

# Hawai'i Journal of Medicine & Public Health

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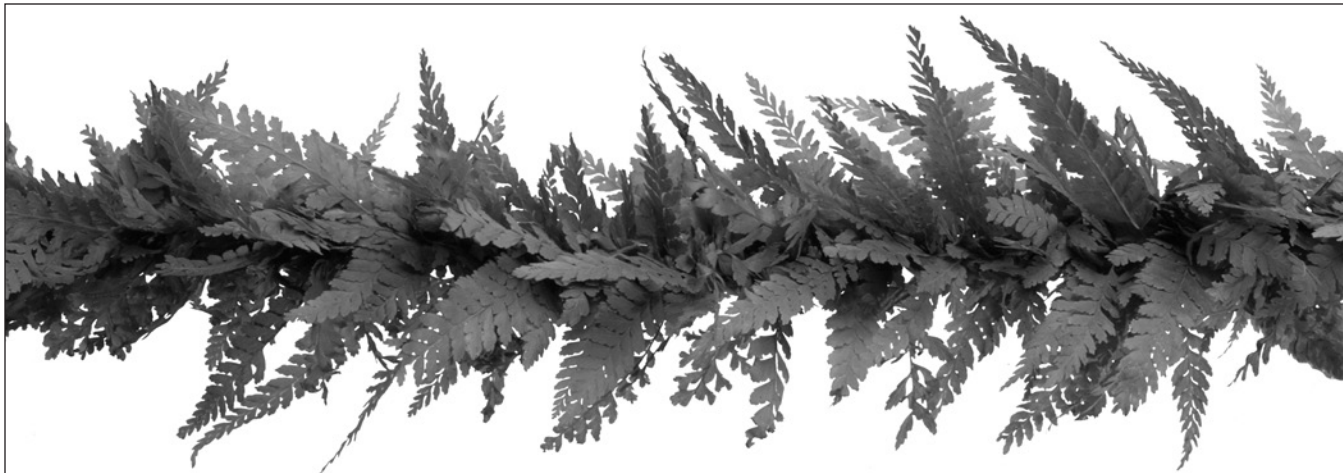
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### **In Memoriam**

#### **Alan Tice MD**

It is with sadness that we note the passing of Dr. Alan Tice in March 2013 while on the mainland. Dr. Tice contributed much to the Hawai'i Journal of Medicine & Public Health, serving as an Associate Editor for over five years. He marched to a different drummer, but was unwavering in his support of the Journal, serving as a major impetus for the conversion from "hard copy" to electronic media. His advice and counsel will be missed. *Ave atque vale.*

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# Pancreatic Anastomosis Leak 15 Years after Simultaneous Pancreas-Kidney Transplantation from Late-Onset Allograft Cytomegalovirus Duodenal Ulcers Presenting with Gross Hematuria

Ekamol Tantisattamo MD; Roland C.K. Ng MD; Heath Chung MD; and Manami Okado MD

## Abstract

*Cytomegalovirus (CMV) infection is one of the most important causes of morbidity and mortality in solid organ transplantation. It can present with hematuria, the most common urological complication in the early post-simultaneous pancreas-kidney (SPK) transplant period. In SPK transplantation, CMV infection usually occurs 1 month after transplantation. We report an instance of bladder-drained SPK transplant presenting with recurrent gross hematuria from CMV infected duodenal graft ulcers 15 years after preserved well-functioning grafts. Serum quantitative Polymerase Chain Reaction (qPCR) for CMV was negative. Postmortem duodenal graft staining for CMV was positive, and revealed the cause of the inciting ulcer. To our knowledge, our patient is the first reported case of very late onset invasive CMV disease causing duodenal graft ulcers 15 years after transplantation, as previously reported cases of posttransplant CMV disease occurred only as late as 18 months. In addition, the absence of correlation between CMV viremia and CMV-infected duodenal allograft in SPK transplant has not been reported. Our case demonstrates that CMV viral load is -unreliable to diagnose invasive CMV disease, and tissue biopsy should be obtained to avoid missed diagnosis causing high morbidity and mortality.*

## Keywords

*cytomegalovirus infection, duodenal graft ulcers, hematuria, pancreas-kidney transplantation, pancreatic anastomosis leak*

## Introduction

Simultaneous pancreas-kidney transplantation (SPK) is the treatment of choice for type 1 diabetes with end stage renal disease. It can improve longevity and quality of life for diabetic patients.<sup>1</sup> However, morbidity and mortality post-transplantation result from medical complications from immunosuppression and opportunistic infection as well as surgical complications from surgical anastomosis. Both medical and surgical complications generally occur in the early post-transplant period when the patients have a high level of immunosuppression. We report an instance of bladder-drained SPK transplant recipient with normal functioning pancreatic and renal grafts for 15 years. The patient presented with recurrent gross hematuria from cytomegalovirus (CMV) duodenal graft ulcers. Untreated CMV infection and duodenal graft ulcers resulted in persistent pancreatic leaks from the duodenovesical anastomosis suture line which subsequently led to uncontrolled peritonitis, severe sepsis, and explantation of the functioning pancreatic graft.

## Case Report

The patient is a 70-year-old man with past medical history significant for bladder-drained SPK transplantation in 1995 secondary to type 1 diabetes and diabetic nephropathy, coronary artery disease, and paroxysmal atrial fibrillation. He had

a normal functioning pancreatic allograft and did not require insulin. His baseline serum creatinine was 1.9 mg/dl (normal reference range of 0.7 to 1.2 mg/dl). He never had a history of pancreatic or renal allograft rejection. He presented with gross hematuria and suprapubic pain 2 days prior to admission.

One month prior to admission, he began having intermittent gross hematuria, and underwent cystoscopy which revealed inflammation around a duodenal-bladder anastomotic area. He was treated with aminocaproic acid with improvement, and the medication was discontinued.

