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HE HULIAU 2012 - ADVANCING NATIVE HEALTH AND WELLNESS



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Guest Editor's Message

Aloha kakou!

It's our pleasure to invite the Hawai'i Journal of Medicine and Public Health (HJMPH) readership to this special issue of selected papers on health disparities among Native Hawaiians, Pacific Islanders, and Native Peoples in Hawai'i and the Pacific region. Many of these papers were presented at our most recent health disparities conference perennially referred to as "*He Huliau ~ a Turning Point*". The 2012 He Huliau Conference was particularly memorable as our Center for Native and Pacific Health Disparities Research partnered for the first time with the Association of American Indian Physicians (AAIP) to jointly share the overall theme of the conference "Advancing Native Health and Wellness."

More than 350 people attended our joint *He Huliau* and AAIP co-sponsored conference in Anchorage, Alaska from July 31 to August 5, 2012. (http://www2.jabsom.hawaii.edu/native/conf_anhw2012.htm) This special issue honors the many friendships, collaborations and shared memories of all attendees, Native (Alaska Native, American Indian, and Native Hawaiian) health professionals, traditional healers, tribal doctors, cultural practitioners, faculty, students, researchers, and community participants who shared their knowledge, skills, and wisdom.

We dedicate this issue to the many voices and faces that took part in our "Advancing Native Health and Wellness" conference. A special *mahalo piha* (true gratitude) to Dr. Donna Galbreath and Dr. Marjorie Mau for serving as Co-Chairs of the conference. Both chairs provided deliberate leadership and enduring patience before, during, and following the conference event!

The papers in this special issue similarly reflect the qualities of the 2012 Conference Co-Chairs: Purposeful and focused while mindful of needed stamina, and participation of diverse communities. The overall scientific theme of this special issue is health disparities with a focus on metabolic syndrome conditions such as obesity, diabetes, stroke, and heart disease in Native Hawaiians (NHs), Pacific Islanders (OPIs) and other Native Peoples in the Pacific.

Overview of Papers

Two manuscripts describe the impact of Type 2 Diabetes Mellitus (T2DM) on hospital outcomes in patients with ischemic stroke (Nakagawa, et al) and on the prevalence of preventable hospitalizations for T2DM complications (Sentell, et al) comparing multiple racial and ethnic groups in Hawai'i. These results reaffirm known health disparities in some minority populations (NHs and OPIs) but also highlight diversity in health outcomes in which some Asian populations (Japanese and Chinese) may have a lower burden of disease compared with Whites. This simple fact about racial and ethnic diversity even within government defined racial categories has been increasingly recognized in recent publications and suggests that further disaggregation of racial/ethnic categories may be on the rise.

Heart disease remains the top cause of mortality in the USA and in NHs and OPIs. Mau, et al, examines the risk factors associated with heart failure severity, a leading cause of hospitalization, in a population of NHs and OPIs. Their results suggest modifiable risk factors that may help to reverse the excess burden of cardiomyopathy in NHs and OPIs.

We are especially delighted to include two manuscripts that include the wisdom and perspectives of traditional healers and cultural practitioners. Look, et al, provides the perspectives or *mana'o* (thoughts) of a select group of highly regarded hula practitioners. Their insights on the holistic health derived from practicing the art and discipline of hula are inspiring. Dillard and Carpenter, et al, share the experience of Na Lomilomi O Papakolea (The lomilomi practitioners of Papakolea) in a special "Case Report from the Field" that describes an integrated approach of traditional healing and western medicine. Both papers remind the reader of how bridging both worlds can enhance the health of patients and entire communities who are seeking wellness.

Kaholokula, et al, and the PILI 'Ohana Partnership provides an in-depth look into how grassroots communities have played a key role in addressing health disparities in their families and communities by developing a special partnership between academia and communities to address concerns identified by the communities themselves. Now in its 9 years of existence, the PILI 'Ohana partnership has served as a model for meaningful relationships that extend way beyond research ... and delves into taking ownership of one's own health and wellness. Similarly the case study by Okihiro, et al, on the largest federally designated community health center in Hawai'i, the Waianae Coast Comprehensive Health Center (WCCHC), and their journey to bring organizational capacity to a disadvantaged community is a powerful message that is worth repeating many times over. From science in diverse clinical settings to cultural practitioners to organizational capacity and community relationships ... we hope that this special issue reminds you of the diversity of health and wellness that exists in our Native Hawaiian and multi-ethnic communities in Hawai'i. We hope that you are inspired by the innovative approaches and ideas that have been shared to overcome challenges in health inequities to achieve a state of being ... we refer to as *PONO*.

With warmest aloha for all that have journeyed with us in the past, present, and into the future,

Marjorie K. Leimomi Mala Mau MD, MS, FACP
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Impact of Diabetes on Prolonged Hospital Stay among Native Hawaiians and other Pacific Islanders with Ischemic Stroke

Kazuma Nakagawa MD; Megan A. Vento BS; Marissa M. Ing MSW; and Susan M. Asai MSN

Abstract

Recent evidence suggests that minority groups have prolonged hospital stays after ischemic stroke. However, disparities in the hospital stay after ischemic stroke among Native Hawaiians and other Pacific Islanders (NHPI) have not been studied. A retrospective study on consecutive patients hospitalized for ischemic stroke at a single tertiary center in Honolulu between 2008 and 2010 was performed. Logistic regression analyses were performed to assess the independent predictors of prolonged hospital stay (hospitalization > 12 days after admission) after ischemic stroke. A total of 740 patients (whites 22%, Asians 53%, NHPI 21%, others 4%) hospitalized for ischemic stroke were studied. NHPI were significantly younger (59 ± 14 years vs 72 ± 13 years) and had significantly higher prevalence of female sex (51% vs 38%), no insurance (10% vs 4%), diabetes (53% vs 18%), hypertension (82% vs 62%), obesity (55% vs 20%) and prolonged hospital stay (20% vs 11%), and lower prevalence of residence outside of O'ahu (12% vs 23%) compared to whites. Univariate analyses showed that NHPI were more likely to have prolonged hospital stay (OR 1.87, 95% CI: 1.01, 3.49) compared to whites. After adjusting for age, sex, race, risk factors, health insurance status, and geographical factor, diabetes (OR 1.76, 95% CI: 1.07, 2.89) was the only independent predictor of prolonged hospital stay. NHPI are associated with prolonged hospitalization after ischemic stroke. However, this effect was attenuated by the impact of diabetes. Further prospective studies are needed to understand the relationship between diabetes and prolonged hospital stay after ischemic stroke.

Keywords

Native Hawaiians, Pacific Islanders, Ischemic stroke, hospital stay, health disparities

Introduction

Stroke occurs in approximately 800,000 people annually in the United States and is the leading cause of disability among adults.¹ Recent evidence suggests that the burden of ischemic stroke is not borne equally by all, with racial minority groups reported to have a higher burden of stroke risk factors and younger age of stroke onset compared to non-Hispanic whites.²⁻¹⁰ Furthermore, minority groups with ischemic stroke have been reported to have longer hospital stay compared to non-Hispanic whites.¹¹ However, the impact of race on hospital stay after ischemic stroke among Native Hawaiians and other Pacific Islanders (NHPI) has not been studied. Therefore, we sought to assess racial differences and other correlates of hospital length of stay among a patient population admitted for acute ischemic stroke. We hypothesized that NHPI with ischemic stroke will have a higher rate of prolonged hospital stay compared to whites.

Methods

The Queen's Medical Center (QMC) is a 505-bed medical center located on O'ahu, the largest hospital in the state of Hawai'i and the tertiary referral center for the Pacific Basin (Hawai'i, American Samoa, the Commonwealth of the Northern Mariana

Islands, Micronesia, and the US territories of Guam). QMC has the only Joint Commission-certified Primary Stroke Center and the only Neuroscience Intensive Care Unit for the state of Hawai'i. Approval from the QMC Research and Institutional Review Committee was received to conduct a retrospective review of the prospectively collected QMC Get With the Guidelines-Stroke (GWTG-Stroke) database. Waiver of consent was obtained to conduct this study. The institutional stroke database, GWTG-Stroke registry, a national quality improvement initiative and stroke registry used by many participating hospitals nationwide,¹² was accessed to identify all patients hospitalized at QMC with a diagnosis of ischemic stroke between January 1, 2008 and August 31, 2010. Patient demographics, cardiovascular risk factors, health insurance status and the geographic location of their residence (O'ahu, other Hawaiian islands or others) were obtained from review of the electronic medical record. The race and ethnicity information were collected from the hospital's administrative database, and were obtained during the registration or admission process using two-part questions. First question was whether or not they are Native Hawaiian or Part-Hawaiian. The second question was an open-ended question to list one race that the patient most closely associated with, based on patient self-identification or family's identification if the patient was incapacitated. Each Asian race (ie, Japanese, Chinese, Filipinos, etc) was aggregated into one category called "Asian," and the Native Hawaiian/Part-Hawaiian and the Pacific Islander race were aggregated into one category, "NHPI," to increase the statistical power of analysis. Because of the low number of black and American Indian/Alaska native patients, these racial groups were combined with the "other" group. For the study, race was categorized as NHPI, Asian, white, or "other" race. Health insurance status was dichotomized to "no insurance" vs "insurance present." Location of residence was dichotomized to "O'ahu" vs "Others" (any other location except the island of O'ahu, including outer Hawaiian islands (Hawai'i, Maui, Kaho'olawe, Lana'i, Moloka'i, Kaua'i, Ni'ihau), mainland United States and foreign country). The patients were considered to be obese if body mass index (BMI) was greater than or equal to 30 kg/m².¹³ Prolonged hospital stay was defined as greater than 12 days to be consistent with prior literature.¹⁴

Statistical Analysis

Data were analyzed using commercially available statistical software (SPSS 20.0, Chicago, IL). Patient characteristics were summarized using descriptive statistics appropriate to variable type. In the univariate analyses, the effect of race on the prevalence of each cardiovascular risk factor, health insurance status,

geographical location of residence, prolonged hospital stay, and in-hospital mortality for each racial group was assessed by performing a separate logistic regression analysis for each categorical variable after entering race (whites as a reference group) as the covariate. For normally distributed continuous variables (age and hospital LOS), analysis of variance (ANOVA) was used to compare each race to the reference group (whites). A final model for prolonged hospital stay was created using the logistic regression model, adjusted for age, sex, race, insurance status, and Hawaiian island of residence and cardiovascular risk factors. The odds ratio (OR) and 95% confidence interval (CI) were calculated from the beta coefficients and their standard errors. Age was used as a continuous variable with a constant OR for each year. Levels of $P < .05$ were considered statistically significant.

Results

Between 2008 and 2010, a total of 740 patients (whites 22%, Asians 53%, NHPI 21%, others 4%) hospitalized for ischemic stroke at QMC were identified. Unadjusted comparison between NHPI and whites showed that NHPI were significantly younger (59 ± 14 years vs 72 ± 13 years) and had significantly higher prevalence of female sex (51% vs 38%), no health insurance (10% vs 4%), diabetes (53% vs 18%), hypertension (82% vs 62%), obesity (55% vs 20%) and prolonged hospital stay (20% vs 11%), and lower prevalence of residence outside of O'ahu (12% vs 23%) compared to whites (Table 1).

Unadjusted and multivariable regression models predicting prolonged hospital stay are presented in Table 2. Unadjusted analysis of prolonged hospital stay showed that NHPI race (OR 1.87, 95% CI: 1.01, 3.49) and Other race (OR 2.69, 95% CI: 1.06, 6.86) were more likely to have prolonged hospital stay compared to whites. When adjusted for age, NHPI race (OR 1.73, 95% CI 0.90, 3.31) no longer became a significant predictor of prolonged hospital stay. In the full model, the only independent predictor of prolonged hospital stay after ischemic stroke was diabetes (OR 1.76, 95% CI: 1.07, 2.89).

Discussion

Although NHPI who were hospitalized for ischemic stroke had a higher prevalence of prolonged hospital stay compared to whites, this association was attenuated by the impact of diabetes, which was the only independent risk factor for prolonged hospital stay. Overall, NHPI were more than a decade younger and had a higher prevalence of cardiovascular risk factors, a finding similar to the results of other observational ischemic stroke studies that compared non-Hispanic whites to other minorities such as Maoris, Hispanics and blacks;^{4-7,15,16} and supports the idea that minority racial groups overall have a younger age of stroke onset and a higher burden of cardiovascular risk factors compared to whites.¹⁷ In the multivariable model, prolonged hospital stay was largely driven by the impact of diabetes, which was highly prevalent among the NHPI. The results of this study are similar to the prior studies that have shown the significant

impact of diabetes or hyperglycemia on prolonged hospital stay in patients with ischemic stroke,^{18,19} CHF exacerbation,²⁰ cardiac surgery,²¹ and other acute medical conditions.²²

The exact mechanism of how diabetes affects the hospital stay after ischemic stroke is unclear and may be multi-factorial. Since diabetic patients with ischemic stroke have been shown to have worse disability and overall functional outcome than non-diabetic patients,²³⁻²⁷ they may require longer hospital stay for inpatient rehabilitation treatments prior to hospital discharge compared to non-diabetic stroke patients. Animal studies also suggest that diabetes impairs cortical plasticity and functional recovery after ischemic stroke,^{28,29} and support the idea that diabetic stroke patients may have slower or less optimal neurological recovery compared to non-diabetic stroke patients. Furthermore, diabetic patients are at higher risk for nosocomial infection such as urinary tract infection and pneumonia.^{30,31} Nosocomial infections that are acquired during hospitalization may also contribute to the prolonged hospital stay in some of the stroke patients. In fact, a prior study showed that diabetes and in-hospital infection are both independent predictors of prolonged hospital stay after ischemic stroke.¹⁸ Unfortunately, the institutional stroke registry does not have the in-hospital infection and complication data to address this possibility.

This study has several limitations. First, the data on the pattern of the ischemic strokes and intracranial/extracranial vascular anatomy were not available, and thus it is unclear if there are racial disparities in stroke etiologies (ie, lacunar strokes, intracranial/extracranial large artery diseases and cardioembolic strokes) that may have impacted the hospital length of stay. Second, the clinical data on glycemic control, diabetes-related complications, and hospital-acquired infection were not available and were not included in the final model. Thus, a potential difference in the duration of diabetes and the degree of glycemic control between different races could not be assessed. Third, the institutional database did not exclude repeat hospitalizations, and it is possible that individual patients were included in the database more than once. Lastly, due to the single-center study design, the results of this study may not be generalizable to other populations. Overall, QMC captures approximately 21% of all ischemic stroke hospitalization for the state of Hawai'i (data from Hawai'i Health Information Corporation). Because our institution is a tertiary referral center, there may have been a referral bias toward more severe stroke patients with more extensive co-morbidities that may have impacted the hospital length of stay.

Conclusion

NHPI are associated with prolonged hospitalization after ischemic stroke. However, these racial differences were not independently significant when the impact of diabetes was taken into account. Further prospective studies are needed to understand the relationship between diabetes and prolonged hospital stay after ischemic stroke.

Table 1. Clinical characteristics of ischemic stroke patients (2008-2010)				
	Whites [†]	Asians	NHPI	Others
No. of patients	166	389	154	31
Age, years	72 ± 13	72 ± 14	59 ± 14*	57 ± 16*
Female	63 (38)	208 (54)*	79 (51)*	10 (32)
No insurance	6 (4)	27 (7)	15 (10)*	0 (0)
Residence outside of O'ahu	38 (23)	26 (7)*	19 (12)*	3 (10)
Risk factors				
Diabetes mellitus	30 (18)	125 (32)*	81 (53)*	9 (29)
Hypertension	103 (62)	289 (74)*	126 (82)*	21 (68)
Atrial fibrillation/atrial flutter	30 (18)	63 (16)	19 (12)	2 (7)
Congestive heart failure	5 (3)	10 (3)	7 (5)	0 (0)
Previous stroke or TIA	15 (9)	47 (12)	19 (12)	2 (7)
CAD or prior MI	42 (25)	70 (18)	31 (20)	4 (13)
Smoking	21 (13)	55 (14)	30 (20)	8 (26)
Obesity	26 (20)	32 (11)*	68 (55)*	5 (23)
Hospital LOS, days	9 ± 20	7 ± 6	11 ± 21	10 ± 12
Prolonged stay (>12 days)	19 (11)	45 (12)	30 (20)*	8 (26)*
Mortality	10 (6)	38 (10)	10 (7)	2 (7)

[†]Asians, Native Hawaiians and other Pacific Islanders (NHPI), and Others were compared to whites (reference group). TIA, transient ischemic attack; CAD, coronary artery disease; MI, myocardial infarction; Obesity = body mass index ≥ 30 kg/m²; LOS, length of stay. Data are n (%) or mean ± SD. *P < .05 compared to whites.

