's problems.²

To resolve internationally-connected health issues, such as the recent Zika outbreak, and to address global health inequities, it is urgent that efforts are made to build research capacity across the 90/10 divide. These can include improving scientific mentorship, and building sustainable scientific collaborations. Such efforts can include groups of colleagues working together on grant-funded projects and/or co-authorship of scientific articles. Other models to strengthen capacity through international collaboration range from graduate or post graduate fellowship programs to institutional collaborations within and between research institutions.³ Collaborative research is a potential way to improve health, scientific development, and reduce inequalities, particularly in many low and middle income countries.⁴

In this article, we describe a capacity building initiative using a bi-directional model between the University of Hawai'i at Manoa (UHM) in Honolulu, Hawai'i and the Federal University of Rio Grande do Norte Santa Cruz campus (UFRN-FACISA) in Santa Cruz, Northeast Brazil. This project was designed to improve the knowledge about the relationship between adolescent pregnancy and adverse health outcomes in older aged adults in Northeast Brazil. It specifically includes a research infrastructure capacity-building aim, including training of masters and PhD students. The bi-directional model, in this case, is when there are fully open lines of communication and collaboration between two sites (Hawai'i and Brazil), where leadership, resources, and capacity are shared, including students' efforts and professors' knowledge. This article focuses

specifically on the perspective of four of the students involved in this project.

Capacity Building and International Collaboration between Northeast Brazil and Hawai'i

In 2017, Dr. Catherine Pirkle at the UHM and Dr. Saionara Câmara at the UFRN-FACISA obtained a Fogarty International Center grant to study adverse life outcomes from adolescent pregnancy in Northeast Brazil. This partnership between UHM and UFRN-FACISA has its roots in an enduring relationship between senior researchers from the Physiotherapy Department at UFRN and the Université de Montreal in Canada, where both Drs. Pirkle and Câmara had mentors. Due to this previous partnership, Dr. Pirkle and Dr. Câmara started working together as students. These two researchers, now both junior professors, have published papers about issues in women's health^{5,6} and were well poised to work together on an NIH grant. The current research project in the field of maternal and child health has a dual purpose: bolster capacity using a bi-directional model and conduct a pilot study on adolescent pregnant women.

UFRN and FACISA

UFRN is located in Northeastern Brazil, one of the most impoverished areas of Brazil. Similar to the geographic challenges faced by those in Hawai'i's rural communities, many students in Northeast Brazil struggle to attend university because of the distance and cost of going to school in the major city of Natal, where the main UFRN campus is situated. To deal with this issue, the Brazilian government has created satellite campuses in rural regions across Brazil to support educational opportunities. This is part of a policy that aims to spread teaching capacity across the country, as well as to generate employment and reinforce the health system in the countryside. One satellite campus is located in Santa Cruz, a small city in the state of Rio Grande do Norte, about 122 km from the state capital, Natal. Since

its inception in 2008, FACISA offers undergraduate courses in nursing, physiotherapy, psychology and nutrition. In 2016, they added two new master's courses: one in public health and another one in rehabilitation sciences.

Another important service located in Santa Cruz is the University Hospital, Ana Bezerra, that receives patients from Santa Cruz and the neighboring regions for obstetric and pediatric care. It also receives UFRN students from different health fields for clinical experiences. Currently, the maternity ward has around 51 registered beds and it receives patients from other communities as it is a referral hospital for maternal health and pediatrics.

University of Hawai'i at Manoa

The Office of Public Health Studies (OPHS) at UHM is located on the island of O'ahu, in the city of Honolulu. Similar to UFRN, the UHM is a part of a wider academic system, with community colleges and satellite campuses on neighbor islands. Diversity and international relations are two important university resources, hosting students from all 50 states and over 150 countries. OPHS also hosts students and faculty from across the world, offering its students both international opportunities and opportunities to work in local communities. In this way, the two institutions involved in this collaboration have important overlaps with regards to student learning opportunities.

Our Bi-directional Model — A Student Perspective

In the bi-directional model, students from both universities working on this project were given the opportunity to do an international exchange. The project started off by including two students as research coordinators, one from each university, to help with daily tasks and keep the project moving forward. Additional activities to increase capacity and involve students included professors from both universities, including a PhD student from Brazil, teaching a class of about 30 students at UFRN-FACISA in basic epidemiology, research methods and ethics, interview methods, and how to take clinical, anthropometric, and biomarker measures. At the end of the course, five students from this class were selected as interviewers for a research study about adolescent pregnancy. The rest of the students will be tracked to assess if and how the class has increased their academic and professional opportunities.