Five days prior to admission, he presented with urinary clot retention requiring cystoscopy and clot evacuation. No tissue biopsy was performed. He presented with recurrent gross hematuria and urinary retention, and lower abdominal pain 3 days later. Foley catheter was placed, and he followed up with his urologist. Cystoscopy was performed, and revealed bleeding from the duodenal-bladder orifice. He developed atrial fibrillation with rapid ventricular response after the procedure, and was brought to the emergency room.

During the examination, the patient was hypotensive, and abdominal exam revealed diffuse rebound tenderness over the left lower quadrant. He was found to have acute anemia with a hemoglobin drop from 9.8 to 8.5 g/dl (normal reference range of 12.9 to 16.1 g/dl), WBC count of 14,000 /mm<sup>3</sup> (normal reference range of 3.6 to 11.1 /mm<sup>3</sup>) and 16% band (normal reference range of 0 to 6%), and platelet count of 87,000 /mm<sup>3</sup> (normal reference range of 150,000 to 400,000 /mm<sup>3</sup>). Serum amylase was elevated to 2,003 units/l (normal reference range of 25 to 125 units/l) and serum lipase was more than 400 units/l (normal reference range of 8 to 57 units/l). Abdominal CT scan showed a small bowel obstruction in the left upper quadrant. The transplanted renal allograft was in the left pelvis. There was ascites in the pelvis, and extraluminal air bubbles on the right and left upper quadrants.

The pancreatitis was initially treated conservatively and then octreotide was started. His abdominal complaints did not improve and serum amylase and lipase continued to rise. Hematuria was cleared with continuous bladder irrigation (CBI). Cystoscopy did not show any foreign body or stone to account for the hematuria. Exploratory laparotomy was subsequently performed for possible bowel perforation, but none was found. There were copious amounts of serosanguineous fluid and saponification of the mesenteric and omental fat. There was no evidence of pancreatic abscess or necrosis. Evacuation of

ascites and washout of the peritoneal cavity and pelvic drain placement were performed. Cultures from ascitic fluid and urine were negative. However, ascites revealed an amylase of 10,000 units/l and a lipase of greater than 400 units/l. Lactate dehydrogenase (LDH) level was 701 units/l (normal reference range of 100 to 200 units/l). Serum qPCR was negative for CMV and polyomavirus type BK.

Two days postoperatively, he developed respiratory distress and hypoxemia likely due to mucous plugging, and was intubated. He had bradycardia which then progressed to asystole. Advanced cardiac life support (ACLS) was performed for 10 minutes and the patient had return of spontaneous circulation. He was extubated 3 days later.

The patient continued to have high amylase output from the pelvic drain. He had recurrent hematuria and anuria; as a result, continuous bladder irrigation was performed. He developed an acute abdomen, and his abdomen became more distended. A second exploratory laparotomy was performed, and revealed a 1.5 cm perforation at the duodenovesical anastomosis suture line, copious amounts of amylase positive ascites fluid in the upper abdomen, and diffuse fat necrosis and saponification of the fatty tissues. Acute gangrenous cholecystitis was also noted, and cholecystectomy was performed. A catheter drain was placed into the perforated site.

He subsequently developed acute kidney injury (AKI). Baseline serum creatinine was 1.9 mg/dl which rose to 3.1 mg/dl. He was previously on tacrolimus 0.5 mg oral twice a day and prednisone 5 mg daily. Initially, tacrolimus dose was adjusted, and prednisone was switched to intravenous methylprednisolone for possible acute renal allograft rejection. Transplant kidney biopsy was performed, and showed evidence of calcineurin inhibitor toxicity. There was no evidence of acute rejection, viral inclusions, CMV or BK virus. The Tacrolimus level was 43 ng/ml. Tacrolimus was adjusted to maintain the target level. The hospital course was complicated with uncontrolled severe sepsis, disseminated candidiasis, pulmonary aspergillosis, and recurrent *Clostridium difficile* colitis. Despite aggressive treatment with broad spectrum antibiotics and antifungal medications, severe sepsis and intraabdominal infection from persistent pancreatic leak were difficult to control. To lower immunosuppression for better infectious control, tacrolimus was discontinued, and intermittent hemodialysis was initiated due to uremia. The patient underwent a third exploratory laparotomy. The previous perforated site at the duodenovesical anastomosis suture line was large, and not amenable to repair. Due to severe pancreatic leak and fungal peritonitis, whole organ pancreatectomy was performed despite good graft function. Pathology of the pancreatic allograft showed a small area of chronic pancreatitis, serositis around the outer surface of the pancreatic allograft, and there was very mild interlobular septal inflammation suggesting the possibility of acute rejection of the pancreatic graft. The duodenal graft segment showed acute erosive ulcers. The bile ducts were unremarkable.

The abdominal wall was left open with a modified suction closure. He then underwent multiple abdominal wash-outs every 2 to 3 days, with eventual abdominal wall closure.

He experienced some improvement and methylprednisolone was tapered to hydrocortisone, and then to prednisone. Intermittent hemodialysis was continued. Unfortunately, he had recurrent septic shock requiring vasopressors. He also had disseminated *Candida glabrata*, pulmonary aspergillosis, as well as recurrent *Clostridium difficile* colitis. He developed respiratory failure, was reintubated, and expired 1 day later. He was hospitalized in ICU for a total of 2 months. An autopsy was refused. However, the remaining tissue of the duodenal graft segment was re-examined, and the immunoperoxidase stain was positive for CMV antigens.

## Discussion

Whole pancreas transplantation needs to provide both endocrine and exocrine functions. The two main surgical techniques used for exocrine drainage are enteric and bladder drainage. Bladder-drained pancreatic transplantation is simple and safe, with low rates of infection.<sup>2</sup> However, it can cause unique metabolic complications such as metabolic acidosis and urological complications including hematuria and urinary tract infection.<sup>3</sup> Moreover, infection is an important complication which leads to high rates of morbidity and mortality, and of these, CMV infection is one of the most important causes of mortality in solid organ transplantation.