Table 2. Multivariable models for Prolonged Hospital Stay (>12 days)			
	Model 1 Unadjusted OR (95% CI)	Model 2 Adjusted for Age OR (95% CI)	Model 3 Fully Adjusted OR (95% CI)
Race [†]			
Asians	1.01 (0.57, 1.79)	1.01 (0.57, 1.79)	0.90 (0.47, 1.70)
NHPI	1.87 (1.01, 3.49)*	1.73 (0.90, 3.31)	1.57 (0.74, 3.34)
Others	2.69 (1.06, 6.86)*	2.45 (0.93, 6.41)	2.72 (0.92, 8.02)
Age		0.99 (0.97, 1.01)	0.99 (0.97, 1.01)
Female			0.87 (0.54, 1.41)
No insurance			1.45 (0.60, 3.48)
Residence outside of Oahu			0.94 (0.45, 1.99)
Diabetes mellitus			1.76 (1.07, 2.89)*
Hypertension			0.77 (0.45, 1.31)
Atrial fibrillation/atrial flutter			1.24 (0.66, 2.34)
Congestive heart failure			1.77 (0.59, 5.37)
Previous stroke or TIA			1.06 (0.51, 2.17)
CAD or prior MI			1.08 (0.60, 1.92)
Smoking			0.88 (0.45, 1.72)
Obesity			0.63 (0.34, 1.17)

Logistic regression model for prolonged hospital stay after ischemic stroke. [†]Asians, Native Hawaiians and other Pacific Islanders (NHPI), and Others were compared to whites (reference group). *Odds ratios (OR) were statistically significant at P < .05. TIA, transient ischemic attack; CAD, coronary artery disease; MI, myocardial infarction; Obesity = body mass index ≥ 30 kg/m².

Conflict of Interest

None of the authors identify any conflict of interest.

Disclosure

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Disparities in Diabetes-Related Preventable Hospitalizations among Working-Age Native Hawaiians and Asians in Hawai'i

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Abstract

Elderly (65+) Native Hawaiian, Filipino, and Japanese men and Filipino women have a higher risk of diabetes-related potentially preventable hospitalizations than Whites even when demographic factors and the higher diabetes prevalence in these populations is considered. The study objective was to determine if similar disparities are seen among the non-elderly (< 65). We used discharge data for all non-maternity hospitalizations by working-age adults (18-64 years) in Hawai'i from December 2006 to December 2010. Annual diabetes-related preventable hospitalization rates (by population diabetes prevalence) were compared by race/ethnicity (Japanese, Chinese, Native Hawaiian, Filipino, and White) and gender. Adjusted rate ratios (aRR) were calculated relative to Whites using multivariable models controlling for insurer, comorbidity, residence location, and age. After adjusting for ethnic-specific prevalence of diabetes and demographic factors, preventable hospitalization rates were significantly higher for Native Hawaiians males (aRR: 1.48; 95%CI: 1.08-2.05) compared to Whites, but significantly lower for Chinese men (aRR: 0.43; 95%CI: 0.30-0.61) and women (aRR: 0.18; 95%CI: 0.08-0.37), Japanese men (aRR: 0.33; 95%CI: 0.25-0.44) and women (aRR: 0.34; 95%CI: 0.23-0.51), and Filipino men (aRR: 0.35; 95%CI: 0.28-0.43) and women (aRR: 0.47; 95%CI: 0.36-0.62). Rates for Native Hawaiian females did not differ significantly from Whites. Disparities in diabetes-related preventable hospitalizations were seen for working-age (18-64) Native Hawaiian men even when their higher population-level diabetes prevalence was considered. Further research is needed to determine factors affecting these disparities and to develop targeted interventions to reduce them. Significantly lower preventable hospitalization rates were seen among Asian groups compared to Whites. A better understanding of these findings may provide guidance for improving rates among Asian elderly as well as other non-elderly groups with disparities.

Keywords

Diabetes, Asians, Pacific Islanders, Hospitalizations

Native Hawaiians and many Asian American populations have higher rates of diabetes than Whites and suffer disproportionately from diabetes-related morbidity and mortality.^{1,2} This is due, in part, to limited access to high-quality, culturally relevant primary care for these groups.^{1,2} Preventable hospitalizations are defined by the Agency for Health Care Research and Quality (AHRQ) as those that could have been potentially avoided, particularly with better access to primary care.³ As the reduction of preventable hospitalizations has the potential to both reduce costs and increase health care quality, these are a focus of considerable recent policy and clinical action.^{4,5} Four of the AHRQ preventable hospitalization types include diabetes-related conditions. These are hospitalizations for uncontrolled diabetes, short-term diabetes complications (eg, ketoacidosis, coma), long-term diabetes complications (eg, renal, eye) and lower-extremity diabetes-related amputations.³ Among individuals 65 years and older, disparities have been identified for these diabetes-related preventable hospitalizations (DRPH) in Native Hawaiian

men, Japanese men, and Filipino men and women compared to Whites even when other factors, including the higher diabetes prevalence among these groups, was controlled.⁶

Rates of DRPH among working-age Native Hawaiian and Asian groups are unknown. It is important to examine this issue for several reasons. First, the burden of diabetes is heavier among Native Hawaiian and many Asian groups at a younger age.^{1,2,7-10} Also, lost productivity and absenteeism due to poorly controlled chronic conditions among those 18-65 years present significant economic costs, as do diabetes-related hospitalizations.¹¹ Medicare also becomes generally available at age 65 and can provide more uniform access to care across racial/ethnic groups, which can decrease racial/ethnic disparities.¹² Finally, with diabetes on the rise in adolescence and young adulthood, long-term complications that can contribute to hospitalization may occur more often in working-age adults representing a major public health problem that needs further investigation in order to better design sustainable solutions.¹³

Few studies about diabetes-related preventable hospitalizations have examined high-risk minority populations such as Native Hawaiians and Asian subgroups. One recent study, mentioned above, focused on diabetes-related preventable hospitalizations specifically among Native Hawaiian and Asian elderly.⁶ Another recent study of preventable hospitalizations across disaggregated Pacific Islander and Asian American subgroup found strong evidence of disparities for some subgroups.¹⁴ However, this study did not consider working-age adults separately from the elderly, though they may have distinct patterns of preventable hospitalizations. Also, it focused on all types of preventable hospitalizations together, rather than looking specifically at diabetes-related hospitalizations, and did not control for gender, insurance status, or other factors that vary across Native Hawaiian and Asian American subgroups and might impact access to diabetes-related care and/or hospitalizations.^{1,2}

To fill in important gaps in the research literature, our study goal was to investigate disparities in the prevalence of diabetes-related preventable hospitalizations for working-age Native Hawaiians and Asian subgroups compared to Whites.

Research Design and Methods

Inclusion and Exclusion Criteria: We used data from all non-pregnancy hospitalizations in Hawai'i collected by Hawai'i Health Information Corporation (HHIC) for those aged 18-64 years from December 2006 to December 2010 (n = 193,082). We excluded hospitalizations: (1) without race/ethnicity including

data with Department of Defense as payer (n=193,082) and with other payers (n=3,963); (2) for patients not from one of the five largest ethnic groups (eg, Japanese, Chinese, Native Hawaiians, Filipinos, or White, n=33,808); (3) for individuals not from Hawai'i (n=5,917); and (4) involving transfers and unknown admission source (n=4,988). After exclusions, the number of eligible hospitalizations was 117,281. This study was deemed exempt from human subjects review by the University of Hawai'i IRB.

Diabetes-Related Preventable Hospitalizations (DRPH): HHIC collects detailed discharge data from all hospitalizations by all payers and the uninsured in Hawai'i.¹⁵ DRPH were defined with AHRQ diabetes-related preventable hospitalization definitions using ICD-9 diagnosis and procedure codes for (1) uncontrolled diabetes without mention of a short-term or long-term complication (ICD-9-CM principal diagnosis codes 250.02-250.03); (2) diabetes with short-term complications, eg, ketoacidosis, hyperosmolarity, coma (ICD-9-CM principal diagnosis codes 250.1-250.33); (3) diabetes with long-term complications, eg, renal, eye, neurological, circulatory, or complications not otherwise specified (ICD-9-CM principal diagnosis codes ; 250.4-250.93) and (4) lower-extremity diabetes-related amputations based on ICD-9 and procedure codes ICD-9-CM procedure codes for lower-extremity amputation in any field and diagnosis code for diabetes in any field.¹⁶ If a trauma diagnosis code was in any field, the amputation was not considered a DRPH. More detail about AHRQ definitions of preventable hospitalizations is available at http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi_guide_v31.pdf.

Race/Ethnicity: Race/ethnicity categorization was based on primary race as reported consistently across all hospitals.¹⁵ Individuals with multiple races were assigned to their primary reported race.

Control Variables: Analyses were stratified by gender. Control variables included age, Charlson comorbidity index (CCI),¹⁷ type of coverage (Medicare, Medicaid, Private, and Other), and location (O'ahu vs other Hawaiian island), all obtained from HHIC data.

Denominators: Our analyses estimated rate estimates with two distinct denominators. The first denominator was number of people in the state by race/ethnicity and gender. Rates calculated with this denominator estimated the total burden of DRPH for each subgroup. The second denominator was the estimated number of patients with diabetes in Hawai'i by race/ethnicity and gender.¹⁸ Rates calculated with this denominator estimated DRPH burden among those known to have diabetes and may reflect difference in quality and access to health care.^{18,19} Denominators were from the 2007-2010 Hawai'i Behavioral Risk Factor Surveillance System.²⁰ Four years of BRFSS data were combined to provide more reliable estimates for racial/ethnic and gender subgroups.

Statistical Analysis: Differences in patient characteristics among five race/ethnicity groups were examined using Chi-squared or Fisher's exact tests for categorical variables and one-way ANOVA or Kruskal-Wallis tests for continuous variables. We calculated unadjusted average annual rates of DRPH using population and disease prevalence denominators. Unadjusted rate ratios (RR) of DRPH and their 95% confidence intervals (95% CI) were estimated by comparing the unadjusted rate for each racial/ethnic and gender subgroup with that of Whites.

Multivariable negative binomial models were used to further adjust for age, gender, co-morbidity, residence on O'ahu, and insurer, providing adjusted rate ratios (aRR) for DRPH by race/ethnicity and gender. We ran models with population (Model A) and diabetes prevalence (Model B) denominators. For patients with multiple hospitalizations, patient characteristics from the first admission were used. As a sensitivity analysis, we also ran the multivariable adjusted models using the last admission. We found no substantive differences in results and only findings based on the first admission are reported here. All data analyses were performed in SAS 9.3 (Cary, N.C., 2011) and a two-tailed *P*-value of less than 0.05 was regarded as statistically significant.

Results

Over the four years, there were 2,531 diabetes-related preventable hospitalizations by 1,488 unique individuals. Among those with a DRPH, significant differences were found across racial/ethnic groups for most patient characteristics except for gender and the number of hospitalizations per patient (Table 1). The mean age at the time of DRPH for Native Hawaiians was 48.2 years, younger than for any other subgroup. There were also significant differences by race/ethnicity for all specific categories of DRPH.

Preventable Hospitalization Rates by Race/Ethnicity and Gender

For models in which population totals were used as denominators, substantial and significant disparities in unadjusted DRPH rates were seen for Native Hawaiians females (RR=2.51; 95% CI: 2.06-3.05) and males (RR=2.84; 95% CI: 2.41-3.34) compared to Whites (Table 2).

After adjustment for age, insurer, residence location, and comorbidity, significant disparities remained for Native Hawaiian females (aRR=3.68; 95% CI: 2.54-5.32) as well as Native Hawaiian males (aRR=4.10; 95% CI: 2.92-5.76) compared to Whites. Rates were significantly lower for Japanese men (aRR=0.66; 95% CI: 0.49-0.89) and women (aRR=0.54; 95% CI: 0.36-0.82) as well as for Chinese women (aRR=0.27; 95% CI: 0.13-0.56) compared to Whites.

Preventable Hospitalization Rates Adjusting for Diabetes Prevalence

When the number of individuals with diabetes was used as the denominator (Table 3), differences in the unadjusted DRPH rate for Native Hawaiian females and males compared to White were no longer statistically significant.

Table 1. Patient Characteristics and Utilization for those with Diabetes-Related Preventable Hospitalization (DRPH) in Hawai'i from December 2006-December 2010 by Race/Ethnicity

	Chinese	Filipino	Native Hawaiian	Japanese	White	P-value ^a
	n (%)	n (%)	n (%)	n (%)	n (%)	
Number of patients	57 (3.8)	226 (15.2)	538 (36.2)	212 (14.3)	455 (30.6)	
Number of hospitalizations	83 (3.3)	375 (14.8)	991 (39.2)	295 (11.7)	787 (31.1)	
Female	18 (31.6)	100 (44.3)	229 (42.6)	83 (39.2)	181 (40.0)	.40
Payer						
Medicaid	11 (19.3)	55 (24.3)	182 (33.8)	26 (12.3)	146 (32.1)	.024
Medicare	11 (19.3)	59 (26.1)	134 (24.9)	59 (27.8)	83 (18.2)	<.001
Private	35 (61.4)	94 (41.6)	202 (37.6)	122 (57.6)	190 (41.8)	<.001
Other	0 (0)	18 (8.0)	20 (3.7)	___ ^b	36 (7.9)	<.001
Live on O'ahu = Yes	51 (89.5)	169 (74.8)	348 (64.7)	163 (76.9)	241 (53.0)	<.001
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Charlson comorbidity index	4.56 (3.49)	4.75 (3.28)	5.02 (3.13)	4.73 (3.09)	3.98 (2.92)	<.001
Age	53.86 (9.66)	49.43 (12.06)	48.17 (11.38)	51.67 (9.74)	49.08 (11.92)	<.001
Number of hospitalizations per patient	1.46 (1.89)	1.65 (2.22)	1.83 (2.48)	1.39 (1.06)	1.75 (2.15)	.12
	n (%)	n (%)	n (%)	n (%)	n (%)	
Types of DRPH						
Uncontrolled diabetes (DM)	___ ^b	19 (5.1)	24 (2.4)	___ ^b	35 (4.5)	.003
Short-term DM complications	30 (36.1)	129 (34.4)	336 (33.9)	70 (23.7)	339 (43.1)	<.001
Long-term DM complication	35 (42.2)	160 (42.7)	406 (41.0)	140 (47.5)	274 (34.8)	.002
Lower-extremity DM-related amputations	14 (16.9)	67 (17.9)	225 (22.7)	83 (28.1)	139 (17.7)	.001

^a P-values based on Chi-squared tests (or Fisher's exact tests) for categorical variables and one-way ANOVA or Kruskal-Wallis test for continuous variables.

^b Number too small (<10) to report.

Table 2. Unadjusted and Adjusted Rate Ratios of Individuals with Diabetes-Related Potentially Preventable Hospitalizations (DRPH) in Hawai'i for those 18-64 years from December 2006-December 2010 by Race/Ethnicity and Gender from Hawai'i Health Information Corporation Inpatient Data using population totals as the rate denominator.^a

	Population totals	# of unique individuals with DRPH ^b	Unadjusted annual rate by population x 10,000	Unadjusted Rate ratio by population totals, compared to whites [95% CI]	Adjusted Rate ratio by population, compared to white [95% CI]	P-value ^c
Model A						
Female						
Chinese	21,386	18	2.06	0.55 [0.34-0.90]	0.27 [0.13-0.56]	<.001
Filipino	71,323	100	3.43	0.92 [0.72-1.17]	1.03 [0.77-1.37]	.86
Native Hawaiian	59,968	229	9.35	2.51 [2.06-3.05]	3.68 [2.54-5.32]	<.001
Japanese	79,289	83	2.56	0.69 [0.53-0.89]	0.54 [0.36-0.82]	.003
White	118,856	181	3.73	1.00	ref	ref
Male						
Chinese	24,048	39	3.97	0.80 [0.57-1.12]	0.85 [0.58-1.25]	.4143
Filipino	70,467	126	4.38	0.89 [0.72-1.09]	0.91 [0.71-1.16]	.45
Native Hawaiian	53,937	309	14.03	2.84 [2.41-3.34]	4.10 [2.92-5.76]	<.001
Japanese	82,551	129	3.83	0.78 [0.63-0.96]	0.66 [0.49-0.89]	.007
White	135,936	274	4.94	1.00	ref	Ref

^a Based on first visit. No substantive difference in findings using last visit.

^b From Hawai'i Health Information Corporation analysis

^c Multivariable models adjusted for age, median Charlson Comorbidity Index, percentage of public insurer, and location of residence.