A team meeting was held in March 2017 where the researchers and students involved in the project could collaborate, network, and have a chance to see the study site and the surrounding area. Researchers from Canada, Hawai'i, Natal, Santa Cruz, and other parts of Brazil, all with diverse experiences in epidemiological studies and various scientific backgrounds, participated in this meeting. The team discussed many aspects of the grant, including the study questionnaires, translation nuances, recruitment and retention strategies for the pilot study, new directions for biomarker development, module development for training, learning from other studies like the Pelotas birth cohort,⁷ and the International Mobility in Aging Study,⁸ student involvement in

the project, branding and marketing, and action points and next steps. Students were intimately involved in this team meeting and could give input from past experiences in projects, learn how to run a team meeting and coordinate multiple site visits, and present in front of the large team.

For travel to UFRN and to UHM, students received some funding from the Fogarty grant. Additional support was received from the graduate office of UFRN, which helped provide some overhead to cover the March 2017 team meeting. The Brazilian government also provided support for one of the PhD students to study at UHM for 6 months as a short-term visiting scholar. OPHS helped support one Master's student's visit to the team meeting in UFRN through a travel scholarship awarded by the Budget Committee. Because of this funding, students were able to experience new countries and schools and meet people with whom they may have life-long professional and personal connections.

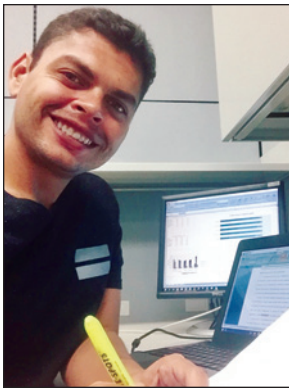
Future Bi-directional Model Applications

Using a bi-directional model for increased capacity building and networking can be helpful in other rural environments where health research capacity is limited. This model is most important in regions that have educational infrastructure, but lack resources such as adequate research funding and human resources around research to develop that specific capacity without additional input. A bi-directional model can easily be adapted into a multi-directional model with the introduction of more researchers and more collaboration opportunities. With the introduction of more researchers and collaborators, networks are expanded, as is the potential to build capacity. Under such models, students have the chance to be mentored by researchers with different backgrounds and a diversity of experiences. This project has included additional mentorship from researchers at The Hospital for Sick Children in Toronto Canada and the Federal University of Pelotas (UFPEL), Rio Grande do Sul, Brazil.

We now describe some of what each of the authors have gained specifically from the bi-directional model.

Cristiano Gomes

I am a PhD student in physiotherapy and short-term visiting scholar from UFRN staying at the University of Hawai'i for six months, under the direction of Dr. Catherine Pirkle within OPHS. As a PhD candidate, this program has offered me a multitude of great experiences. I have worked with a local team and have attended classes taught by UH professors, including courses on epidemiology, health policy, computer applications in statistics, and infectious diseases. Those courses are also taught at my home university, but from a different perspective. It was very interesting to be exposed to different teaching methodologies. The topics discussed in the infectious disease course were specifically useful, as Brazil is a tropical country where diseases like Dengue, Zika, and Yellow Fever are common. I hope to apply everything I have learned here with my own students when I return to Brazil.



Cristiano Gomes working on a literature review and data analysis at the OPHS office at UHM during his six month stay in Hawai'i.

At a personal level, taking part in this program also has its challenges. Finding yourself alone in another country can be hard; however, at the same time, it also gives you the chance to grow. This kind of program is about exchanging life experiences, meeting new people, learning a different language, and opening your mind to new cultures, flavors, colors, etc. Hawai'i has a very rich and unique culture, which offers an opportunity to rethink your own life, choices, and get stronger.

Jessica Filippoli

I recently completed an MPH in Epidemiology from UHM and the Office of Public Health Studies. I also worked as a research coordinator on this project. I had the opportunity to go to Brazil for a week through this project to visit the main campus of UFRN in Natal and the satellite campus in Santa Cruz (FACISA). I was lucky enough to stay with one of the PhD students working on the project. This experience gave me a different point of view of Brazil than I would have gotten as a tourist living in a hotel for the week.

My experience in Brazil, especially during the team meeting, helped to focus the experiences and learning I garnered during the previous 6 months collaborating with Dr. Pirkle and Dr. Câmara. Through my involvement, I have learned what it takes to build a research project from scratch and with an international component. It has made me want to continue to pursue a career in academia and research and has solidified my excitement and passion for public health. Engaging in the team meeting, pitching ideas to a room full of well-respected researchers, and having those ideas accepted is one of the best feelings a Master's student can have.



Jessica Filippoli with the research team in Natal, Brazil.

Ingrid Guerra

Being able to experience another culture is always enriching. This international exchange program has broadened my horizons and perceptions, and has given me the ability to learn about other languages, behaviors, and different social, political and economic issues. Having the chance to be a part of an international experience in the health field was enlightening because it gave me the opportunity to be informed about a new medical system. In addition, this type of international exchange opens the door to collaborate and learn scientific and personal skills from a diversity of experts in a different setting. And, I believe the opposite may be also true in that others may learn from me. Furthermore, new research partnerships and international collaborations have emerged with this experience, strengthening science and hopefully improving the health of different populations across the globe.