Our patient presented with two main urological complications of bladder-drained SPK transplantation, namely, hematuria and pancreatic leak. Our investigation led to the findings that these complications were due to CMV infection and allograft CMV duodenal ulceration. Invasive CMV disease at the graft duodenal segment causing late urological complication with hematuria and pancreatic leak 15 years after bladder-drained SPK transplantation in our patient is unique, as previously reported cases of post-transplant CMV disease occurred only as late as 18 months.<sup>4-6</sup> There were 3 previously reported cases of duodenal perforation after pancreas transplantation alone (PTA) or SPK transplantation,<sup>4-6</sup> which are summarized in the Table 1.

In SPK transplantation, CMV infection usually occurs after 1 month of transplantation.<sup>7</sup> The incidence of CMV infection is 38–78 % if no CMV prophylaxis is given.<sup>7</sup> Risk factors for CMV infection include donor-recipient serostatus, total immunosuppressive state, use of lymphocyte-depleting induction for rejection treatment, comorbid illnesses, neutropenia, and coinfection with HHV-6 and HHV-7.<sup>7</sup> In addition, pancreas and SPK transplant recipients have a significantly higher risk for CMV disease than kidney transplant recipients who have the lowest risk for CMV disease among all organ transplants.<sup>7</sup>

Our patient underwent SPK transplantation 15 years ago, and the CMV serostatus was unknown. The patient had normal functioning pancreatic and renal allografts, and never had

| Table 1. Three Previously Reported Cases and Our Case of Duodenal Graft Perforation Post Pancreas Transplantation <sup>4-6</sup> |                      |  |                    |  |  |                      |
|--|----------------------|--|--------------------|--|--|----------------------|
| References   | Age (years) / Gender | Transplant technique / Exocrine drainage | Presenting symptom | Etiology of duodenal graft perforation | Onset from transplantation to duodenal graft perforation | Management           |
| 9.   | 33 / M               | SPK / Bladder                            | Abdominal pain     | Simple ulcer                           | 5 months   | Direct closure       |
| 10.  | 32 / F               | PTA / Bladder                            | Abdominal pain     | CMV duodenitis                         | 18 months  | Graft duodenectomy   |
| 11.  | 30 / F               | SPK / Bladder                            | Hematuria          | CMV duodenitis                         | 12 months  | Graft pancreatectomy |
| Our case   | 70 / M               | SPK / Bladder                            | Hematuria          | CMV duodenal ulcer                     | 15 years   | Graft pancreatectomy |

SPK: simultaneous pancreas-kidney transplantation. PTA: pancreas transplantation alone. CMV: cytomegalovirus.

graft rejection. The dosage of immunosuppressive medication including tacrolimus and prednisone were not changed prior to his developing gross hematuria.

In kidney transplantation, there is an association between CMV viremia and CMV-related renal allograft pathology.<sup>8</sup> However, this correlation has not been reported in duodenal graft SPK transplant. In general, high CMV viral loads correlate with risk of developed CMV disease.<sup>9</sup> However, the correlation between viral load and immunohistopathology is not well documented.<sup>10</sup>

Our patient was not treated for CMV infection because CMV viral load was repeatedly negative. Staining for CMV from the duodenal graft was positive posthumously. Missed diagnosis for duodenal graft ulcers from CMV infection led to uncontrolled hematuria, duodenal perforation, and persistent pancreatic leak. This case demonstrates that CMV viral load is unreliable and does not necessarily correlate with invasive CMV disease.

The incidence of late-CMV disease has decreased due to CMV prophylaxis post-transplantation. There are two approaches for CMV prevention: universal prophylaxis and preemptive therapy.<sup>10</sup> In the universal prophylaxis strategy, antiviral medications are administered to all patients in the immediate very early post-transplant period. Duration of using antivirals ranges from 3 to 6 months. For preemptive therapy, there is regular CMV monitoring for early detection in an asymptomatic patient and antiviral therapy is initiated once the viral replication increases to assay threshold to prevent the progression to clinical disease.<sup>10</sup> Preemptive therapy allows more selective drug targeting, decreased drug cost, and toxicities; however, it needs weekly laboratory monitoring, and a short turnaround time in the laboratory. In addition, the threshold of viral antigenemia and viral load to initiate treatment have not been well established.<sup>10</sup>

Prophylaxis is favored over preemptive therapy, in high risk mismatched patients (positive CMV donor and negative CMV recipient [D+/R-]).<sup>10</sup> However, late-onset CMV disease defined as the CMV disease occurring after discontinuing prophylaxis is significant and was as high as 18% at 12 months.<sup>11</sup> Risk factors for late-onset CMV disease are D+/R- serostatus, higher levels of immunosuppression, and allograft rejection.<sup>12</sup>

In our patient, both prophylaxis and preemptive therapy were not continued. It is difficult to diagnose CMV disease in high risk patients as there is no correlation between CMV viral load and invasive CMV disease. Therefore, a high index of suspicion and invasive investigations are warranted to diagnose invasive CMV disease.

## Conclusion

Early detection of CMV disease even in the late post-transplant period is important, especially with recurrent hematuria from duodenal graft ulcers. Even though CMV antigenemia may be negative, tissue biopsy should be obtained with initial cystoscopy. Moreover, preemptive treatment for CMV disease in an SPK recipient presenting with recurrent hematuria should be considered in this at-risk population.

*This case report was presented as a poster presentation at the American College of Physician (ACP) Hawai'i chapter meeting on January 7th, 2012 and National Kidney Foundation (NKF) 2012 Spring Clinical Meeting May 9-13, 2012 at the Gaylord National in Washington DC.*

## Conflict of Interest

The authors report no conflict of interest.