Table 3. Unadjusted and Adjusted Rate Ratios of Individuals with Diabetes-Related Potentially Preventable Hospitalizations (DRPH) in Hawai'i for those 18-64 years from December 2006-December 2010 by Race/Ethnicity and Gender from Hawai'i Health Information Corporation Inpatient Data using those with diabetes as the rate denominator.^{ab}

	# with diabetes in Hawai'i ^c	# of unique individuals with DRPH ^d	Unadjusted annual DRPH rate by # with diabetes in Hawai'i x 10,000	Unadjusted rate ratio by # with diabetes in Hawai'i, compared to whites [95% CI]	Adjusted Rate ratio by # with diabetes in Hawai'i, compared to white [95% CI]	P-value
Model B						
Female						
Chinese	1,323	18	33.32	0.30 [0.19-0.49]	0.18 [0.13-0.37]	.007
Filipino	4,942	100	49.55	0.45 [0.35-0.57]	0.47 [0.36-0.62]	< .001
Native Hawaiian	5,745	229	97.62	0.88 [0.73-1.07]	1.15 [0.81-1.64]	.43
Japanese	4,249	83	47.84	0.43 [0.33-0.56]	0.34 [0.23-0.51]	< .001
White	4,007	181	110.62	1.00	Ref	ref
Male						
Chinese	1,532	39	62.34	0.42 [0.30-0.59]	0.43 [0.30-0.61]	< .001
Filipino	6,174	126	49.98	0.34 [0.27-0.42]	0.35 [0.28-0.43]	< .001
Native Hawaiian	4,469	309	169.33	1.14 [0.97-1.35]	1.48 [1.08-2.05]	.02
Japanese	5,639	129	56.02	0.38 [0.31-0.47]	0.33 [0.25-0.44]	< .001
White	4,532	274	148.06	1.00	ref	ref

^a Multivariable models adjusted for age, median Charlson Comorbidity Index, percentage of public insurer, and location of residence.

^b Based on first visit. No substantive difference in findings using last visit.

^c From Hawai'i Department of Health Behavioral Risk Factor Surveillance System data.

^d From Hawai'i Health Information Corporation.

However, after adjustment for covariates, DRPH rates were significantly higher for Native Hawaiians males (aRR = 1.48; 95% CI: 1.08-2.05), but did not differ significantly for Native Hawaiian females (aRR: 0.88; 95% CI: 0.73-1.07). Compared to Whites, DRPH adjusted rates were significantly lower for all Asian subgroups [Chinese men (aRR = 0.43; 95% CI: 0.30-0.61) and women (aRR = 0.18; 95% CI: 0.13-0.37); Japanese men (aRR = 0.33; 95% CI: 0.25-0.44) and women (aRR = 0.34; 95% CI: 0.23-0.51); Filipino men (aRR = 0.35; 95% CI: 0.28-0.43) and women (aRR = 0.47; 95% CI: 0.36-0.62)].

Conclusions

Significant disparities in DRPH were seen for working-age Native Hawaiians, a group already known to have higher rates of diabetes.^{1,7-10} Crude rates more than twice as high as Whites were seen in both females and males. Also, the mean age was younger for Native Hawaiians (48.2 years) than for any other subgroup. For Native Hawaiian women, these disparities appear to be explained by higher prevalence of diabetes, but for Native Hawaiian men, they persisted after adjusting for prevalence. This study adds new evidence about the consequences of diabetes among Native Hawaiians and suggests that, among Native Hawaiian men under 65, interventions are needed not just to reduce prevalence but to ensure access to chronic care management and primary care in order to reduce diabetes-related preventable hospitalizations.

In contrast, for Asian subgroups, DRPH rates were notably lower than in Whites. This was true even before the higher diabetes prevalence in Asian groups was considered. Once diabetes prevalence was considered, rates were significantly lower for Chinese, Japanese, and Filipino men and women compared to Whites. In Hawai'i, Japanese and Chinese populations tend to have extremely strong health profiles as well as good access to health care.²¹⁻²³ In many cases, average health outcomes are better for Japanese and Chinese in Hawai'i than for Whites (and every other racial/ethnic group), presenting a distinct pattern compared to the continental United States. Thus, it is not surprising that among working-age individuals we did not see a disparity in diabetes-related preventable hospitalizations among Chinese and Japanese groups. However, for many, but not all, health outcome and access variables in Hawaii, Filipinos tend to show health disparities similar to Native Hawaiians.²¹⁻²³ Thus, it is useful to see that among working-age Filipinos no disparities in diabetes-related preventable hospitalization were seen compared to Whites as this was not necessarily an expected finding.

Further study would be useful to identify factors associated with reduced frequency of DRPH among non-elderly Japanese, Filipinos, and Chinese compared with Whites. These might include improved access to health care, home and social support, and health-related behaviors.² More extensive research on this topic would be particularly helpful as previous work

in the elderly (65+) found higher DRPH among Asian men compared to White men,⁶ which was unexpected based on the reasons discussed above. More research is needed to uncover underlying factors that might be affecting these differences in DRPH between elderly and non-elderly Asians.⁶

We also provide further evidence that using population totals versus disease prevalence totals as our denominator indicate different portraits of rates and of disparities.¹⁸ Both are valid estimates of a type of burden from preventable hospitalizations, but considering rates only using population totals may not fully illuminate disparities. Specifically in this study when only population size was considered, a large disparity was seen for diabetes-related preventable hospitalizations for Native Hawaiian women compared to White women. However, this disparity disappeared once the higher diabetes prevalence among Native Hawaiian women compared to Whites was considered. This suggests that a focus on decreasing diabetes prevalence among working-age Native Hawaiian to comparable rates to White women would also eliminate any disparities in diabetes-related preventable hospitalizations. However, our study finds that for Native Hawaiian men, equivalent diabetes rates would not be enough to eliminate disparities in diabetes-related preventable hospitalizations. Even when the higher diabetes rates among Native Hawaiian men compared to Whites were considered, a disparity in diabetes-related preventable hospitalizations was seen. This suggests that in efforts to reduce diabetes-related preventable hospitalizations for Native Hawaiian men, it is critically important to not only focus on diabetes prevention but also to ensure that all those with diabetes have access to strong, effective primary care as our findings underscore the fact that this is not necessarily the case currently.

This study also adds to the large evidence base showing the importance of disaggregating Asian American and Pacific Islander (AA/PI) subgroups in research generally and in diabetes and preventable hospitalization research specifically.^{2,6,14,24} Although previous research using combined AA/PI samples has not found significant DRPH disparities compared to Whites,²⁵⁻²⁷ we found significant disparities for Native Hawaiian men after disaggregating AA/PI subgroups.

There are several limitations to our study. As 40% of diabetes in the United States is undiagnosed,²⁷ underreporting of diabetes may impact our BRFSS denominator estimates and may differ by race/ethnicity. Interpretation of our results should take into account that it includes data from a single state and thus may not be generalizable to other US states. However, as access to culturally appropriate care may be worse for Native Hawaiian and Asian American groups in many other settings, our study may actually underestimate AA/PI disparities. Moreover, our analyses are based on administrative data, which has some general limitations,²⁸⁻³⁰ and lacks detail about some potential confounders, such as education, obesity, having a primary care provider, and diabetes duration.

Despite these limitations, we believe our study of over 2,500 DRPHs in a four-year period provides insight into subgroups of working-age adults who might benefit from improved primary care for diabetes. A disproportionate number of DRPHs were found among Native Hawaiians, particularly Native Hawaiian men.

These results have several implications for health care delivery as well as public health policy. First, reduced prevalence of diabetes among Native Hawaiians would significantly decrease DRPHs disparities. Second, for Native Hawaiian men under 65, interventions are needed not just to reduce prevalence but to ensure access to chronic care management and primary care in order to reduce diabetes-related preventable hospitalizations. Third, disaggregating AA/PI subgroups is important for revealing disparities and for designing effective interventions.^{1,2,14,24}

This study adds to growing body of knowledge aimed to reduce racial and ethnic disparities in diabetes among minorities, including Pacific Islanders and Asian Americans, and is consistent with the long term health policy goals of high quality, affordable health care that promotes equal and extended quality of life across all populations.³¹

Conflict of Interest

None of the authors identify any conflict of interest.

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Association of Modifiable Risk Factors and Left Ventricular Ejection Fraction among Hospitalized Native Hawaiians and Pacific Islanders with Heart Failure

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Abstract

Background: Heart Failure (HF) disproportionately affects Native Hawaiians and Other Pacific Islanders (NHOPIs). This study examines risk factors associated with left ventricular ejection fraction (LVEF) among 151 hospitalized NHOPI HF patients enrolled at a single tertiary care hospital between June 2006 and April 2010.

Methods: Enrollment criteria: (1) NHOPI by self-identification. (2) Age ≥ 21 yrs. (3) Diagnosis of HF defined: (a) left ventricular ejection fraction (LVEF) $\leq 40\%$ or LVEF $\leq 60\%$ with abnormal diastolic function and (b) classic HF signs/symptoms. LVEF was measured by echocardiography within 6 weeks of hospitalization. Clinical measures, medical history, and questionnaires were assessed using standardized protocols. Linear regression modeling was used to examine the association of significant correlates of LVEF, which were then included en bloc into the final model. A P-value $< .05$ was considered statistically significant.

Results: Of 151 participants, 69% were men, mean age 54.3 ± 13.5 years, blood pressure $112 \pm 20/69 \pm 15$ mmHg, and body mass index (BMI) 36.9 ± 9 kg/m². Twenty-five percent of participants were smokers, 45% used alcohol and 23% reported a history of methamphetamine use. Clinically, 72% had hypertension, 49% were diabetic and 37% had a prior myocardial infarction. Nearly 60% had moderate to severe LVEF ($< 35\%$). Higher LVEF was independently associated with female sex and greater BMI ($P < .04$) while pacemaker/defibrillator and methamphetamine use was independently associated with lower LVEF ($P < .05$).

Conclusions: Methamphetamine use and BMI may be important modifiable risk factors associated with LVEF and may be important targets for improving HF morbidity and mortality.

Introduction

Heart failure (HF) remains one of the leading causes of hospital costs and disproportionately affects racial and ethnic minorities compared with whites. Despite well known health disparities in heart disease and HF in particular, there remains a paucity of studies that have thoroughly examined the underlying cause of HF among high risk racial and ethnic minority populations.¹ Native Hawaiians and Other Pacific Islanders (NHOPIs) are known to bear an excess burden of heart disease morbidity and mortality and HF is a significant contributor.²⁻⁵ Yet it remains unclear as to why NHOPIs continue to suffer from increased heart disease disparities, including HF, when compared with other ethnic minority populations in the State of Hawai'i. A recent multi-ethnic study assessed incident cases of heart failure in six US communities over 4 years comparing White, African American, Hispanic and Chinese Americans and found that Chinese Americans (1.0/1000 person-years) had the lowest and African Americans the highest incident cases of HF (4.6/1000-person-years). However, the authors concluded that the increased incidence of HF in African Americans was largely related to

the higher prevalence of co-morbidities such as hypertension and diabetes as well as socioeconomic status.⁶ While among Hispanics and Whites (2nd and 3rd highest incidence of HF), increased left ventricular mass had a greater effect on etiology of HF. Although only four ethnic/racial groups were examined in this study, we have found similar differences between ethnic groups residing in Hawai'i in which underlying etiology of disease can vary across multiple ethnic groups and in several instances the Asian sub-group may actually out perform Whites as the "healthiest" racial group.^{7,8}

Thus, we were particularly interested in examining the clinical characteristics of HF among NHOPIs, as a group disaggregated from Asian Americans, to improve the granularity of our understanding of heart disease disparities among NHOPIs. In particular, NHOPIs with HF have been reported to develop HF at least 10 years earlier than the general HF population.⁹ Moreover, NHOPIs with HF were found to have a higher prevalence of methamphetamine use and some studies have even suggested that methamphetamine-induced HF may actually represent a reversible form of cardiomyopathy.¹⁰⁻¹³ To improve HF outcomes among NHOPIs, the Malama Pu'uwai Study (Caring for the Heart Study) a randomized control trial designed to test a culturally informed heart failure education program, was initiated at a single tertiary care hospital on Oahu, Hawai'i. The purpose of this study was to examine risk factors associated with left ventricular ejection fraction (LVEF) among hospitalized NHOPIs with heart failure (HF) at baseline in the Malama Pu'uwai Study. We chose to examine LVEF, a measurement of the percentage of blood ejected from the left ventricle per contraction, as it is commonly used to assess cardiovascular function. Cardiovascular function is important because it is associated with quality of life, prognosis, and ability to perform activities of daily living for patients living with HF.

Methods

The Malama Pu'uwai Study is a randomized control trial that is testing the efficacy of a culturally tailored HF education program to reduce re-hospitalizations and/or death compared to usual care among hospitalized NHOPI patients with HF. All subjects were recruited from a large, urban, university-affiliated tertiary care hospital within 6 weeks of a hospital discharge in which HF was listed either as the primary or secondary diagnosis. Only patients residing on O'ahu and Moloka'i were recruited for this study because of logistical considerations. Eligibility

criteria included: (1) Age ≥ 21 years old; (2) Ethnic/racial background self-identified as NHOPI (including Samoan, Tongan, Micronesian, other Pacific Islanders); (3) Clinical symptoms and signs of HF; (4) Left ventricular ejection fraction (LVEF) $\leq 40\%$ or $\leq 60\%$ with echocardiographic evidence of abnormal diastolic function. All participants gave written informed consent prior to enrollment.

Potential participants were recruited and enrolled through a stepwise process that was initiated at admission to the study hospital. On admission, patients were first screened by a trained cardiac nurse who identified potential patients based on whether they fulfilled the first three eligibility criteria. If so, the patient was then approached during the course of the index hospitalization by trained study recruiters who provided additional study information (design, duration, eligibility, etc) to the patient. If interested, patients were invited to contact the study office within 4-6 weeks following discharge or the study office would contact the participant for possible enrollment.

Between June 1, 2006 and April 30, 2010, the cardiac care service of the tertiary care study hospital admitted 1,033 patients. Of these cardiac service admissions, 506 patients were unavailable for study recruitment because they were admitted solely for ambulatory cardiac services, in/out surgery, etc, while 527 non-duplicated individuals were screened and found to meet initial demographic eligibility screening criteria. Of the 527 patients, 213 declined further information about the study, leaving 314 cardiac service inpatients (60%) that were willing to be contacted post-hospital discharge for possible study enrollment. Of the 314 NHOPI heart patients discharged, 135 patients (43%) declined study participation for the following reasons: (a) 8 patients died following hospital discharge, (b) 118 were unable to be contacted (disconnected phone number, wrong mailing address, moved away, etc) or later decided not to enroll in the study. Thus, 189 patients (60%) who had expressed a willingness to enroll and allow a thorough medical record review to formally determine study eligibility were contacted post-hospital discharge. Unfortunately, 21 patients who enrolled during the first 3 months of the study were later deemed ineligible after review of hospital medical records that revealed ineligibility such as serious illnesses that prohibited full participation in the study or required skilled nursing care at time of discharge ($n = 18$) or died prior to randomization ($n = 3$), or did not meet enrollment criteria ($n = 16$) and a single patient declined participation just prior to randomization ($n = 1$). Thus, 151 of the 189 NHOPI patients with heart failure, discharged from the index hospitalization (within 6 weeks) gave written informed consent, completed a baseline data examination and were formally randomized. Analysis of this baseline examination data serves as the primary focus of this paper.

Demographic information (eg, ethnicity, education, marital status) was self-reported at study entry. Clinical and anthropometric measurements (eg, blood pressure, pulse, height, weight, body mass index) were performed at enrollment according to standardized methods. Past and current medical history (eg, hypertension, diabetes, coronary artery disease), social his-

tory (eg, alcohol and smoking use) were obtained by patient self-reported and verified by medical record review of index hospitalization. Methamphetamine use was also assessed by self-report and verified by medical record review or positive toxicology screen. Trained interviewers administered the 10-item short form of the Center for Epidemiologic Studies of Depression (CES-D) and the 23-item Kansas City Cardiomyopathy Questionnaire (KCCQ).¹⁴

Data analysis was performed on all demographic, behavioral, clinical and cardiovascular factors and reported for the entire study population ($N = 151$) and stratified by sex (men and women) for descriptive purposes. Spearman correlation coefficient of all potential risk factors with LVEF was calculated. Linear regression modeling was performed using an en bloc approach to examine the association of significant correlates of LVEF adjusted for other covariates. P values $< .05$ were considered statistically significant. Data were analyzed using SAS version 9.1 (SAS Institute, Cary, NC).

Results

A total of 104 men and 47 women of NHOPI racial background ($N = 151$) were enrolled (Table 1). The mean age was 54.3 years, with men, on average, 4 years younger than women. Forty-four percent of patients were married and 36% had attended some college or attained a college degree. Smoking was reported in 25% of patients, any alcohol use within the past year in 45% and methamphetamine use in 23%, with men reporting a higher frequency of all 3 health behaviors compared to women (men vs women: smoking 27% vs 19%, alcohol 54% vs 26%, methamphetamine use 27% vs 15%).