Undoubtedly, being a part of this kind of collaboration has brought me meaningful and enriching experiences in many areas-- personal, academic and professional. Plus, regarding public health, it offered me an overview of questions related to health and its determinants, as well as socio-economic, physical and individual environments.



Ingrid Guerra during her June 2017 visit to the University of Hawai'i.

Juliana Fernandes

I am a PhD student in the Physiotherapy Department at UFRN. I am working on this project as a research coordinator in Santa Cruz under direction of Dr. Câmara and Dr. Pirkle.

For me, being part of this team is a huge learning opportunity. In these last few months, I have been following the development of this bi-directional project, and for me it is a big responsibility to be part of this process. The PIs are very engaging and the way that they deal with adversity in this project is inspiring.

Because of this project, I have the chance to meet remarkable researchers in public health. Also, I attended a progress report meeting run by the Fogarty International Center for grants in Washington, D.C. in May 2017 that was assessing the progress of the projects over their first year. This meeting was a good opportunity to get to know different researchers from around the world and see what they are doing in the public health field. It



Juliana Fernandes at the NIH progress report meeting in Washington DC, beside the poster of the bi-directional model for the conference.

was a moment that showed me possible future paths. All these moments that I am living make me try to do my best and has confirmed my feelings about wanting to work more in public health research. This international experience has broadened my vision and widened my horizons in global health research. It is an honor to be part of this exciting project and I know that more amazing experiences will come.

Each of our experiences had one thing in common, building lasting relationships and networks with people from around the world who have helped to shape our academic careers. It is also clear that mentorship from wonderful professors such as Dr. Pirkle and Dr. Camara is essential in building and fostering these relationships. We have found that international travel, while not necessary, it is a valuable tool in understanding cultures, learning new practices, and growing as an academic. All of us have traveled internationally multiple times for school and it is unanimous that having those opportunities has broadened our perspective on cultures and people.

If someone were to ask how success would be measured from this project, we all would agree that success is in the friends we have gained, the mentoring that we have absorbed from all of the researchers, and being able to apply our knowledge from so many different backgrounds to help a research project flourish and learn so much in the process. Overall, one challenge that we came across that many other projects do is the financial aspect. There is never enough money to do exactly what we would dream to do in a project; however, the principle investigators have made it a point to make sure that the students involved have ample opportunity to travel for as low of a cost as possible because they both see that its very valuable to give us these experiences.

Conclusion

Bi-directional research creates opportunities for participants to learn, prosper, and work with others to solve shared problems. Exchanges create future leaders who instinctively appreciate the value of international collaboration, understanding, and empathy. Evaluations consistently show that foreign exchange participants

complete their academic programs with a better impression of their host country and its people. In turn, the communities who host the exchange participants build international partnerships of their own and gain a better appreciation of foreign cultures and values. All people involved in exchange programs, both participants and hosts, can then engage with those around them with regard to their new international exposure, creating vast lifelong benefits for all participants. Our experience demonstrates how universities in two different academic worlds can foster and participate in reciprocal collaboration and how bidirectional and multidirectional research models can help students grow and excel in academic and real-world settings. All of the students involved will be continuing to help out with the project, including staying in contact with each other on a professional and a personal level. There are some publications in process, which include all of the students and their specific interests in the project as well as some conference poster presentations in the United States and in Brazil. Even though we are located around the world, this project has worked well because there is a real drive to learn and grow across diverse perspectives from study leadership, students, and other collaborators. .

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THE WEATHERVANE

RUSSELL T. STODD MD; CONTRIBUTING EDITOR

SUMMERTIME IN THE OUTDOORS COULD BE TICKLISH.

A combination of factors will surely lead to a great summer for ticks. A milder winter in the northeast and upper midwest, plus a bumper crop of acorns enjoyed by a burgeoning mice population all lead to more ticks. According to Richard S. Ostfeld, senior scientist at Cary Institute of Ecosystem Studies, the severity of the tick season is directly related to the acorn production. The acorns are enjoyed by the mice, the initial hosts, and baby ticks latch on to the mice to be infected with Lyme Disease. The Connecticut Agricultural Experiment Station that includes Center for Vector Biology and Zoonotic Diseases has received over 800 ticks thus far with 38% testing positive for Lyme Disease. Average for the past five years is 27% for a full season. Lyme Disease is the most common vector-borne disease in the United States. According to the Centers for Disease Control and Prevention (CDC) there are more than 300,000 new cases of Lyme disease a year, about triple the rate two decades past. Most cases are in the Northeast, mid-Atlantic region and Upper Midwest states. It is less common on the West Coast where it is spread by a western black-legged tick. For Lyme disease to be transmitted, the tick usually has to be attached for 24 to 48 hours, so do not fail to perform tick checks after each day in the outdoors. Many Lyme disease patients never see a tick, so diagnosis of the disease can be difficult. So, wear long stockings, tuck in trousers, and be aware.