## Acknowledgement

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# Factors Affecting Household Adoption of an Evacuation Plan in American Samoa after the 2009 Earthquake and Tsunami

Emma J. I. Apatu MPH; Chris E. Gregg PhD; Kasie Richards DrPH;  
Barbara Vogt Sorensen PhD; and Liang Wang MD, DrPH

## Abstract

*American Samoa is still recovering from the debilitating consequences of the September 29, 2009 tsunami. Little is known about current household preparedness in American Samoa for future earthquakes and tsunamis. Thus, this study sought to enumerate the number of households with an earthquake and tsunami evacuation plan and to identify predictors of having a household evacuation plan through a post-tsunami survey conducted in July 2011. Members of 300 households were interviewed in twelve villages spread across regions of the principle island of Tutuila. Multiple logistic regression showed that being male, having lived in one's home for < 30 years, and having a friend who suffered damage to his or her home during the 2009 tsunami event increased the likelihood of having a household evacuation plan. The prevalence of tsunami evacuation planning was 35% indicating that survivors might feel that preparation is not necessary given effective adaptive responses during the 2009 event. Results suggest that emergency planners and public health officials should continue with educational outreach to families to spread awareness around the importance of developing plans for future earthquakes and tsunamis to help mitigate human and structural loss from such natural disasters. Additional research is needed to better understand the linkages between pre-event planning and effective evacuation responses as were observed in the 2009 events.*

## Keywords

*American Samoa, tsunami, household evacuation, planning*

## Introduction

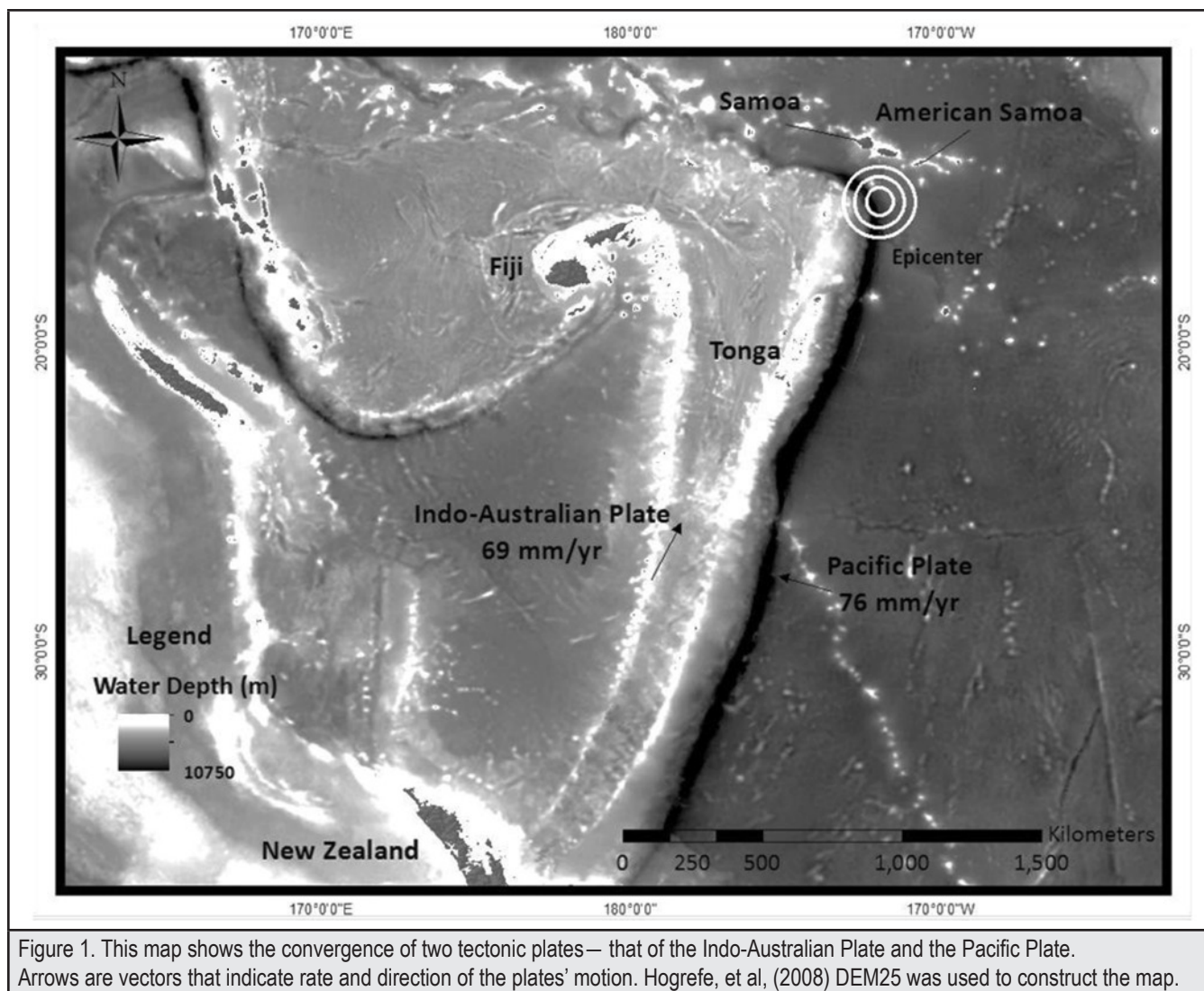
The Pacific islands are vulnerable to an admixture of natural hazards arising from earthquakes, volcanic eruptions, submarine landslides, and monsoons, all of which are probable threats to Pacific island coastlines, including American Samoa.<sup>1</sup> The geographical positioning of the islands, along the Pacific Rim of Fire where a long chain of volcanoes and high seismic activity occur exposes these islands to potential risk for extreme natural disasters. Not only are Pacific Islands vulnerable to natural hazards, but also their isolated geographical positioning makes it challenging to receive outside assistance in large scale disasters such as tsunamis.<sup>2,3</sup> Additionally, many developing nations, like those found in the Pacific Islands, have been found to experience greater impacts from natural disasters due to socioeconomic vulnerability.<sup>4</sup>