Among recently hospitalized NHOPIs with HF, 72% reported a diagnosis of hypertension, nearly half (49%) had diabetes and more than one-third (37%) had a history of myocardial infarction (MI). (Table 2a) The mean BMI was 36 ± 9 kg/m², however, 15 participants (10%) are not included in this mean value because of weight in excess of 400 lbs. (the maximum limit of the weight scale) or inability to stand for height measurement. Thus, the mean BMI value is likely an underestimation of the true BMI for this population. Mean blood pressures were well within recommended treatment goals (< 130 mmHg systolic BP and < 80 mmHg diastolic) with mean values of 112 mmHg and 69 mmHg respectively.¹⁵ The most common class of HF medications used by patients were beta-blockers (72%), followed by diuretics (64%), and ACE/ARB medications (63%). Half of the patients were on aspirin and another 25% reported the use of warfarin for anticoagulation. The mean CES-D score was 10.1 in both sexes, which is consistent with elevated depressive symptoms. The mean KCCQ score was 62.3, similar to subjects with NYHA class II-III heart failure in a large cohort of outpatients with systolic dysfunction and similar to scores at 24-weeks following hospital discharge for more than 1400 HF patients in the Efficacy of Vasopressin Antagonism in HF Outcome Study with Tolvaptan (EVEREST) trial.^{16,17}

Nearly half (47%) of all patients had severe LVEF of $< 30\%$. (Table 2b) While another 11% were found to have moderate-

Table 1. Demographic and Behavioral Factors of Recently Hospitalized Native Hawaiians and Other Pacific Islanders with Heart Failure (N=151)

Characteristic	Women (n=47)	Men (n=104)	Combined (N=151)
Age (years, mean)	57.2	53.0	54.3
Marital status			
Married	15 (32%)	52 (50%)	67 (44%)
Divorced/Separated/Widowed	20 (43%)	27 (26%)	47 (31%)
Never married	12 (25%)	25 (24%)	37 (25%)
Education			
Less than H.S.	9 (19%)	18 (17%)	27 (18%)
High school	18 (38%)	52 (50%)	70 (46%)
Some college	9 (19%)	20 (10%)	29 (19%)
College graduate or more	11 (23%)	14 (13%)	25 (17%)
Smoking (in last 6 months)	9 (19%)	28 (27%)	37 (25%)
Alcohol (in last 12 months)	12 (26%)	56 (54%)	68 (45%)
Methamphetamine use (anytime)	7 (15%)	28 (27%)	35 (23%)

Table 2a. Clinical Characteristics of Recently Hospitalized Native Hawaiians & Other Pacific Islanders with Heart Failure (N=151)

Clinical Characteristic	Women (n=47)	Men (n=104)	Combined (N=151)
Systolic BP (mmHg, mean, SD)	114±27	112 ± 20	112 ± 20
Diastolic BP (mmHg, mean, SD)	68 ± 16	70 ± 14	69 ± 15
Pulse (bpm, mean, SD)	73 ± 16	74 ± 14	74 ± 15
BMI (kg/m ² , mean, SD)	37 ± 10	35 ± 9	36 ± 9
H/O Hypertension (self-report)	37 (79%)	72 (69%)	109 (72%)
H/O Diabetes mellitus (self-report)	24 (51%)	50(48%)	74 (49%)
KCCQ Scores**	62.7±23.0	61.5±25.5	62.3±23.7
CES-D scores*	10.1 ± 6.2	10.1 ± 6.8	10.1 ± 6.6
Heart failure medications			
Beta-blockers	31 (66%)	84 (81%)	115 (76%)
ACEI/ARBs [§]	29 (62%)	66 (63%)	95 (63%)
Diuretics	32 (68%)	65 (63%)	97 (64%)
Aspirin	21 (45%)	55 (53%)	76 (50%)
Warfarin	13 (28%)	26 (25%)	39 (26%)

* 10-item version of the Center for Epidemiological Studies – Depression (CES-D) = scores of > 10 indicates presence of symptoms consistent with depression.

** 23-item, self-administered Kansas City Cardiomyopathy Questionnaire (KCCQ) instrument quantifies physical function, symptoms, social function and quality of life for patients with HF. Summary score ranges from 0-100, with higher scores reflecting better health status.

[§] ACEI=Angiotensin-converting enzyme inhibitor; ARBs=Angiotensin receptor blockers.

severe LVEF (30%-34%). Thus, nearly 60% of all enrolled patients had severe (< 30%) to moderate-severe (30%-34%) left ventricular ejection fraction. Men were more likely to have moderate-severe to severe heart failure (61%) compared with women (32%). Thus, not surprisingly, more men report having a pacemaker or defibrillator (30%) compared with women (15%) since one of the clinical indications for placing an implantable cardiac defibrillator is severe reduction in LVEF.

Table 3 shows that higher left ventricular ejection fraction

(LVEF) was significantly associated with female sex and BMI, while history of implantable pacemaker/defibrillator, smoking, alcohol, and methamphetamine use were all associated with lower LVEF (all *P*-values < .03). After adjusting for age and all significant factors of LVEF, four risk factors remained statistically significant. Female sex and BMI remained positively associated with LVEF (all *P*-values < .04), while presence of pacemaker/defibrillator and methamphetamine use was associated with reduced LVEF (all *P*-values < .05). (Table 4)

Table 2b. Cardiovascular Disease (CVD) Characteristics of Recently Hospitalized Native Hawaiians and Other Pacific Islanders with Heart Failure (N=145)

CVD Clinical Characteristic	Women (n=47)	Men (n=104)	Combined (N=151)
Systolic Ejection Fraction (EF)*			
Mild (45%-60%)	11 (24%)	19 (19%)	30(20%)
Mild-moderate (40%-44%)	8 (17%)	4(4%)	12(8%)
Moderate (35%-39%)	8(17%)	11 (11%)	19(13%)
Moderate-severe (30%-34%)	3 (7%)	13 (13%)	16 (11%)
Severe (<=30%)	14 (30%)	55 (54%)	69 (47%)
Unknown	2 (4%)	0 (0%)	2 (1%)
H/O Myocardial Infarction	17 (36%)	39 (38%)	56 (37%)
H/O CABG	10 (21%)	21 (20%)	31 (21%)
H/O Pacemaker/Defibrillator	7 (15%)	31 (30%)	38 (25%)
H/O Atrial fibrillation	12 (26%)	21 (20%)	33 (22%)

* Systolic ejection fraction as determined by echocardiography, heart catheterization, or nuclear scan. Women n=46; Men n=102 due to missing values.

Table 3. Correlation of Potential Risk Factors of Left Ventricular Ejection Fraction (LVEF) in Recently Hospitalized Native Hawaiians & Other Pacific Islanders with Heart Failure (N=151)

Variable	Spearman's rho	P-value
Age	0.12	.15
Sex (female)	0.22	.006
Education	0.16	.06
Smoking (tobacco) [§]	-0.22	.008
Alcohol use [§]	-0.18	.03
Methamphetamine use [§]	-0.23	.006
Kansas City Cardiomyopathy Questionnaire (KCCQ) [§]	0.09	.27
Center for Epidemiologic Studies of Depression (CES-D) [§]	-0.05	.60
Body Mass (BMI) ^{§*}	0.28	.001
Systolic Blood Pressure [§]	0.09	.29
Diastolic Blood Pressure [§]	-0.11	.17
H/O Hypertension	0.05	.52
H/O Myocardial Infarction	0.02	.85
H/O CABG/PTCA	0.02	.84
H/O Rheumatic Heart Disease	-0.01	.89
H/O Atrial fibrillation	-0.09	.27
H/O Diabetes mellitus	0.05	.56
H/O Pacemaker/Defibrillator	-0.28	< .001

[§] = The following variables were analyzed with a reduced n because of missing data: smoking (n=148), alcohol use (n=148), methamphetamine use (n=147), KCCQ (n=139), CES-D (n=139), BMI (n=134), SBP (n=147), DBP (n=148).

* BMI, n=134 because of excessive weight >400 lbs. or because measured height was not possible (unable to stand due to wheel chair bound) by 15 participants.

Variable	Coefficient	STD error	P-value
Age (per 5 yr. increments)	0.05	0.10	.613
Sex (women referent)	5.08	2.47	.042
Smoking (yes)	-4.89	2.54	.057
BMI (per 1.0 kg/m ²)	0.32	0.12	.009
Pacemaker/Defibrillator inserted (yes)	-7.69	2.54	.003
Methamphetamine use (yes)	-6.13	3.03	.045

Discussion

This study provides initial results on risk factors for reduced LVEF in hospitalized NHOPIs with heart failure. Thus, it provides new insight into the diversity of HF risk factors in another racial/ethnic minority population at increased risk for HF disparities. Of note, we found that NHOPIs were approximately 10-15 years younger than the usual general HF population and this finding parallels similarities in US Blacks with HF.¹⁸ The high prevalence of depression symptoms and reduced quality of life scores are also consistent with existing studies in other HF populations. For example, high rates of CES-D-assessed depression symptoms were noted in other HF populations but CES-D scores were not significantly associated with severity of LVEF.¹⁹⁻²¹ Our results are also consistent with these prior studies.

After adjusting for significant correlates of LVEF, female sex and BMI remained independently associated with LVEF. Several studies have reported that HF outcomes and severity of HF measures are worse in men compared to women.¹⁸ Our study is consistent with these results and provides further validation of our findings in a NHOPI HF patient population. The association of higher BMI and improved HF outcomes (mortality) has been reported by Curtis, et al, in more than 7,000 HF patients.²² This “obesity paradox” has also been observed in several smaller HF cohorts and was recently examined by Padwal, et al, in a meta-analysis of more than 23,000 patients with HF to assess risk for mortality. The authors stratified patients according to reduced versus preserved LVEF and found that despite adjustment for confounders, BMI of 30.0-34.9 kg/m² resulted in the lowest mortality with a U-shaped mortality curve across both LVEF categories.²³ The authors discuss potential explanations for the consistent findings of an “obesity paradox” and propose that a more definitive study would be needed to address the role of obesity and mortality in HF patients. In our study, BMI was also paradoxically associated with a higher LVEF and this is consistent with the most recent meta-analysis study by Padwal, et al. Similarly, it remains unclear in our patient population of NHOPIs as to why BMI seems to be a protective factor despite the missing data of the extremely obese participants in our study cohort at baseline (n=15 missing BMI due to weight > 400 lbs).

We also found a significant association between lower LVEF and the presence of implantable pacemaker/defibrillator and methamphetamine use after adjusting for other covariates.

While the association of history of pacemaker/defibrillator was not unexpected, the significant association between prior methamphetamine use and LVEF was a consistent finding that has been reported by other studies. Ito, et al, conducted a retrospective review of medical records for patients younger than 45 years of age who were discharged from the hospital with HF and reported that methamphetamine users had a significantly lower LVEF (32.9% ± 11.3%) than non-users (44.6% ± 17.8%). Our results are consistent with the finding of methamphetamine use as an independent risk factor for reduced LVEF. Several other studies have also reported on the link between long-term methamphetamine use and cardiomyopathy that may be reversible.^{9,24-30} In Yeo, et al’s, case-control study of 107 HF patients younger than 45 years of age and discharged from a tertiary care medical center in Hawai‘i, 43% were prior or current methamphetamine users, who had a 3.7-fold higher odds ratio for cardiomyopathy after adjusting for age, BMI, and renal failure compared to non-users.¹⁰ Moreover, NHOPIs accounted for 54% of the cardiomyopathy patients who had used methamphetamine and, in general, NHs were more likely to have used methamphetamine by age 12 years old compared to other racial/ethnic groups.^{9,31} Several small studies have reported on cardiomyopathy associated with methamphetamine use as yet another cardiovascular insult (ie, hypertension and cerebrovascular disease) related to habitual use of methamphetamine. Won, et al, recently reviewed the effects of methamphetamine-associated cardiomyopathy (MAC) and noted that several gaps in our understanding of prevalence, incidence, pathophysiology and therapeutics remain unanswered.¹³ However, what is clear, is that MAC was a phenomenon first recorded in Hawai‘i and other western regional states and has now slowly spread eastward across the United States. Thus, the authors recommend that greater recognition of MAC and how best to prevent and/or treat the condition be investigated as there is likely to be an increase of MAC with increased use of methamphetamine-like substances across other regions in the United States. Our study results supports the idea that MAC remains a significant underlying cause of HF hospitalization especially among NHOPIs and is associated with reduced LVEF. For policy makers and health care providers, recognition of MAC within hospitalized HF patients is important for treatment and especially prevention of repeat hospitalization and for designing comprehensive

treatment approaches to improve LVEF by also addressing other chronic problems such as methamphetamine use.

Interpretation of our results should also consider the limitations of the study. All of the study patients were recruited from a single tertiary care hospital and were confined to one racial/ethnic group (NHOPIs), although this referral medical center is the largest in the State and its patient population approximates the ethnic distribution of the State's population (ie, 18% Native Hawaiian ancestry). Acquisition of illicit drug use, tobacco and alcohol use were all self-reported which may have led to an underreporting of these health behaviors. Despite this potential bias for underreporting, we still found a significant association between smoking, alcohol and methamphetamine use with lower LVEF and this association persisted only for methamphetamine use following adjustment for other significant factors.

In summary, our results suggest that diagnosed HF seems to occur 10-15 years earlier in this select population of hospitalized NHOPIs. The significant positive association of LVEF with female sex, higher BMI and a negative association with presence of pacemaker/defibrillator and prior use of methamphetamine is consistent with prior studies on methamphetamine use and HF. To our knowledge, this is the first cross sectional study to characterize a relatively large sample of NHOPIs with diagnosed HF, and to identify significant modifiable risk factors that may guide the development of programs aimed at reducing the burden of HF in NHOPIs and other high-risk populations. For example, programs designed to reverse these HF trends may need to consider how best to address not only smoking and alcohol use but also the challenges of methamphetamine use to prevent and/or treat HF in NHOPI patients. The obesity paradox found in this study similar to other studies needs further investigation. Among NHOPIs in which morbid obesity (>40 kg/m²) is estimated to affect 25%-30% of adults and increased CVD mortality is well known in this population, suggests that perhaps other aspects of weight beyond a single static measure may be important. As Miller described, the characteristics of individuals suffering from heart failure, such as NHOPIs often do not align with those of the participants in studies that determine practice guidelines.³² Thus, further studies of HF risk factors, etiologies, types, and treatments among high risk populations such as racial and ethnic minorities is needed to reverse the HF burden and trends observed in the US population and other countries with racially and ethnically diverse populations.

Conflict of Interest

None of the authors identify any conflict of interest.

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Kumu Hula Perspectives on Health

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Abstract

To prepare for research studies that would evaluate the impact of hula as part of a clinical intervention, including cardiovascular disease (CVD) prevention and management programs, kumu hula defined as "culturally recognized hula educators and experts," were interviewed. Investigators sought to elicit their views regarding hula's traditional and contemporary connections to health and well-being, assess the cultural appropriateness of such projects, and suggest ways to maintain hula's cultural integrity throughout clinical intervention programs. Six prominent kumu hula from five different Hawaiian Islands participated in semi-structured key informant interviews lasting between 60 and 90 minutes. Each was asked open-ended questions regarding their attitudes, beliefs, and experiences regarding the connections of hula to health as well as their recommendations on maintaining the integrity of the dance's cultural traditions when developing and implementing a hula-based CVD program. All kumu hula endorsed the use of hula in a CVD intervention program and articulated the strong, significant, and enduring connections of hula to health and well-being. Each kumu hula also recognized that health is the full integration of physical, mental, emotional, and spiritual well-being. When care is taken to preserve its cultural integrity, hula may be an effective integrated modality for interventions designed to improve health and wellness.

Keywords

Native Hawaiians, Hula, Health, Well-being, Medical Interventions; Cardiovascular Disease

Background and Objectives

It is well established that Native Hawaiians disproportionately have numerous health disparities, including having the highest cardiovascular disease (CVD) mortality rate in Hawai'i and one of the highest nationally.¹⁻³ Despite recommendations to incorporate strategies to optimize patient adherence to CVD prevention programs,^{4,5} there are few CVD prevention and treatment interventions tailored for this high-risk population. Guided by a community-based participatory research (CBPR) approach, the Native Hawaiian dance form of hula was selected as the basis for developing and evaluating two CVD interventions: (1) post-hospitalization cardiac rehabilitation (CR), and (2) community-based hypertension management.^{6,7} Investigators, along with community and cultural informants, believed that Native Hawaiian cultural practices, such as hula, could be used effectively and appropriately as a part of CVD and other clinical interventions, but that it was important to gather insight from recognized cultural experts.