THEY ARE UDDERLY PAMPERED.

American dairy cows are among the worlds most productive. A single cow can produce 10.3 metric tons of milk, on average in 2016, according to the US Department of Agriculture. That would supply 150 people for a year, almost 40% greater yield than 20 years ago. America's dairy farmers believe that a happy cow is a cash cow, so they treat them as dairy queens. They play soothing classical music in milking rooms, use fans and sprinklers to mimic spring breezes, and provide robotic back-scratching sessions. The cow goes for milking to a squad of robotic milkers when she feels like it. She enters a pen with self-guiding mechanical arms set to work cleaning, massaging and milking her udders using lasers and brushes while the robot distracts her by serving fresh food. Each cow is milked about three times a day. Farmers want their cows to rest 12 hours a day to maximize output, so these ladies get water beds to protect their legs. The production cycle usually lasts from three to seven years and then most dairy cows become ground beef, but hey, it's a great life while it lasts.

DROP OUT OF HIGH SCHOOL AND DIE BEFORE YOUR TIME.

After many years of decline a startling development shows that the mortality rate for white, middle-aged Americans is on the rise. Two Princeton economists, Anne Case and her Nobel-winning husband Angus Deaton, produced a follow-up paper to their 2015 landmark study, showing that the picture is growing worse. Blacks have long had a much higher death rate than whites, but that has dropped since year 2000 while the white rate has crept up. Driving the rise for whites are increases in "deaths of desperation" – drugs, alcoholism, liver disease and suicide. The opioid epidemic has further heightened a trend already under way. Death rates for white non-Hispanics with a high school education or less now exceed those of blacks overall. By contrast, the mortality rate has continued to decline this century for whites with a college degree "This doesn't seem to be about current income," Ms. Case said, but more about accumulating despair. She believes the problem is rooted both in worse job opportunities and increasing social dysfunction. These changes occurred in tandem with a decline in marriage, children born out of wedlock, temporary relationships and social isolation. Overall, the economists paint a sorry picture for a broad swath of white adults.

PERHAPS YOU CAN FIND YOUR FATE — IF YOU WANT TO.

The Food and Drug Administration (FDA) approved the first direct-to-consumer genetic testing of personal risk of contracting ten serious conditions. Now patients can determine the possibility of developing Parkinson's disease, late onset Alzheimer's, celiac disease and hereditary thrombophilia, a blood clotting condition. The product is offered by a closely held genetics testing company 23andMe Inc. About two million people have bought a test from 23andMe whose products include an ancestry test for \$99 and a combined health and ancestry test for \$199. Customers will soon be able to get information about their risk for the 10 diseases included in the \$199 package. The company located in Mountain View, California, emphasizes that in all cases the test does not describe a persons overall risk of developing the disease in question. Other factors, like personal life style and environment, may also be important.

IF AT FIRST YOU DON'T SUCCEED —

In Heisingborg, Sweden, Samuel West announced his "Museum of Failure," a collection of innovative missteps that might serve as an inspiration for future successes; sort of, don't try this. Among his initial exhibits, Harley-Davidson's 1995 line of colognes; coffee-infused Coca-Cola; the Bic "For Her" pen, because women's handwriting techniques are surely unique; and the Twitter Peek, a 2009 device that does nothing but send and receive tweets (might be revitalized with Trump administration).

COME ON COEDS; THERE IS A REAL SCIENTIFIC WORLD TO CHALLENGE.

While nearly half of all bachelor's degrees earned in the 2015-2016 academic year went to women, only 21% of undergraduate engineering degrees and an even smaller share were in computer science. Men are flocking to under graduate and graduate programs in computer science and engineering. More than twice as many women received degrees in psychology last year as they did in computer science, engineering and the physical sciences combined. The distaff side accounted for 77.6% of bachelor's degrees in psychology last year and earned 57.6% of all under graduate degrees across disciplines in the academic year. School officials are frustrated and increasingly offer special boot camps, internships, and mentoring opportunities to boost ranks of women in these fields. So far, it is much more fun to study psychology, and ignore that heavy-duty math science stuff.

ADDENDA

- The sun's diameter is 109.12 times the diameter of the earth.
- There is one slot machine in Las Vegas for every eight inhabitants.
- Nancy Reagan had agreed to be the world's first artificial heart donor.
- Ask not what you can do for your country; ask what's for lunch.
- It's no longer a question of staying healthy. It's a question of finding a sickness you like.

ALOHA AND KEEP THE FAITH *rts*

(Editorial comment is strictly that of the writer.)

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