On Tuesday, September 29, 2009, at 6:48AM (local time), the US Territory of American Samoa was struck by an 8.1 magnitude earthquake that triggered a destructive tsunami.<sup>5</sup> The earthquake produced moderate to very strong ground shaking across the whole of American Samoa. The tsunami arrived on the nearest shoreline of American Samoa in as little as 15 minutes after the onset of the earthquake.<sup>6</sup> Approximately 149 persons in Samoa, 34 in American Samoa, and nine in Tonga died in the tsunami.<sup>5</sup> The death toll in American Samoa, was low as

residents showed a remarkable ability to effectively evacuate the coastal zone on a weekday, when thousands were in the inundation zone on their way to and from school, work, and home. According to the US Department of Homeland Security (2010), 241 homes were destroyed, 308 had major damage, and an additional 2,750 homes reported some damage, accounting for approximately 35.2% of all American Samoa homes being affected by the disaster.<sup>7</sup> It is estimated that Federal recovery assistance to the Territory has totaled over \$125 million dollars.<sup>7</sup> Many years later, American Samoa is still recovering from the disaster and the Federal Emergency Management Administration is currently taking part in a \$25 million recovery effort.<sup>8</sup>

American Samoa consists of five islands: Tutuila, Aunu'u, Ofu, Olosega, and Ta'u and two atolls, Rose and Swains.<sup>8</sup> American Samoa is a group of isolated islands in the Polynesia archipelago, 1,800 miles northeast of New Zealand. The territory lies in one of the world's most seismically active regions where two active tectonic plates abut.<sup>9</sup> See Figure 1. The territory spans an area of approximately 197 Km<sup>2</sup> split up into approximately 65 villages across three districts (East, West, and Manu'a) with an estimated total population of 55,519.<sup>10</sup> The economy is driven by its fish processing industry that accounted for 31% of jobs in 2002.<sup>11</sup> The latest gross domestic product (GDP) estimate for American Samoa was 575.3 million in 2007.<sup>8</sup>

Tsunamis are a public health concern for American Samoa and preparedness is a key element to lessening the impact of such disasters. The Centers for Disease Control and Prevention (CDC) recommends that individuals living in earthquake prone regions prepare for earthquakes by having a household evacuation plan (ie, details of evacuation routes; emergency food; and water supplies).<sup>12</sup> Despite CDC's recommendations for earthquake preparedness for communities in seismic hazard zones, people seldom take precautionary efforts to protect their homes and families.<sup>13</sup> To understand motivating factors for natural hazard mitigation, social scientists have spent an extensive amount of time exploring predictors of household evacuation planning. In studies based in the continental US, demographic variables such as sex, education, income, and length of residence have been found to predict preparedness behavior.<sup>14-16</sup> However, little is known about household evacuation planning adoption for earthquakes and tsunamis in vulnerable areas outside of the continental US, such as American Samoa. Therefore, the aims of this study were to estimate the prevalence of having household evacuation plans among adult residents and to identify predictors of household evacuation planning in American Samoa.



## Methods

Approval for the study was granted by the American Samoa Office of Samoan Affairs and East Tennessee State University's Institutional Review Board. Study villages in the Eastern and Western districts were purposely selected (See Figure 2) with respect to varying run-up heights (run-up is the highest elevation above mean sea level that the tsunami reached) and wave arrival times of the 2009 tsunami event to gather diverse perspectives of responses. Post-tsunami work conducted by Fritz, et al, (2011) indicated that the western part of the island experienced some of the most damaging impacts from the tsunami where run-up heights were the highest; run-up heights decreased going eastward. Poloa had the highest tsunami run-up heights of more than 17 meters and Tula had run-up of 9 meters.<sup>17</sup> The villages of Tula and Fagasa were included in the study because they are located further from the source of the tsunami and hence had additional time to respond to the first tsunami wave compared to the villages in the western side of the island, which were closest to the tsunami source.

Prior to the commencement of data collection, the interviewers attended a two-day training session led by the research team, to help ensure interview standardization. The interview team consisted of local persons that were students, professionals, or both. All interviews were conducted in July, 2011. We attempted to conduct a census in villages on the Western side of the island (Fagamalo, Maloata, Fagali'i, Poloa, Amanave, Agugulu, Se'etaga, Afao, Asili, and Amaluia). Fagasa and Tula, two eastern villages, were sampled by simple random sampling of every other household. In both study districts available homes that remained after the tsunami were approached during the collection period, and an alternating strategy of interviewing male and female respondents was adopted to ensure a balanced sex representation. In instances where no one was home, interviewers approached the home up to three times in an attempt to secure an interview.

Prior to each interview, interviewers provided a study introduction, ensured that the householder was on-island during the 2009 event and was an adult over the age of 18. Then

interviewers proceeded with an informed consent process and commenced with the interview after consent. In total, 300 interviews were completed from 308 approached households in twelve villages across the Eastern and Western districts. The interviews investigated predictors of household preparedness for future earthquakes and tsunamis. The research team coordinators performed follow-up visits with randomly selected respondents in each study village to confirm quality and accuracy of interviews. No discordant information was found from the follow-up visits. Additionally, interviewers met with study coordinators at a central location on a weekly basis to submit completed questionnaires. Forty-nine cases were excluded from the analysis because of missing values due to non-response; thus, analyses were conducted with  $N=251$  cases.

### Measures

The study questionnaire was created in English and then translated into Samoan. For quality assurance, it was then back-translated to English to look for differences in meaning, modified as needed, and then pilot tested with three local community members. The questionnaire was guided by the Protection Action Decision Model (PADM) which is a detailed stage/flow theoretical framework used to understand decision making, behavioral response, and preparedness with respect to natural hazards.<sup>19,20</sup> The questionnaire sought to find out what people did during the earthquake and tsunami and what preparations they have made to protect against future earthquakes and tsunamis. The dependent variable, household evacuation planning, was assessed through the question: "Do you and the members of your household have an evacuation plan for a future earthquake and tsunami?" Response options were: "Yes" (=1), "No" (=0), and "I don't know".

The independent variables included socio-demographic characteristics on individuals and households. Individual demographic items included: age (continuous), sex (male, female), the following variables were dichotomized: education ( $\leq$ High school,  $>$ High school), yearly household income ( $\leq$ \$14,999,  $>$ \$15,000), length of residence ( $<$ 30 years,  $\geq$ 30 or more years), distance of shorelines ( $<$ 100 meters,  $\geq$ 100 meters), hazard awareness meeting attendance (yes, no), damage to immediate family's property (yes, no), property of friend, relative, neighbor, or co-worker you know personally was damaged in the earthquake (yes, no), and a friend, relative, neighbor, or co-worker you know personally was killed or has been killed or injured in the earthquake (yes, no), and immediate family death or injury (yes, no).