Hula, the indigenous dance of Hawai'i, preserves significant aspects of Native Hawaiian culture, with strong ties to health and spirituality. *Kumu hula* which is defined as persons who are "culturally recognized hula experts and educators", maintain and perpetuate this cultural tradition.^{8,9} Originally performed to convey history and spiritual beliefs, hula is now commonly

practiced as a form of cultural and creative expression, and is comprised of specific controlled rhythmic movements that enhance or allude to the meaning or poetry of the accompanying songs or chants.¹⁰ While Native Hawaiians may have a cultural affinity for hula, dancers come from many different races and ethnicities, and hula is practiced by both men and women of all ages.^{11,12} There are at least 174 *halau hula* (hula schools) in Hawai'i led by *kumu hula* and nearly 1,100 schools of dance teaching hula worldwide with enrollment ranging from a dozen to several hundred students.^{13,14}

To prepare for a hula-based clinical intervention research and be consistent with CBPR principles and Native Hawaiian cultural protocols, key informant interviews were conducted with recognized and accomplished *kumu hula*. Specifically, the purpose of the interviews was to elicit *kumu hula* perspectives regarding hula's traditional and contemporary connections to health and well-being, assess the cultural appropriateness of the intervention, and to suggest ways to maintain hula's cultural integrity throughout the development and implementation of programs to prevent and manage CVD. To the investigators' knowledge, this is the first biomedical research study to scientifically examine the development of a clinical intervention based on hula.

Methods

Six prominent *kumu hula* were identified to participate in informant interviews. They were selected for gender balance, varied geographic location (5 different Hawaiian Islands) and hula lineage. Native Hawaiian culture gives special significance to genealogical heritage, and the transmission of knowledge within familial groups. This emphasis carries over to the cultural practice of hula where *kumu hula* strongly identify with the lineage of their training.¹⁵ Hula lineage can also have a connotation of particular expertise in specific dance repertoire, historic chants, and choreography. All *kumu hula* interviewed had extensive experience in providing hula training and education, were well-recognized authorities in hula, and acknowledged cultural resources for Native Hawaiian communities. Following accepted cultural norms, the *kumu hula* were first contacted by the investigators through a common acquaintance, if a current relationship did not exist.

Prior to the interview, the *kumu hula* were informed of the reason for the study: to use hula as basis for a CVD intervention. Each *kumu hula* was individually interviewed in person by a researcher and an assistant. Each interview included a series of open-ended questions soliciting opinions on (a) hula and health,

(b) a hula-based CVD prevention and management program, (c) ways to preserve cultural integrity, (d) teaching students with illness/disability, (e) ways to improve retention, and (f) appropriate hula repertoire. With the permission of informants, all interviews were recorded, with participants given editing authority to exclude material that, upon reflection, they preferred not to share widely. The interview sessions lasted between 60 to 90 minutes and were transcribed. Transcripts were evaluated using a thematic analysis method following standard qualitative methods.¹⁶ First, investigators reviewed all transcripts and established general domains determined from the context of the questions and the responses of the participants. Then, three members of the research team and a community member with hula training, independently reviewed the transcripts and identified repeating themes for each domain, and other themes that emerged with high frequency. Next, an investigator reviewed the transcripts to determine if additional themes or domains could be identified or clarified. Finally, the frequency of various themes was established through review of transcripts.

This paper presents a summary of findings from the first three areas of the interviews. While some of those interviewed expressed their views more succinctly than others, quotes in the discussion that follows are drawn from all those interviewed, with a minimum of two quotes and a maximum of five quotes drawn from any one interview. To preserve anonymity, each *kumu hula* is identified with a number in brackets. The study was approved by the University of Hawai‘i’s Institutional Review Board.

Table 1. Kumu Hula Participants Demographic Characteristics	
Description	n (%)
Gender	
Female	5 (83)
Male	1 (17)
Ethnicity	
Hawaiian	6 (100)
Non-Hawaiian	0 (0)
Age (Years)	
50 -60	3 (50)
61 - 70	1 (17)
71 - 80	1 (17)
80+	1 (17)
Years as Hula Educator (Years)	
31 - 40	5 (83)
41 - 50	
50+	1 (17)

Results

Interviews were conducted with 6 *kumu hula*, 1 male and 5 female with extensive experience teaching hula traditions, protocols, songs, chants and dances. All *kumu hula* were Native Hawaiian, most taught hula for 31-40 years, and one *kumu hula* had over 50 years of teaching experience (Table 1).

All *kumu hula* endorsed that hula could appropriately be used as part of a health intervention and conveyed that, with correct preparation and guidance, it could be conducted consistent within the parameters of the cultural practice. In addition, every *kumu hula* articulated that health is the full integration of the physical, mental, emotional, cultural, and spiritual facets of a person, a viewpoint that is consistent with traditional Hawaiian views of health. They expressed that the hula dance form affects all these health facets, particularly when hula is taught, practiced, and performed with traditional content and context in mind. One *kumu hula*, from Kaua‘i, put it very succinctly: *No. 2* “Hula is not only dance, it’s all of these things.” A second *kumu hula* elaborated: *No. 5* “I see a really great relationship between hula and health in all aspects of health, not just physical health, but mental and emotional health, spiritual health; and I think hula is one of the few physical activities where you can—just the mere fact of what hula incorporates, automatically, you are addressing all, all aspects of the human being and the human being’s health.”

However, acquiescing to the interview questions on specific sub-fields of health, *kumu hula* were willing to offer considerable insight into each area separately, allowing results to be discussed as somewhat distinct areas: (1) physical health; (2) mental health; (3) emotional and social support; (4) spiritual health; and (5) the importance of cultural integrity.

Physical Health

The first area discussed was physical health and hula. As one *kumu hula* described: *No. 4* “Now, if we look at hula for its physical benefit, I don’t think any hula dancer will say it doesn’t benefit them physically. It gets them more in tune with their bodies, every aspect—where your elbows are, where your knees are, where are your toes pointed, where’s your head, your chin up, your chin down, your eyes up, every part of your body is brought to your awareness...you get to know your body real quickly with hula...”

A *kumu hula* renowned for a dance style of vigorous physicality discussed how high levels of physical conditioning could be incorporated into hula training. One way described was through extended periods of continuous dancing; another was using weights on feet and hands. This *kumu hula* explained, *No. 1* “Well, actually it started with sandbags, that was when I was taking hula, but I do that in other classes, they put on two pound weights.”

Others discussed various physical aspects of hula training including: breathing exercises, spine alignment, foot placement, and stretching. Clearly to all *kumu hula*, physical conditioning was only one basic, though necessary, level of hula: *No. 2* “You have to start from scratch. When you build a house...you start

from the foundation and the house got to build up. And that's how I teach." Hula was seen explicitly as progressing through levels and stages: No. 4 "Like many things related to Hawaiian culture, there are levels and stages that you go through to acquire these three things and often times it starts with physical, it continues to intellectual, and then it continues to spiritual."

Mental Health

Kumu hula explicitly recognized that dancers must clear their heads of No. 1 "mind chatter" and to "get outside" of oneself. "You turn yourself over to the story. So it's not a self thing, it's more about the story that you're translating." This aspect of health with stress management implications, was explained in relation to simple rituals and routines: No. 5 "The mental health part of it to me, starts with leaving your slippers at the door. A routine, you know, which is what protocol is, it is a sequence of events that always happens the same way no matter what. So when you establish those routines, even if it's a routine of putting, leaving your slippers at the door, walking in and saying aloha, walking to the wall and putting your bag down, taking your pa'u (skirt) out and putting it on your bag, sitting in a circle. And then the protocol of standing up, and going into a line... Just those little things, it's really mental health because it helps the children, the students, anybody. It forces them to have some organization in their lives."

Most kumu hula commented on the cognition needed to properly learn hula. This involved not only remembering the sequence of foot patterns, body movements, and hand motions but also the appropriate understanding of the history, story, and poetry of each song or chant that accompanies each hula. The oldest kumu hula interviewed, who also had the longest teaching experience, emphasized that mental benefits were more important than physical benefits.

No. 6 "People think that hula is just physical and just exercise, but you have to know mentally what it means. It means many things. It means spiritual, all those kind of things. It makes you think a lot, if a student doesn't understand, I make them tell (ie, explain it to) me."

The kumu hula went on to describe observed improvements in memory retention, especially in older dancers, and how that ties into motivation for participation.

Emotional Health and Social Support

Kumu hula were aware of the importance of their students' emotional health and the importance for halau hula members to unconditionally support one another in a comfortable, relaxed atmosphere. No. 3 "I think sitting there and doing a hula will bring a smile to your face." This was seen as connecting emotional health to mental health: No. 5 "...when they come in, it has to feel like they're coming into a home... All the chants, all the preparation chants, that's to... morph you from your everyday self into your hula self, and...you transform slowly. And with everything you chant, and every piece of dressing that you put on, that's pulling you into your hula self, and that's letting go of your everyday self."

This connection between dancers also had an effect on their collective dancing which in turn reinforces the bond. No. 1 "I personally like to see that kind of thread working throughout the rows [of dancers], that's when you know that they are clicking. And they're all together in that kind of mental state, which strengthens that bond." Another kumu hula elaborated about the development of a supportive environment, No. 3 "They aloha you, you aloha them, you aloha what you doing, you aloha your teacher, you aloha the dance, you know. And then, when you finally get better, you aloha your health. And enjoy the journey, enjoy the journey." The cultural value of aloha^{17,18} was widely recognized as instrumental in the relationship of hula to health, connecting the kumu hula to students, and students to each other.

This also reflects the traditional Hawaiian practice of conflict resolution, ho'oponopono,^{19,20} a practice mentioned explicitly by one of the kumu hula: No. 2 "So when they were in any great trouble they would have ho'oponopono and they would come to me and I would gather, well I had one family that was getting a divorce. But we had ho'oponopono and got together and later on they stayed married for another 10 years; cause [now] they just got divorced and then she remarried. But all the time that the children and her was in the halau they put the family together."

Another kumu hula formalized this concept of "leaving conflict outside the door" by incorporating a formal entrance chant, a practice in classic hula training to help bring the dancer into focus and clarity which would be presented each time dancers entered their training area.²¹

No. 6 "Some of them have arguments with their husbands at home and when they come I see them crying. I say 'what happened to you?' She tells me she had a big argument and I tell her 'you know what, go leave it out my door. You come in clear, I don't want to hear about your husband, you leave that out there.' Then she comes inside and she feels better. But what I do...I make them chant before they come inside."

In the example mentioned, the entrance chant for the halau hula, reminds the students of their personal beauty, their relationship to the land on which they reside, their families, and to the value of aloha.

Spiritual Health

Regarding spiritual health, one kumu hula put it clearly: No. 5 "From a Hawaiian perspective, health isn't a scientific thing, it's a spiritual thing." It was clear for everyone interviewed; "spiritual health" encompasses all the other areas of physical, mental, and emotional health, and therefore was the aspect of health that was most important. This perspective was reinforced by a kumu hula who observed: No. 3 "Spirituality encompassed the entire life of Hawaiians. You wake up - you pray, you go outside—you pray, you build a house—you pray, you go to get things in the garden—you pray. They would pule (pray) for every aspect, I mean, they were constantly praying and they were in tune...and so, when you were dancing, you were really dancing to akua (God, or the gods)."

A third *kumu hula* concluded: No. 2 “*Spiritually, hula can be one of the most important parts of your life. If you believe in God and you believe that He heals you and takes you in his arms and caresses you and gives you knowledge of something that you are missing, hula does play an important spiritual role.*”

Cultural Integrity

Every *kumu hula* interviewed believed that cultural integrity could be preserved in a hula-based CVD programs, and that retaining this integrity was critical for the success of such a program. Specific considerations were relayed to ensure the integrity of the cultural practice: focus should not be exclusively on the physicality of hula, and the importance for dancers to understand the literal and poetic aspects of the accompanying songs or chants should be emphasized.

No. 4 “*The most important thing is not to trivialize the hula... Seeing that people do hula purely for the physical part of it, for me, does not fulfill its cultural mandate. And its cultural mandate is to maintain the poetry, and maintain the cultural memory of a people.*”

All emphasized that the meaning and messages of the songs and the chants were far more significant than the physical aspects of dance itself.

No. 5 “*The first thing is the class has to start with the understanding that the most important thing is the words and the chants, everything starts from the words. And so the stories have to be told, the explanation has to be given. It has to be... you have to teach more than a routine, more than motions... It's not the hula itself. It's all the other things you learn.*”

Summing up the cultural side of hula and how it can work in a CVD prevention program, another concluded: No. 4 “*If the whole program can be designed appropriately for the health benefits as well as the hula benefits, then I think it is a wonderful way to bring people back into their culture if they don't already have a strong connection. Because you know, again, for me, hula does touch upon all parts of Hawaiian culture, and dancing is universally a way that people express. Singing and dancing is a way people express their inner feelings more easily than painting or anything else.*”

This *kumu* explicitly cautioned, No. 4 “*If you focus on the hula you will get your outcomes, but if you focus only on the physical aspect of the dance, success is not so likely.*”

Discussion

Experts of the cultural traditions and practice of hula emphasized the strong, significant, and enduring connections between hula and health. Each *kumu hula* interviewed supported the concept of integrating a hula-based program for preventing and managing CVD. All expressed the traditional purpose and integrity of this cultural practice should be preserved in such a program. More importantly, they all believed these factors would prove to be key components of a successful health intervention.

To address health disparities in Native Hawaiians and other ethnic populations, it has been suggested that innovative and culturally relevant approaches are needed to increase accessibility and adherence to disease prevention and management programs. When care is taken to preserve its cultural integrity, hula may be an effective modality for cardiac rehabilitation and hypertension management and perhaps for other health conditions. The discussion with *kumu hula* identified health implications including: physical activity, stress management, and social support. Most interviewed *kumu hula* discussed how hula training and performance integrated the different aspects of health. For example, many discussed the importance of the meanings, stories, and metaphors of accompanying songs or chants, which ties mental health benefits including memory retention and cognition with physical performance. Several *kumu* talked about how the health benefits from hula training are not always immediately evident. While the physical benefit is the first and most apparent, with consistent and persistent effort by the dancer, mental, emotional, and often spiritual benefits are also achieved.

There are limitations to our study. Only six *kumu hula* were included in the interviews. While participating *kumu hula* included both genders, multiple geographic locations within the Hawaiian Islands, and multiple hula lineages, they may not be representative of all *kumu hula*. Importantly, the interview focus was on utilization of hula for risk and recovery from cardiovascular disease; therefore *kumu hula* opinions regarding specific application of hula to other health programs were not explored.

The information and insights from these interviews were pivotal in the design and implementation of the Hula Empowering Lifestyle Adaptation (HELTA) Study, a hula-based cardiac rehabilitation intervention study and a second pilot study, entitled Ola Hou: Hypertension and Hula Pilot study. Data from these studies are presently being analyzed and results will be reported soon.

Conflict of Interest

None of the authors identify any conflict of interest.

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Case Report from the Field: Integrating Hawaiian and Western Healing Arts in Papakolea

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Abstract

Papakolea, the only Native Hawaiian (NH) homestead community located in urban Honolulu, has one of the highest proportions of NHs living in a single geographic area. Despite prior attempts dating back to the 1920s to improve the health of the community, many health disparities remain within the Papakolea community. This is the story of how the Papakolea community decided to confront the health of its community by integrating Hawaiian and Western healing arts. The purpose of this “Case Report from the Field” is to share the journey the Papakolea community started back in 1992 to build capacity within their own community by forming its first 501(c)3 community based non-profit organization entitled *Kula no na Po’e Hawai’i* (referred to as *Kula*). Through *Kula*, a unique traditional healing training program was started called *Na Lomilomi O Papakolea (NLOP)*. *NLOP* became the first self-sustaining health program for training lomilomi practitioners (traditional NH therapeutic massage) in the Papakolea community. This case report describes how lomilomi practitioners and medical practitioners began sharing their skills and expertise to heal their clients and in the process began to heal the community itself. The purpose of this paper is to describe their journey with the intent of sharing how one dedicated group of people has been successful in healing their community and is now on the road to better health and sustained well being by working together.

Community Background

The Hawaiian homestead community of Papakolea, Kewalo, and Kalawahine (referred to as “Papakolea”) was established on May 16, 1934 under the Hawaiian Homes Commission Act, 1921.¹ Papakolea covers an area of approximately 177 acres, located on O’ahu at the heart of its urban core, in the city of Honolulu. It is a unique Native Hawaiian (NH) settlement because it’s the only urban homestead in the State. Papakolea is densely populated with the highest proportion of NHs living within a single geographic area and is known to have a high proportion of residents with some of the lowest household incomes. However, the Papakolea community also has a long history of health program delivery to its people that date back to the 1920’s when public health nurses operated well-baby clinics in the community. The clinics allowed the public health nurses to care for infants and toddlers of the community.