### Statistical Analysis

Household locations were recorded after each interview on aerial photographs using a push pin. Afterwards, the interview location points were digitized and georeferenced in GIS software ArcMap 10<sup>®</sup>. Distance to shoreline was calculated by measuring each georeferenced interview location point to the closest coastal perimeter using an American Samoa Digital Elevation Model (DEM).<sup>21</sup> Chi-squared ( $\chi^2$ ) tests or student t tests were used to

compare characteristics of participants who reported having an evaluation plan for a future earthquake and tsunami ( $n=88$ ) with characteristics of participants who did not report having the plan ( $n=163$ ).  $\chi^2$  tests were used to determine significance for categorical variables (expressed in frequencies with percentage values) and t tests were used to determine the significance for continuous variables (expressed as mean  $\pm$  standard deviation). Multiple logistic regression analyses were used to adjust for factors whose  $P$ -values were less than .05 in univariate analyses and to evaluate the associations of those factors and having an evaluation plan. All analyses were performed using SAS, version 9.2 (SAS Inc., Cary, NC).

### Results

The overall response rate was 97% (300/308), suggesting an interest in the study villages in sharing their experiences with the earthquake and tsunami disaster. Participants' median age was 43 years ( $SD=13.6$ , range 18-77 years). The prevalence of having a household evacuation plan was 35% (88/251) among the participating households. The distribution of household evacuation plans is illustrated in Figure 2. Respondents from the village of Poloa had the lowest report of a plan among the villages surveyed, ie, 11% (2/19).

Table 1 shows that eight of the eleven predictors of having an evacuation plan, were significant, where as only age, education, and family death or injury was found not to be significant. Multiple logistic regression analysis showed that males were two times more likely to report having a household evacuation plan than females ([OR] 2.1; 95% CI=1.2, 3.7). Residents who had lived in their homes less than 30 years were more likely to report having a household evacuation plan ([OR] 2.5, 95% CI=1.4, 4.7). Individuals having a friend, a relative, a neighbor, or a co-worker whose property was damaged in the earthquake were approximately three times more likely to report having a household evacuation plan ([OR] = 3.0, 95% CI = 1.3, 7.0). See Table 2.

### Discussion

We conducted a post-tsunami reconnaissance study, in numerous villages on an island where major damage was sustained to infrastructure during the 2009 tsunami and where 34 persons lost their lives. Thirty-five percent of surveyed households reported having an evacuation plan for future earthquake and tsunamis. Our study identified characteristics which are more likely predictors of having the plan, but we have no data regarding the quality of the plan. In the bivariate analyses, householders that reported attending a hazard awareness meeting were more likely to report having an evacuation plan. Our findings show that males are more aware of having a household evacuation plan than females. If this is the case, emergency planners should help ensure that household evacuation planning is conducted as a family activity where all persons of a household can identify their tsunami evacuation plan depending on where they are located at the time of a tsunami threat (ie, at home, school, work, recreation). Moreover, having a friend or neighbor that

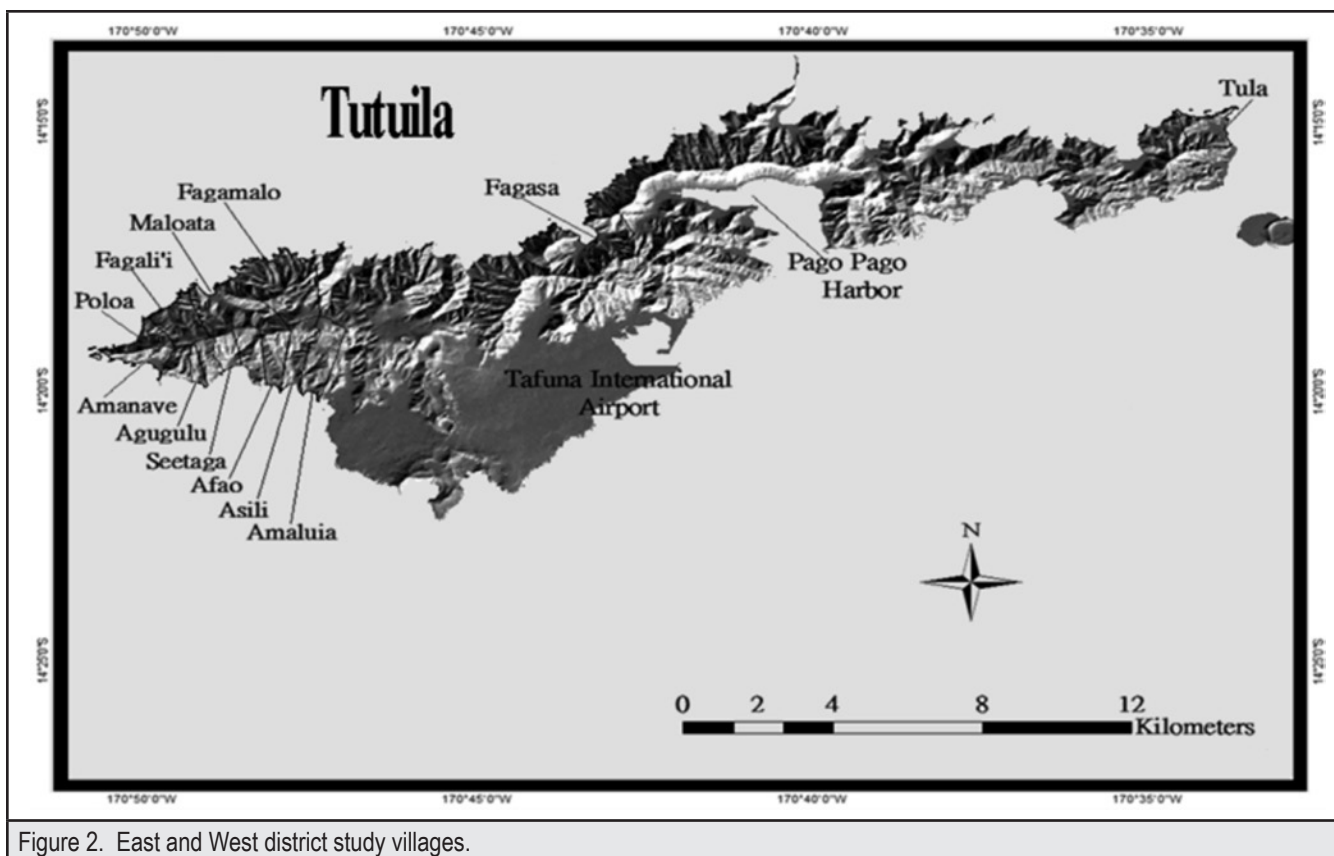


Figure 2. East and West district study villages.