Kula no na Po’e Hawai’i (referred to as “*Kula*”) is Papakolea’s first 501(c)(3) community-based non-profit organization. *Kula* was started in 1992 by a group of concerned community women wanting to improve the educational skills of children and strengthen relationships between community parents and the school system. The educational vision of *Kula* also included a focus on the importance of healthy living for all ages. Today, *Kula* programs use community capacity building as a method to address a range of health disparities to improve NH access to health care. Community leaders in Papakolea understand

that addressing health disparities is one of the key elements of self-determination that will propel their community forward. This community “grassroots” approach to health improvement has garnered programs that are part of the community development efforts focusing on health needs of residents while also strengthening community capacity building.²

The purpose of this “Case Report from the Field” is to share our story from Papakolea, a single NH homestead community, and how we brought together traditional healing and western medicine to our community. We recognize that there are many ways to go about integrating traditional healing with western medicine. Our intention on sharing our experiences from the field is to inspire others to pursue this goal with a sense that others have successfully done it, and to promote awareness of the challenges and the rewards that it may bring to the community and the people involved.

How We Began

Na Lomilomi O Papakolea (NLOP) is one of the health programs of *Kula* that was established in 1998 by Somerset “Kalama” Makaneole (known as Kalama). Kalama was a visionary person who started this program to teach his ‘*ohana* (or family taught) style of Hawaiian *lomilomi* massage called *kino ho’oponopono*—which encompasses Hawaiian healing massage to provide total body alignment. In this style, taught by Kalama, the practitioners learn to align the body from head to toe. The emphasis of the training is the Hawaiian healing arts of *lomilomi* (traditional NH therapeutic massage), *la’aulapa’au* (herbal medicine), and *ho’oponopono* (conflict resolution) as he learned through the teachings of his ‘*ohana* and Papa Kalua Kaiahua of Aiea.

As *kumu* (teacher), Kalama embraced the wisdom, knowledge, and understanding of the gift of healing and acknowledging God as the source of all healing power. He felt his mission in life was to develop and advance the arts and science of the Hawaiian healing practice by providing integrated Hawaiian and Western healing arts in a caring, professional, and ethical manner. His life’s mission was to promote the health and welfare of NHs and all humanity. He served as dedicated *kumu* of this group until his untimely passing in July 2012.

What began as a 7-week program to train community members to serve ‘*ohana* and community has now lasted 16 years. After Kalama’s *na haumana* (students) complete their initial training, the next phase to advance their skills and knowledge is to complete a 5-year apprenticeship. During this time, members

provide *lomilomi* services in the community (free of charge), at hospital visits, and home blessings or other venues where it is appropriate. After completion of the training and 5-year commitment, if desired, a practitioner could receive Kalama's blessing to leave and take care of their 'ohana.

A Need Identified, A Need Served

In 2003, the health and wellness needs identified by the results of the *Ho'ola Pono O Papakolea* (Health) survey found that there were health-related needs not being met in the Papakolea community. *Kumu* Kalama and his students working with community residents on *lomilomi* also began to see a wide variety of untreated and/or neglected health problems. Some medical conditions prompted recommendations by the traditional healers to follow-up with the person's physician. Many were ill yet were uncomfortable with seeking medical attention as instructed. While the increase in attendance was a positive step for the community's health program, it was increasingly clear that Kula needed to address these unmet medical health needs. The Papakolea community residents had identified accessibility and convenience to health care as a priority. Accessibility and acceptability are important factors that either encourage or impede use of health care services by many community members. If health care is inaccessible and not culturally acceptable, people from Papakolea will often not interact with the health care system unless they are in desperate need of acute care.³

As NLOP continued serving clients through its traditional healing program the healers came to recognize that many of their clients were in need of medical care as well as the *lomilomi* they were receiving. Over the years, several health care institutions had brought limited services to the Papakolea community. But most had failed because of the inability to sustain a meaningful relationship within the community for extended periods of time. Again, the Papakolea community was faced with another seemingly "impossible" need with few resources to meet the needs of the community. However, they knew from working with *Kumu* Kalama that if they remained steadfast and willing to work hard an opportunity would become available in response to the needs of the Papakolea community.

Building the Program from the Ground-up

Dr. Chiyome Fukino, beginning her tenure as State of Hawai'i Director of the Department of Health decided to leave her private practice to a hardworking NH physician, Dr. Jocelyn Jurek. Dr. Fukino proposed an innovative community partnership between Papakolea and Dr. Jurek to address health issues of NHs in the Papakolea community. The basic idea was to have Dr. Jurek perform clinical visits in the community center and to perform home visits for elders who were unable to walk into the clinic. After completing an initial trial period of Dr. Jurek's community-based clinical practice, both the physician and the Papakolea community felt that it would be worthwhile to continue the partnership long term. Dr. Jurek met monthly

with the practitioners of NLOP. The Papakolea community and the NH physician both worked diligently to acquire sustainable funding. The Papakolea community was successful in receiving partial funding for Dr. Jurek's services; but unfortunately this source of funding was not sufficient to sustain Dr. Jurek's community-based clinical practice and it was eventually discontinued and lay dormant.

Despite not being able to retain Dr. Jurek's services in the community, NLOP continued their open forum trainings for *lomilomi* students in Papakolea. Further refinement of *Kumu* Kalama's teaching protocols that included both Hawaiian and Western healing arts was developed and he established a teaching curriculum for future students to learn from and study. The *lomilomi* training course is exemplified by a well know Hawaiian proverb ('*Olelo No'eau*): " 'A'ohe pau ka 'ike i ka halau ho'okahi." (All knowledge is not taught in the same school).⁴

A New Day...A New Partner

In 2007, NLOP was fortunate to find another group of physicians from the recently formed (2002) Department of NH Health (DNHH) at the University of Hawai'i John A. Burns School of Medicine. Dr. Dee-Ann Carpenter, a well-known NH Internal Medicine physician began to build a strong relationship with the Papakolea community and the *lomilomi* practitioners. Though the clinical model originally created by Dr. Jurek was not possible, eventually a new community-based clinical health screening program emerged in which both the medical doctor and traditional practitioners began to develop a co-learning model in the Papakolea community. The ongoing "integrated" *lomilomi* and clinical screening program continues to thrive today and occurs weekly in the Papakolea community.

Currently, Kula has established partnerships with several academic departments at the University of Hawai'i and they have leveraged their experience on how to use community based participatory research (CBPR) approaches to address some of the most pressing needs of their community. From service-learning projects to research training and data collection, Kula is now well equipped with a skill set that will serve them well for future needs and service programs of the larger Papakolea community. It is with great pride that this journey to becoming self-directed and a stronger community first began with the courage of a small group of traditional healers who welcomed the involvement of western trained doctors to not only diagnose and treat community members, but also invited the physicians and academic organizations to "walk in their shoes." In this way, the partnership has grown to teach others the healing power of working together in harmony (*lokahi*). The empowerment of these relationships has extended well beyond *lomilomi* and medical home visits. Rather it has helped an entire community from the individual, to the organization and up to the community level to finally realize the vision of the founding *kupuna* (elders) of the Papakolea homestead community to promote a healthy lifestyle for all people.

Reflections and Lessons Learned for the Next Generation

Our journey began back in 1992 and continues on today as one example of how a group of dedicated NHs from an impoverished community can actively reverse those trends simply by understanding the power of relationships and their ability to transcend what seems like immeasurable obstacles and barriers. To see beyond the tension of the present and to imagine the possibilities and the courage to pursue them was pivotal. The Papakolea community is grateful for the strong partnership with the DNHH and Dr. Carpenter that has now stretched over 8 years of continued presence and support. The benefits that have resulted from the integration of western medicine and traditional healing has allowed for several teaching and service-learning opportunities for students in multiple disciplines, such as medicine, nursing, social work, psychology as well as *lomilomi*, *la'au lapa'au*, and other cultural practices. Through this sustained effort, the Papakolea community now has more than 40 individuals who have been trained in *lomilomi* and 15 practitioners who provide *lomilomi* services on a weekly basis to all comers. As the use of NH traditional healing continues to grow, this dedicated group, Na Lomilomi O Papakolea, continues to help hundreds of people annually, sustained through donations by those who receive services and given to those who came to learn and expected nothing in return. The community-academic partnership forged by the Papakolea community and the Department of NH Health works because we have taken great care to let the relationship evolve naturally over time. People grow at their own pace, and our community and academic leaders helped to ensure that others did not compromise the team.

Papakolea has been fortunate to have community partners who support the need for a new health care paradigm to address health care inequities among NHs and other diverse populations. We hope that our story will inspire others to join in this movement for health equity, social justice, and community empowerment for health and wellness. We believe a new day is dawning and we invite others to join us. *E ala e!*

Conflict of Interest

None of the authors identify any conflict of interest.

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The PILI 'Ohana Project: A Community-Academic Partnership to Achieve Metabolic Health Equity in Hawai'i

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Abstract

Native Hawaiians and Pacific Islanders (NHPI) have higher rates of excess body weight and related medical disorders, such as diabetes and cardiovascular disease, compared to other ethnic groups in Hawai'i. To address this metabolic health inequity, the Partnership for Improving Lifestyle Intervention (PILI) 'Ohana Project, a community-academic partnership, was formed over eight years ago and developed two community-placed health promotion programs: the PILI Lifestyle Program (PLP) to address overweight/obesity and the Partners in Care (PIC) to address diabetes self-care. This article describes and reviews the innovations, scientific discoveries, and community capacity built over the last eight years by the PILI 'Ohana Project's (POP) partnership in working toward metabolic health equity. It also briefly describes the plans to disseminate and implement the PLP and PIC in other NHPI communities. Highlighted in this article is how scientific discoveries can have a real-world impact on health disparate populations by integrating community wisdom and academic expertise to achieve social and health equity through research.

Introduction

The metabolic health of Native Hawaiians (NHs) and Pacific Islanders (PIs) (eg, Samoan, Chuukese, Filipinos) is most threatened by excess body weight and its consequences, diabetes (DM) and cardiovascular disease (CVD). Compared with other ethnic groups in Hawai'i, between 76% to 90% of NHPIs have excess body weight (Body Mass Index ≥ 25 kg/m²) and at increased risk for DM and CVD compared to Whites (57%) and Japanese (47%) in Hawai'i.^{1,2} Nearly 20% of NHPIs have DM compared to 8.3% of the general population.³ Complicating the prevention and treatment of excess body weight and the management of DM is the fact that many NHPIs are faced with socioeconomic challenges (eg, discrimination, lack of livable wages, and other related stressors) and live in obesogenic environments.³

In 2005, the community-academic partnership called the PILI 'Ohana Project (POP) was formed to work toward metabolic health equity in Hawai'i. Guided by the principles of community-based participatory research (CBPR) and the Social Action Theory,⁴ the original POP partners included six organizations:

Department of Native Hawaiian Health (DNHH) in the John A. Burns School of Medicine, University of Hawai'i (UH), a clinical department focusing on health inequities in NHPIs (investigators: J.K. Kaholokula and M.K. Mau).

Kula no na Po'e Hawai'i (KULA), a non-profit organization addressing the education and health needs of the Hawaiian Homestead communities of Papakolea, Kewalo, and Kalawahine (investigators: P. Kekauoha and A. Dillard).

Ke Ola Mamo (KOM), a non-profit NH Health Care System for the island of O'ahu providing health services to primarily low income Native Hawaiians (investigator: D. Palakiko).

Hawai'i Maoli of the Association of Hawaiian Civic Clubs (HM), a non-profit organization serving a confederation of 58 clubs across Hawai'i and the continental United States (founding investigators: C. Rose and H. Gomes; current investigator: C. Hughes).

Kokua Kalihi Valley Comprehensive Family Services (KKV), a community-owned clinic providing health and social services to primarily immigrant Pacific Islanders and Asians (investigator: S.R. Yoshimura).

Kalihi-Palama Health Center, an outpatient health center offering health and social services to primarily immigrant Pacific Islanders and Asians (investigator: A. Leake).

During the past 8 years of NIH-funding our POP partnership has developed, implemented, and evaluated several community-placed lifestyle and diabetes self-care programs. The POP has also worked to adapt and disseminate these programs to other NHPI communities in Hawai'i with local funding (ie, Office of Hawaiian Affairs, Kaiser Permanente Hawai'i, and the 'Imi Hale: Native Hawaiian Cancer Network).

This article provides a brief overview of the innovations and scientific discoveries led by the POP and the community capacity built around working towards metabolic health equity for NHPIs. It also briefly describes the POP's dissemination of the adapted interventions to other community-based organizations (CBOs) across Hawai'i.

Innovations

Lifestyle Intervention

The community-led health promotion programs developed by the POP to address excess body weight and DM management in NHPI communities include:

PILI Lifestyle Program (PLP)

Originally a nine-month behavioral lifestyle intervention with two phases, the POP adapted the Diabetes Prevention Program's Lifestyle Intervention (DPP-LI)¹⁰ into a 3-month intervention to initiate weight loss (Phase 1) and then designed a novel complementary 6-month family- and community-focused intervention for weight loss maintenance (Phase 2). This translation and intervention development process was informed by community assessments with more than 330 NHPI stakeholders.

The community assessments completed by our community investigators included a series of focus groups, surveys, key informant interviews, and “windshield tours” of the participating communities. The Social Cognitive Theory¹¹ and the Social Action Theory¹² were the behavior change theories used in guiding the intervention translation.

The adapted DPP-LI phase of PLP is comprised of eight lessons lasting 1-1 1/2 hours, delivered to small groups (10 to 15 people per group) over 12 weeks. Using culturally-relevant examples, the lessons focus on healthy eating, physical activity, and managing stress/negative emotions to achieve healthy lifestyle goals.^{13,14} The family and community focused phase of the PLP included six additional monthly lessons, with each lasting approximately 1-1 1/2 hours in length. During phase two, participants actively involve their family and community in their healthy lifestyle plan through various activities designed to build these social supports. More details about the PLP can be found in previous publications by Mau, et al,¹⁴ and Kaholokula, et al.⁵

The PLP was culturally-adapted in several ways: (1) NHPIs provided their perspectives and ideas about weight management and these ideas were integrated into the intervention strategies. (2) community leaders also provided their input into the development and review of the PLP curriculum, (3) all materials were written using popular terminology and used local examples relevant to NHPI cultural norms for diet and physical activity, and (4) the final curriculum was reviewed by a group of NHPIs to confirm its cultural relevance.

Although the PLP was originally developed to reduce excess body weight in NHPIs, it also proved useful in weight maintenance of a healthy body weight (BMI < 25). After the development of the nine-month PLP, the POP also developed a PLP expanded to 18-months that included supplemental DVD-delivered lessons for its Phase 2. The expansion was to ensure better long-term weight loss maintenance for people with excess body weight. The self-guided DVD lessons were created to make the PLP more accessible to people who were unable to make regularly scheduled group-delivered lessons by a community health advocate because of work schedules and/or family demands. In addition, the POP is currently in the process of translating the PLP into a 12-month Worksite-based Lifestyle program called PILI@Work in partnership with ‘Imi Hale: Native Hawaiian Cancer Network and is being tested in several NH-serving organizations across Hawai‘i.

Diabetes Self-Management Intervention

The POP also adapted a diabetes self-management intervention, called Partners in Care (PIC) for NHPI communities. PIC was an adaptation of DM materials designed for American Indian, African American, and Latino people with poorly controlled type 2 diabetes.^{15,16} The intervention uses the Social Cognitive Theory as the theoretical framework by combining its constructs¹⁷ with selected cultural themes, concepts, values, and relationships to promote diabetes self-management based on

the American Diabetes Association (ADA) standards of care. Four focus groups with NHPIs were conducted to ensure the educational content and implementation was culturally appropriate and relevant to their communities. PIC is comprised of 12 weekly lessons delivered by a community peer educator to a small group (approximately 12 people) and lasts about 1 hour per lesson. More details about the PIC can be found in the publication by Sinclair, et al.⁹

Discovery

In developing and testing the effectiveness of the PLP and PIC in achieving weight loss and glycemic control, respectively, several scientific discoveries were made:

Socio-Ecological Influences

As mentioned earlier, the POP conducted comprehensive community assessments of five NHPI communities on O‘ahu to survey the assets and needs for, and challenges to, obesity control.⁷ Using a socio-ecological framework, the findings are summarized in Figure 1. From these assessments, the POP identified several important factors that influence weight loss in NHPIs with excess body weight. Many of the factors that either facilitate or hinder intentional weight loss are common to other populations, such as weight loss self-efficacy (ie, the confidence and ability to eat healthy and exercise), locus of control (ie, within one’s own control versus an outside force), and negative emotions (ie, stress). However, other factors unique to NHPIs were also uncovered.

For example, on a social and community level, there is a preference for ethno-cultural activities as a form of exercise, such as hula for NHs and ballroom dancing for Filipinos. Eating expectations seem to exert a strong influence within PI cultures, such as the expectations around the amount to eat and social pressures to prepare or bring certain types of food items to social gatherings. Many of the people interviewed expressed difficulty in eating healthier because they were expected by others from their ethno-cultural group to eat large servings of food and/or to prepare/serve calorie dense and high fat foods, such as dishes with Spam, canned corned beef and side dishes with high-fat mayonnaise.

The socio-ecological model (figure 1) guided the adaption of the DPP-LI and the development of the PLP curriculum and its family and community focused strategies. It was also used by each of our POP community partners to build capacity within their respective communities to address the issue of overweight and obesity. For example, some communities established Zumba classes (a Latin-inspired dance-fitness program), promoted existing hula classes, provided cooking courses on cooking local favorites healthier, identified Farmer’s Markets within close proximity of their community to purchase fresh fruits and vegetables, and solicited support from local experts (eg, elders, professionals living in the service area) to serve as role-models and leaders in affecting change in the community environment for obesity control.

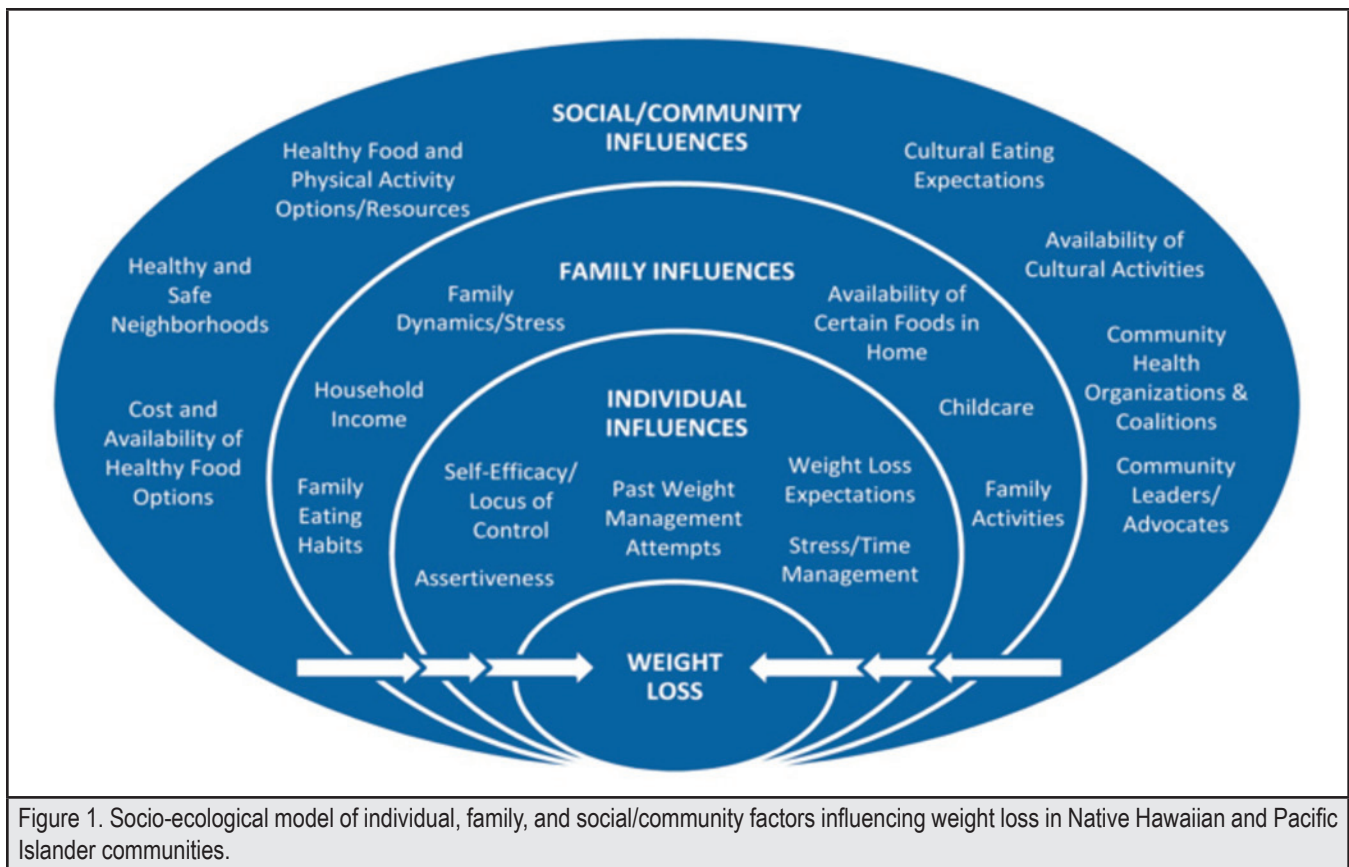


Figure 1. Socio-ecological model of individual, family, and social/community factors influencing weight loss in Native Hawaiian and Pacific Islander communities.

PILI Lifestyle Program

Through a randomized controlled trial (RCT), the POP found that the nine-month PLP was effective in achieving its primary and secondary clinical outcomes. When compared to a nine-month standard behavioral weight loss maintenance program (SBP), the nine-month PLP was found superior in achieving $\geq 3\%$ weight loss and preventing weight regain in 144 NHPs. At the end of nine months, 51% of participants in PLP met the $\geq 3\%$ weight loss goal (mean weight loss of 2.54kg, SD=7.0) compared to 31.4% of those in SBP (mean weight loss of 0.45kg, SD=9.8; $P < .0001$).⁶ When comparing the maintenance phase of the PLP and SBP, PLP participants had an average weight regain of 0.075 kg (SD=4.7) versus 0.581 kg (SD=2.7) for SBP participants.⁵ Both PLP and SBP participants showed significant ($P < .05$) improvements over 9-months in systolic (-5.7mmHg and -7.8mmHg, respectively) and diastolic (-3.9mmHg and -5.0mmHg, respectively) blood pressure. PLP participants compared to SBP participants also showed significantly ($P < .05$) improvements in their physical functioning, as measured by a six minute walk test. Further details of our research results can be found in a series of previously published papers.⁵⁻⁷ Overall the culmination of our PILI research findings are consistent with the Diabetes Prevention Program (DPP) in terms of reducing a person's risk for diabetes by 16% for every 1.0 kg (or 2.2 lbs) of weight loss.¹⁸ Though our results only reported on a 3% weight

loss, other studies have found that as little as 3% weight loss are beneficial for high-density lipoprotein, glucose metabolism, triglycerides, and other cardiovascular disease risk factors.¹⁹

Weight Loss Related Factors

Combining the PLP and SBP data, the partnership discovered substantial ethnic differences in weight loss between Native Hawaiians, Chuukese, and other Pacific Islanders (eg, Samoans and Filipinos). A majority, 63.6%, of the Chuukese participants achieved the $\geq 3\%$ weight loss goal at the end of nine-months compared with 35.7% of NHs and 31.8% of the PIs (difference significant at $P = .015$; $n = 100$).⁶ There could be several reasons as to why the Chuukese group seemed to respond better to the lifestyle programs (PLP and SBP). First, to ensure comprehension, the lessons were delivered to Chuukese in both English and in their native language by a bilingual Chuukese health worker, which may have made the lessons more salient and relevant to their cultural context. The Chuukese participants may have also provided each other with greater support. Chuukese people are in general a tight-knit community that relies heavily on each other for economic and emotional support because of the socio-economic and socio-cultural stressors they face as a new immigrant group in Hawai'i. The lifestyle modifications encouraged in the interventions may have been easily adopted because of positive Chuukese role models in the group. Or, the

behavioral strategies may have been relatively more novel to the Chuukese participants, making them more receptive to the recommended lifestyle modifications.

Another discovery was the importance of initial weight loss in affecting long-term weight loss maintenance for NHPs. Greater weight loss in the first three months of the interventions was associated ($P < .001$; $n = 100$) with achieving the $\geq 3\%$ weight loss goal at nine-month follow-up.⁶ Other studies have also found that greater weight loss early in an intervention is associated with better long-term weight loss maintenance in other populations.²⁰ Perhaps losing more weight early on stimulates a person's motivation to continue to lose weight. Or, perhaps people who benefit from a weight loss intervention will do so early on because of initial motivation, greater self-efficacy, and/or social and other environmental (eg, access to gyms and walking/bike trails) supports.

Partners in Care

Through a delayed-intervention RCT design, the PIC was shown to be effective in achieving its primary and secondary clinical outcomes. The PIC led to significant reductions in HbA1c and improvements in understanding and performing diabetes self-management behaviors (as measured by the Summary of Diabetes Self-Care Activities²¹ and the Diabetes Care Profile,²² respectively) in NHPs ($n = 82$). The PIC participants achieved a mean decrease in HbA1c of -1.6% compared with a HbA1c of -0.3% ($p < .001$) for the delayed-intervention control participants.⁹ This reduction in HbA1c is also clinically significant as it is well known that for every 1% reduction in HbA1c there is a risk reduction of 21% for any diabetes-related endpoint (ie, death, myocardial infarction or microvascular complications).²³ Further details of the PIC study outcomes can be found in the publication by Sincliar, et al.⁹

Community Capacity-Building

The POP partnership was successful in developing the capacity of 4 of the original community-based organizations (CBO) to engage in CBPR and to address the health and wellbeing of their own communities. CBPR's intent is to seek social justice (ie, equitable access to the benefits of society) and representation of marginalized groups (ie, certain ethnic groups, the poor, and the underserved).⁴ The aforementioned innovations and discoveries of the POP are evidence of how built capacity can result in productive research findings performed by CBOs. In fact, the PLP and PIC are now regularly offered in a majority of the participating CBOs. Not readily apparent from these outcomes are the many other ways in which our participating CBOs built their own capacity to address the metabolic health of their communities.

During our 8-year CBPR partnership, several of our community investigators have obtained graduate degrees in public health (S. Yoshimura) and social work (A. Dillard) in large part because of their involvement in the POP. Two community investigators are working toward their PhDs (D. Palakiko and A. Dillard). They cite their involvement in the POP as a motivator

in their decision to seek advanced degrees. With the resources and opportunities that come with these educational advancements, these community investigators are well-positioned for independent federal funding. In fact, KULA has already received their first independent Federal grant from the Administration for Native Americans (ANA) to address the health and wellbeing of their kupuna (elders). Three of the four partnering CBOs are actively involved in other NIH-funded research projects with DNHH and other UH schools and departments.

Additionally, the participating CBOs have created opportunities for healthier living by enhancing the resources and supports available to their community members. For example, KULA has established regular Zumba and hula classes led by individuals from their Hawaiian homestead community. They are introducing aquaponics, which is the combining of conventional aquaculture (eg, farming fish or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment, into several homes in their community. KKV has incorporated the 100-acres of land (Ho'oulu 'Aina) afforded to them by the State in Kalihi Valley to health promotion programs for communal gardening. KOM incorporates their lifestyle programs, such as access to their workout gym and consultation with a staff nutritionist, to enhance the PLP and PIC. HM and KULA, with support from KOM, have annual health screenings for their community and club members, respectively, which serves as a recruitment opportunity for PLP and PIC.

Dissemination and Implementation

The POP will be working toward disseminating the PLP and PIC in other NHP communities across Hawai'i over the next two years. The POP has developed a community-to-community dissemination model (CCDM) and this effort will include four of the original POP community investigators (ie, KULA, KM, KKV, and HM) to take the lead in serving as mentors to new CBOs in adapting and implementing the PLP and/or PIC to ensure its feasibility and relevance for their community/clinic setting. The POP also hopes to disseminate to NHP CBOs on the continental United States and across the Pacific. These CBOs will have the freedom to adapt the interventions to fit their local needs and contexts. For example, a CHC might choose to make PLP or PIC a part of their community outreach program or integrate it into their primary care services. Or, the CHC could partner with the NHHCS on their island in making the PLP and PIC available to their NH patients and their families. A Hawaiian homestead community or a Hawaiian Civic Club might incorporate aspects of the PLP or PIC into their monthly or quarterly community gatherings/meetings as part of a health promotion initiative.

Closing Remarks

Because of the sustainable CBPR partnerships, innovations, and discoveries of the POP, and the capacity built in the participating CBOs, it has become a "best practice" model of CBPR to address the health and wellbeing of NHPs. The PLP and PIC are also being used as means to mobilize these communities

and to increase community awareness and participation in other issues important to their communities, such as food sovereignty, organic and traditional Hawaiian farming, and the economic and environmental impact of genetically modified foods. The work of POP demonstrates how scientific discoveries can have a real-world impact on health disparate populations by integrating community wisdom and academic expertise to address our shared interest in achieving social and health equity for all.

Conflict of Interest

None of the authors identify any conflict of interest.

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Addressing Health Disparities by Building Organizational Capacity in the Community: A Case Study of the Wai'anae Coast Comprehensive Health Center

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Abstract

Native Hawaiians and other residents living in economically disadvantaged communities suffer disproportionately from many health conditions, especially chronic diseases. Reversing this trend requires a comprehensive approach encompassing more than just improvement in healthcare delivery. Indeed, societal changes at multiple levels must occur, including environmental, systems, and policy change, in order to bring about sustainable improvements in community health and wellness. A key strategy to accomplish these upstream changes is an increase in the capacity of community-based organizations to provide leadership in health advocacy, support community health promotion, prioritize resource allocation, and participate in community health research. In disadvantaged communities where health disparities are the most severe, community health centers (CHC) are well positioned to take a pivotal role in these efforts. This report is a case study to describe processes taking place at Hawai'i's largest CHC to build organizational capacity and bring about upstream changes that improve community health and wellness. Ongoing processes at the CHC include (1) Institutional: commitment to address health disparities, expand the CHC research infrastructure, and develop a comprehensive worksite wellness program (2) Collaborative: development of a network of community partners committed to the common goal of improving the health and wellness of community residents, and (3) Systems and Policy: activities to strengthen the CHC's and community's ability to influence systems changes and policies that reduce health disparities. Preliminary results are encouraging although the processes and timelines involved require a long-term commitment in order to affect tangible results that can be measured.

Background

Native Hawaiians, other Pacific Islanders, and residents of economically disadvantaged communities suffer disproportionately from many health conditions, especially chronic diseases such as diabetes and cardiovascular diseases.^{1,2} To address health disparities, health care organizations and physicians have long focused on changing individual behavior since many of the serious chronic disorders are at least partially preventable. Improving access to appropriate and timely medical services is an equally important factor in preventing and treating chronic medical conditions that lead to health disparities. Indeed, optimal, patient-centered care that improves disease outcome, while reducing healthcare costs, is now a focus of President Obama's Affordable Care Act.

However, in high-risk communities, disease burden begins early in life with the development of risk factors, such as overweight and obesity,³ and are linked to complex psychosocial, geopolitical and economic factors that also lead to long-term financial and educational inequity.⁴ Experts now recognize the critical need to address health disparities, not only through improvements in healthcare delivery, but through comprehen-

sive changes, at multiple levels of society, in order to affect environmental, systems, and policy changes that promote community health and wellness^{4,5} and make healthier lifestyle choices accessible, appealing and easier for residents to make.

A key strategy to bring about these upstream changes is to build organizational capacity and empowerment within community-based organizations (CBOs) as a means to improve community health through research, community engagement and mobilization (Table 1).⁵ Organizational capacity involves structures, programs and practices of an organization needed to influence community health status, and social determinants of disease including: (1) Intra-organizational components that relate to function, expertise, leadership, and credibility to effectively take ownership in addressing the health disparities in the community the CBO serves; (2) Inter-organizational components that enable CBOs to effectively network and build trust with other partners, including community, private, academic and governmental organizations, to share resources and develop complementary partnerships, while reaching shared goals through consensus and collective impact (3) Extra-organizational components or those activities by CBO's that impact community residents and systems through local and national government policy change.^{5,6}

In disadvantaged communities where health disparities are the most severe, federally qualified community health centers (FQCHC) are well positioned to assume a significant role in reversing these trends through initiatives at the clinical, community, and policy level.^{5,7} To be sure, FQCHC's are located within medically underserved populations, are open to all community members regardless of income and ability to pay, and are governed by a Community Board with strong community ties. To date, very little has been written about strategies to enhance the empowerment and organizational capacity of FQCHCs to reduce and/or eliminate health disparities in the communities they serve.