experienced property damage was a predictor of having a preparedness plan. It may be that this led to a vicarious experience in which the person internalized their friends' and/or neighbors' household damage as their own and decided to ensure their family's safety against future earthquakes and tsunamis. External ties to friends and neighbors may have a profound effect on tsunami preparedness behavior. The literature is inconclusive on whether direct or vicarious experience motivates preparedness, Paton, et al, (2001) reported direct experience is required for volcanic hazard preparedness in New Zealand.<sup>22</sup> However, Neisser, Winograd, and Bergman (1996) reported in a memory study that people experiencing household damage had more accurate long-term memories of the experience than did those reporting no damage, but a subgroup of those with no damage was found to be significant, those with friends or relatives who sustained damage.<sup>23</sup> These authors suggested that memory recall was improved by rehearsing experiences during the event with friends, neighbors, and family, ie, where they were at the time of the earthquake, what they did, etc. Perhaps there is a similar dialogue occurring in subpopulations in American Samoa, which motivates adoption of preparedness measures. People residing in their homes for less than 30 years were more likely to report having a plan. This suggests that emergency managers should try and target residents living in their homes for more than thirty years to engage in household planning.

One major limitation of this study is that respondents may not have been aware of all their family member's household

earthquake and tsunami preparedness efforts which could have contributed to the reported lack of household planning. Additionally, it was noted during data analysis that a \$5,000-\$5,999 income category was inadvertently omitted from the survey. As a result, respondents who earned in this category may not have responded to the question, thereby underestimating the prevalence of the low income group, or selected a different category, introducing a potential source of error in the dichotomized income variable. This study was also limited by the fact that occasionally (~5%), targeted households were not able to be interviewed because of a threat of attack from dogs that represented a health and safety risk to the interviewers. Dog related injury has been found to be a major public health concern accounting for half of all injuries in American Samoa.<sup>18</sup> Additionally, selection bias may have been an additional downfall of this study given that safety against dogs was an issue for interviewers. It is believed that the dog threat would be a source of non-differential bias which possibly could have led to an underestimate of the prevalence of household preparedness.

## Conclusions and Recommendations

The prevalence of household evacuation planning for future earthquakes and tsunamis gathered from this study signals that preparedness should include the family so both females and males in the household are involved. Past work on health promotion behaviors related to cancer screening in American Samoa have found that venues such as churches are effective

Table 1. Comparison of participants' characteristics by whether having an evaluation plan for a future earthquake and tsunami: A cross-sectional study in American Samoa, 2011 (N=251).

| Characteristics   | Having an evacuation plan for a future earthquake and tsunami |            | P-value <sup>a</sup> |
|---|---|------------|----------------------|
|   | No (n=163)  | Yes (n=88) |                      |
| Age (years), mean± SD   | 42.0±13.7   | 43.8±13.5  | .334                 |
| <b>Sex</b>  |   |            |                      |
| Male  | 72 (58.5)   | 51 (41.5)  | .037                 |
| Female  | 91 (71.1)   | 37 (28.9)  |                      |
| <b>Education</b>  |   |            |                      |
| > High school   | 82 (68.3)   | 38 (31.7)  | .281                 |
| ≤ High school   | 81 (61.8)   | 50 (38.2)  |                      |
| <b>Income</b>   |   |            |                      |
| ≤ \$14,999  | 63 (54.3)   | 53 (45.7)  | .001                 |
| >\$15,000   | 100 (74.1)  | 35 (25.9)  |                      |
| <b>Length of residence</b>  |   |            |                      |
| < 30 years  | 74 (53.6)   | 64 (46.4)  | <.001                |
| ≥ 30 or more years  | 89 (78.8)   | 24 (21.2)  |                      |
| <b>Distance of shoreline (meters)</b>   |   |            |                      |
| < 100   | 73 (58.9)   | 51 (41.1)  | .047                 |
| ≥ 100   | 90 (70.9)   | 37 (29.1)  |                      |
| <b>Hazard awareness meeting attendance</b>  |   |            |                      |
| Yes   | 55 (52.3)   | 49 (47.1)  | .001                 |
| No  | 108 (73.5)  | 39 (26.5)  |                      |
| <b>Damage to immediate family's property</b>  |   |            |                      |
| Yes   | 96 (58.5)   | 68 (41.5)  | .004                 |
| No  | 67 (77.0)   | 20 (23.0)  |                      |
| <b>Property of friend, relative, neighbour, or co-worker you know personally was damaged in the earthquake</b>                    |   |            |                      |
| Yes   | 95 (55.9)   | 75 (44.1)  | <.001                |
| No  | 68 (84.0)   | 13 (16.1)  |                      |
| <b>A friend, relative, neighbour, or co-worker you know personally was killed or has been killed or injured in the earthquake</b> |   |            |                      |
| Yes   | 67 (55.8)   | 53 (44.2)  | .004                 |
| No  | 96 (73.3)   | 35 (26.7)  |                      |
| <b>Immediate family death or injury</b>   |   |            |                      |
| Yes   | 49 (66.2)   | 25 (33.8)  | .784                 |
| No  | 114 (64.4)  | 63 (35.6)  |                      |

Abbreviation: SD = standard deviation. <sup>a</sup>P-value was from a Chi-squared ( $\chi^2$ ) test or t test. Note: Totals may not equal 100% because of rounding.

places to reach broader audiences.<sup>24</sup> Future research should better understand the linkages between pre-event planning and effective individual and household evacuation responses as were observed in the 2009 events.