This report is a case study that describes the multifaceted approach currently taking place at the largest FQCHC in Hawai'i, the Wai'anae Coast Comprehensive Health Center. It is a comprehensive approach to build organizational capacity in order to address health disparities by; (1) participating and leading health disparities research, (2) engaging with the community to foster health promotion and community action, (3) networking with other community based organizations in order to realize shared goals in community health and wellness, and (4) participating in advocacy efforts in order to influence

Table 1. Building Organizational Capacity at WCCHC Logic Model			
Goal: Improved health of community residents and reduce chronic disease health disparities			
Strategies	Activities	Short term Changes	Longer Term Changes
Intra-organizational Change			
Institutional commitment	<ul style="list-style-type: none"> • Commitment of CHC Administration and Board of Directors to community based health research, programming, and policy 	<ul style="list-style-type: none"> • CHC funding to expand community health activities • Greater awareness among CHC Administration and community leaders about community health 	<p>Extra-organizational Change:</p> <ul style="list-style-type: none"> • Stronger community and CHC partnerships • Stronger academic community partnerships <p>↓</p> <ul style="list-style-type: none"> • Increase in organizational and community capacity to bring about sustainable individual and community level change including interventions, policies, practices and programs • Development of more-effective, sustainable community-based strategies to improve health • More community members engaged in health and wellness activities
Develop research infrastructure	<ul style="list-style-type: none"> • Establish CHC Research Committee, IRB, and Community Research Advisory Council • Establish research policies and procedures 	<ul style="list-style-type: none"> • Interventions and research that align with local/community beliefs, norms, culture and practices • Expanding pool of CHC trained clinicians • Shared learning between academia and community • Research that community understands and can act upon 	
Develop CHC based researchers	<ul style="list-style-type: none"> • Research training of CHC-based healthcare providers and community members • Trainings led by CHC-based healthcare providers and community members 		
CHC Worksite Wellness	See Table 3	<ul style="list-style-type: none"> • Healthier, more satisfied employees • Increased numbers of community role models and community health promotion champions 	
Inter-Organizational Change			
Community-based CHC programs to improve access to healthier lifestyles (foods, physical activity, etc)	<ul style="list-style-type: none"> • Community Farmer's Markets • Community based presentations, health fairs and screenings 	<ul style="list-style-type: none"> • Increased access to and consumption of healthier foods by residents • Increased trust in CHC within the community 	
Building sustainable community partnerships	<ul style="list-style-type: none"> • Dissemination of CHC based research results • Dialogue and planning with community-based organizations, State/County government about issues related to community health 	<ul style="list-style-type: none"> • Shared learning between community based organizations including CHC • Development of shared goals/objectives, research and action 	

the development and implementation of policy and legislation that brings about systems change and improves the health and wellness of residents.

Community Setting

The Wai‘anae Coast Comprehensive Health Center (WCCHC) is Hawai‘i’s largest FQHC. WCCHC has five clinical sites and provides health care services to the majority of residents of two rural communities on the western side of O‘ahu, Hawai‘i’s most populated island. These communities are impoverished: per capita income is among the lowest in the State and unemployment is almost double that of the State overall.⁸ In 2011 WCCHC provided health services to 28,775 patients: 52% were Native Hawaiian, 11% were Other Pacific Islanders, 15% were Asian, 42% were younger than 20 years of age, and 76% had incomes at or below 200% of the US federal poverty level.⁹

Intra-organizational Capacity: Building research infrastructure and community mobilization capacity

Research Infrastructure

Academic researchers have long targeted WCCHC and the Wai‘anae Coast area as a potential community to conduct research studies because of their large indigenous patient base, its proximity to Honolulu, and the known heavy burden of chronic disease. In 1985, the WCCHC Board of Directors was approached to participate in a longitudinal study on cancer prevention. Prior to agreeing to participate, the Board considered previous negative experiences with academic researchers and the need for a research approach that considered Native Hawaiian concepts and values.¹⁰ In response, the WCCHC Board took its first steps to independently develop a CHC research infrastructure.

With input from community members and health center staff, WCCHC research principles and guidelines were developed, embodied as a new community-based participatory research (CBPR) model.¹¹ Published in 1992, these guidelines and principals continue to frame the research process within the Wai‘anae community and at WCCHC (Table 2).^{10,11} The 5-year Wai‘anae Cancer Research Project, based on the participatory research model developed at WCCHC, was successfully funded by the National Cancer Institute and conducted with participation of WCCHC staff and patients.

Since that time, WCCHC has developed its own research infrastructure including (1) the WCCHC Research Committee, (2) WCCHC Institutional Review Board, (3) the WCCHC Community Research Advisory Council to advise researchers, (4) the WCCHC Research Committee on the development and approval of studies, and (5) a research policies and procedures manual that provides guiding principles for research—based both at the health center and within the community. The WCCHC research policies and processes continue to evolve to streamline processes, meet new federal and state legislation and policy related to health information privacy and security, and support the evolution and implementation of community-based participatory research. WCCHC’s research infrastructure has become a national model for CHC-based research, which has led to affiliations and partnerships with organizations and academic institutions in Hawai‘i and from across the country.¹⁰

Homegrown Researchers

The WCCHC Medical Administration recognizes the value of research to advance its mission, build health center capacity and create mechanisms to build partnerships. The Administration also recognizes the need to foster and support community researchers, especially Native Hawaiian community members and WCCHC’s own healthcare providers, who understand the strengths and challenges of the community and its residents. In doing so, the WCCHC Administration has supported advanced training in research for clinicians and staff members, providing them with flexibility in clinical shift assignments and responsibilities, in order to take advantage of academic research training opportunities, especially those based at the University of Hawai‘i (UH).

In partnership with UH, research training has included: (1) project specific instruction in data collection, data management, measurement, subject recruitment, community engagement, and qualitative techniques such as focus groups; (2) general research topics such as research design, grant writing, and biostatistics; and, (3) formal multi-year fellowship programs in clinical and community-based research.

Community members and WCCHC staff including medical assistants, community outreach workers, registered dietitians, and social workers, many of whom live in the community, have also actively engaged in WCCHC sponsored research training opportunities. Subsequently, the WCCHC has participated in health disparities research studies involving women’s stress and mental health, breastfeeding, cancer, intimate partner violence,

Table 2. Principles and Guidelines for Participatory Research (Excerpts) ¹⁰
Guidelines for Research
<ul style="list-style-type: none"> • The community participates in planning the research • Research is sensitive to culture • There are direct and immediate benefits for community residents and participants • Research participants are active participants rather than passive subjects • Minority members are represented in research projects targeting minority populations • Data are owned by both community and research agency • An increased share of resources flows to the community
Procedures for Use of Information and Data
<ul style="list-style-type: none"> • Established guidelines for publications, public presentation, and newspaper articles of research findings • Identified a Publications Committee Review process • Described the use of data for program planning

cardiovascular disease, diabetes, and adolescent metabolic syndrome.

More recently, WCCHC Research Staff, providers and Wai‘anae residents have led training seminars at UH on community-based participatory research, evidence of the growing research expertise at the health center. In addition, the expansion in WCCHC’s research capacity, the active participation by community members in research training and studies, and engagement of the community research advisory council in the research development and approval processes, emphasize the central role of the Wai‘anae community in framing the research process.

The training and support by WCCHC has also led to the development of a growing pool of trusted, experienced clinicians involved in and/or leading clinical research activities based at WCCHC and in the community (Table 3). This includes three Native Hawaiian physicians who have completed a two-year fellowship at the UH John A. Burns School of Medicine (JABSOM) Native Hawaiian Center of Excellence—a faculty development program that focuses on health disparities research to improve Native Hawaiian health. Moreover, four WCCHC physicians have academic appointments at UH JABSOM and receive a portion of their salary directly from the UH. Although not all of these clinicians are currently leading independent research projects, all are participating in some community and/or clinic-based research projects that are outside of the scope of their clinical practice duties and responsibilities. This work strengthens WCCHC’s ties with community partners thereby increasing its visibility and credibility, while simultaneously addressing health disparities among Native Hawaiians and other Pacific Islanders.

Community Champions and Employee Health and Wellness WCCHC has over 600 employees, the majority of whom are from the community. The employees are the face of the health center. The employees also represent a potential pool of community health and wellness champions who can mobilize the community through a consistent health promotion message that capitalizes on their influence both at WCCHC and in the

Table 3. WCCHC Community-based clinical researchers associated with JABSOM			
WCCHC position, employment date	Training	Research and Community Engagement Focus	Current academic position
Pediatrician 1, 1999 to present	UH JABSOM Community Pediatrics Fellowship, Masters of Science Clinical Research	Childhood obesity among Native Hawaiians and other Pacific Islanders	Assistant Professor, UH JABSOM
Pediatrician 2, 2000 to present	UH JABSOM NHCOE ^a	Native Hawaiian health career development	Assistant Professor, UH JABSOM
Obstetrician-Gynecologist, 2005 to present	UH JABSOM NHCOE ^a , UH JABSOM Dept. of Ob-Gyn Family Planning Fellowship	Family planning among Native Hawaiian and other Pacific Island Women	Assistant Professor, UH JABSOM
Family Medicine Physician, 2000 to present	UH JABSOM NHCOE ^a	Mental health screening and depression among Native Hawaiian teens	
Psychologist 1, 2007 to present	UH JABSOM RMATRIX ^b	Impact of maternal stress in women from low-income communities	
APRN ^c 1, 2013 to present	UH JABSOM RMATRIX ^b	Obesity in adolescents	
APRN ^c 2, 2013 to present	UH JABSOM RMATRIX ^b	Improving access to healthcare for adolescents	

^aUniversity of Hawai'i, John A. Burns School of Medicine Department of Native Hawaiian Health, Native Hawaiian Center of Excellence; ^bUH JABSOM – Multidisciplinary and Translational Research Infrastructure Expansion; ^cAdvance practice registered nurse.

Table 4. WCCHC Employee Wellness Program
Employee Wellness Services (provided free to all employees)
<ul style="list-style-type: none"> • Health screening • 52 Weeks To A Healthier You—A communication and engagement campaign to inspire employees to participate in their personal wellness through weekly health challenges • Free gym membership and personal fitness training • Group Fitness Classes • Behavioral health services including stress management and time management • Caregiver's Support Group • Tobacco Cessation • Asthma Education • Weight Management including nutrition counseling and medical management
Employee Wellness Time
<ul style="list-style-type: none"> • Full time employees are given 1.5 hours of work time per week for exercise and wellness activities (Subject to the prior approval from their supervisor)

community. Nevertheless, WCCHC employees carry a similar disease burden as other community members; many are impacted by chronic disease such as diabetes and obesity. Like other community members, they also face difficult challenges in making healthier choices.

The WCCHC Administration recognizes the need to support the health and wellness of their employees in order to: (1) maximize productivity; (2) reduce healthcare costs; (3) support individuals taking responsibility for lifestyle choices, and; (4) develop community health champions and role models. As such, the WCCHC recently committed to a comprehensive employee wellness program that supports health and wellness at work (Table 4). The program, run by the WCCHC Preventive Health Department, has improved employee access to healthier foods through a well-utilized clinic-based Farmer's Market as well as enhanced opportunities for physical activity and stress management through the WCCHC Fitness Center. In addition, new policies have been developed and implemented to motivate employees to participate in health programs and to insure that

they have time during work hours to access WCCHC wellness programs.

Like many organizations, improving and maintaining employee health is difficult—participation in employee health programs can be inconsistent, service to employees in satellite clinics is challenging, and funding for larger, more intensive programs is limited. Still, the WCCHC's Preventive Health Department and Administration are committed to working with WCCHC's staff to discover the most robust methods to enhance, maintain and measure employee health and well-being.

Inter-organizational and Extra-organization Capacity

Research dissemination and the WCCHC Board of Directors
Clinical reports and research studies performed at the WCCHC continue to document that community members experience significant health disparities, especially in chronic diseases (ie, obesity, diabetes and metabolic syndrome) despite major improvements in healthcare delivery in the State of Hawai'i

Table 5. Prevalence of diabetes among WCCHC Primary Care Patients 2011-2012	
Age Group	Diabetes Prevalence (vs Hawai'i State BRFSS 2009)*
25-34 years	6.6% (2.2%)
35-44 years	15.8% (4.1%)
45-54 years	23.4% (9.4%)
55-64 years	29.2% (12.9%)
65 years and older	32.4% (18.2%)

*BRFSS: Behavioral Risk Factor Surveillance System¹²

(Table 5).¹² Diabetes, cardiovascular disease and childhood obesity are common conditions at the WCCHC.^{12,13} Prediabetes and other precursors of chronic disease are developing at an earlier age. Among the children attending WCCHC, over 50% of children from 6 years of age are overweight or obese and 17-20% are severely obese.

These reports have been disseminated to WCCHC clinicians, administrators, the WCCHC Research Advisory Council, the WCCHC Board of Directors, and community members through presentations and meetings. In 2012 due to the dissemination of data and the challenges residents face trying to change behavior in a community that does not easily support healthy choices, the WCCHC Board of Directors made “Diabetes Prevention” a strategic priority of the health center. This established an institutional commitment by the Board to broaden the health center’s scope to address diabetes, one of most important chronic conditions impacting the Wai’anae Coast community. In doing so, the WCCHC Board and Administration supports efforts by the WCCHC staff and researchers to become actively involved in strategies that improve the health, not only of individuals through clinical services, but the community as a whole. While only in its infancy, this programmatic commitment focuses resources on initiatives that will enhance the development and implementation of policies and systems changes in the community to support wellness, healthier eating and physical activity of the Wai’anae Coast residents.

Community Health

WCCHC is facilitating improved access to healthier foods. The health center has established weekly Farmer’s Markets, with a wide selection of fruits and vegetables, at three sites in the WCCHC community. The markets are accessible and growing in popularity, provide educational training and outreach, and enable use of the electronic benefit transfer (EBT) card program of the federal Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program for low-income families. To further improve access to healthy foods, the WCCHC recently received a grant to pilot test an EBT “Double Bucks” program at the markets in which \$10 in EBT benefits can be doubled each week and used towards the purchase of produce, including traditional Native Hawaiian foods such as *pa'i'ai* (pounded taro). These initiatives complement the health

education programs provided to patients at WCCHC and support the development of environments that make it easier and more affordable for residents to make healthier choices.

Community Partnerships and Policy

WCCHC is now working with several key community leaders and the Wai’anae Wellness and Place-Based Learning Alliance (the Alliance), a collaborative association of community-based organizations dedicated to addressing education, health, and wellness along the Wai’anae Coast. The Alliance was created not just for a specific grant application, but to realize long-term community change. The Alliance recognizes the key role of culture, history, family, and Native Hawaiian values in the health and wellness of community members. It acknowledges the wealth of untapped community resources and the inherent strengths of the community. The Alliance aims to maximize resources, build on established programs, leverage partnerships, and pool data in order to augment the collective impact on improving the health and lives of Wai’anae residents. In doing so, WCCHC and its partners, aim to progressively expand their capacity to support social change, community health, and public policy initiatives.

For example, the Alliance is working with public schools in the community to understand the role of chronic absenteeism in student underachievement and how WCCHC and community-based organizations can help schools, and their students, address the issue through policy and programs based in the community.

WCCHC is now also working with the Alliance to understand the community needs and perceptions surrounding the issues of diabetes and chronic disease prevention and discussing community-based solutions. This information will help WCCHC and the Alliance to plan next steps in chronic disease prevention within the community.

Other target areas include strengthening community partnerships to support the implementation of the Hawai’i Department of Education Wellness Policy, school based health delivery, improvement in the community’s built environment (human-made surroundings that provide the settings for resident activities such as streets, parks, and buildings), and enhancing strategies to influence state and federal legislation that address community health. These include early childhood education, student health, and price differentials for foods and beverages. To determine how to most effectively approach these complex issues, WCCHC is working with several community partners such as the Hawai’i Department of Education, the Department of Health, and other organizations working with Wai’anae Coast schools, to better understand current State and County policies that may offer to expand the potential list of interventions and remedies to the broad Wai’anae Coast community members.

Discussion

Strong organizational leadership to build capacity and commitment enables community-based organizations to fulfill their mission, effectively capitalizing on opportunities to meet the needs of the communities they serve. Building strong orga-

nizational capacity cultivates innovative programs, internal structures and networks that enhance expertise, trust, credibility, and effectiveness.^{6,15}

This case study provides documentation that a FQCHC, such as WCCHC, can, with a sustained mission build organizational capacity and play a pivotal role in reducing and/or eliminating health disparities in the community it serves. Other FQCHC in Hawai'i, such as the Kokua Kalihi Valley Health Center, have also been involved in a wide-variety of efforts to address the social determinants of health within the communities they serve.¹⁶ Today there are over 1,000 FQCHC nationwide, however, the extent to which they are involved in efforts to improve the health of their communities is varied. A recent report documented the work of 52 CHCs to address the social determinants of health and wellness in their community.¹⁶ For WCCHC, efforts to reduce health disparities are grounded in a commitment by the health center leadership to make it a priority. This is not just through the provision of high quality primary care services, but through ongoing processes and programs, targeting multi-level changes within the organization and community as well as resources external to the WCCHC. The ultimate goal is to make health and wellness attainable for all patients and community members.

While the preliminary results are encouraging, the processes and timelines set in motion require a long-term commitment by the WCCHC leadership to affect tangible results that can be measured over time. WCCHC will need to establish benchmarks and work with partners to determine how capacity building measures relate to organizational performance in improving community health outcome. WCCHC must also determine the best strategies to leverage and prioritize funding of these community initiatives and balance them with the ever-increasing demand for expanded, high-quality healthcare service delivery. Finally, while this report is a documentation of one CHC's commitment and progress, we realize that other smaller capacity FQCHCs may not have the resources to invest in such programs and activities. Nevertheless, we believe that building FQCHC organizational capacity to improve community health and wellness, even in partnership with other CHCs, has the potential over time, to significantly reduce and/or eliminate health disparities in the other high-risk communities across the United States.

Conflict of Interest

None of the authors identify any conflict of interest.

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