### Conflict of Interest

None of the authors identify any conflict of interest.

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Table 2. Multiple logistic regression of associations between factors and having an evaluation plan for a future earthquake and tsunami: A cross-sectional study in American Samoa, 2011 (N=251).

| Characteristics   | Having an evacuation plan for a future earthquake and tsunami (n=88) |         |         |
|---|--|---------|---------|
|   | AOR <sup>a</sup>   | 95% CI  | P-value |
| <b>Sex</b>  |  |         |         |
| Male  | 2.1  | 1.2-3.7 | .015    |
| Female  | 1  |         |         |
| <b>Income</b>   |  |         |         |
| ≤ \$14,999  | 1.5  | 0.8-2.7 | .176    |
| >\$15,000   | 1  |         |         |
| <b>Length of residence</b>  |  |         |         |
| < 30 years  | 2.5  | 1.4-4.7 | .003    |
| ≥ 30 or more years  | 1  |         |         |
| <b>Distance of shoreline (meters)</b>   |  |         |         |
| < 100   | 1.6  | 0.9-3.0 | .110    |
| ≥ 100   | 1  |         |         |
| <b>Hazard awareness meeting attendance</b>  |  |         |         |
| Yes   | 1.8  | 1.0-3.3 | .057    |
| No  | 1  |         |         |
| <b>Damage to immediate family's property</b>  |  |         |         |
| Yes   | 1.1  | 0.5-2.3 | .781    |
| No  | 1  |         |         |
| <b>Property of friend, relative, neighbour, or co-worker you know personally was damaged in the earthquake</b>                    |  |         |         |
| Yes   | 3.0  | 1.3-7.0 | .011    |
| No  | 1  |         |         |
| <b>A friend, relative, neighbour, or co-worker you know personally was killed or has been killed or injured in the earthquake</b> |  |         |         |
| Yes   | 0.8  | 0.4-1.6 | .516    |
| No  | 1  |         |         |

Abbreviations: AOR = adjusted odds ratio. <sup>a</sup>The AORs were adjusted for all the variables. CI= confidence interval; SD=standard deviation.

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# Evaluating the Impact of a School-based Prevention Program on Self-esteem, Body Image, and Risky Dieting Attitudes and Behaviors Among Kaua'i Youth

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and Rosanne C. Harrigan EdD, MS, APRN-Rx

## Abstract

*Eating disorders and obesity (EDO) are increasing among youth, having serious long-term physical and psychological consequences. The purpose of this study was to determine if significant differences exist in EDO risk factors following participation of 4-6th grade students in a school-based EDO prevention curriculum. This community-based research project assessed students at baseline and one week following EDO intervention. Primary outcome variables measured self-esteem, body dissatisfaction, and high risk eating attitudes and behaviors. Pre and post-test differences were calculated using mixed models, correcting for clustering within schools and teachers. This study found mean changes in all scores in healthy directions, as well as movement of students into lower risk groups post-intervention. This program demonstrated that a classroom curriculum is associated with decreased risks of EDO in boys and girls, supporting prevention programs at an early age for both sexes. Studies to determine long term benefit and guide booster interventions are warranted.*

## Introduction

Eating disorders and obesity (EDO) are increasing among youth and can have serious long-term physical and psychological consequences, making the development of effective prevention imperative. This investigation assessed known EDO risk factors (body satisfaction, self-esteem, and eating attitudes and behaviors) following participation of 4-6th grade students in an EDO prevention curriculum delivered in a classroom setting.

Scope of eating disorders and related behaviors among youth: There is a broad range of body image concerns, including feeling dissatisfied with one's body, exhibiting dieting and more risky eating behaviors and attitudes, and in more severe cases meeting criteria for an eating disorder such as anorexia or bulimia. Children are starting to exhibit body dissatisfaction (BD) and risky dieting behaviors and attitudes earlier, and are presenting earlier with eating pathology and diagnosable disorders.<sup>1,2</sup>

Dissatisfaction with one's body and desiring to lose weight has been referred to as the cultural norm.<sup>3</sup> Nationwide, almost half (45.6%) of all students in the 2007 Youth Risk Behavior Survey<sup>4</sup> were trying to lose weight, being more prevalent among girls (61.7%) than boys (29.9%). In that same survey,<sup>4</sup> 12.3% of students had gone without eating for more than 24 hours, 6.3% of students had taken diet pills, powders, or liquids without a doctor's advice, and 4.5% of students had vomited or taken laxatives to lose weight or to keep from gaining weight during the previous month. The National Health and Nutrition Examination Survey (NHANES) found 17.2% of normal and underweight children ages 8-15 had gone without eating for more than 24 hours trying to lose weight in the past 12 months.<sup>5</sup> Also notable, 17.4% of 8-11 year old boys and 27.5% of 12-15 year old boys were trying to gain weight.<sup>5</sup>

Body weight and shape concerns may be manifested in boys in the form of taking supplements and substances to achieve a more muscular physique. Nationwide, 4.0% of students had taken steroid pills or shots without a doctor's prescription one or more times during their life.<sup>4</sup> It is likely that many more have taken more accessible, unregulated, or non-prescription dietary supplements to enhance muscularity or enhance performance.

Eating disorders represent the third most common chronic illness among adolescents<sup>6</sup> and are often cited as having the most significant morbidity and mortality among the mental illnesses.<sup>1,7,8</sup> Once established, eating disorders are very difficult to treat and can be fatal.<sup>1,7</sup> Even with evidence-based treatment, many eating disordered patients have substantial psychological and/or physical impairments for the long term.<sup>1,7</sup> In addition, poor body image is associated with other serious conditions, such as low self-esteem and depression,<sup>9</sup> self-injurious behaviors and suicidality,<sup>10,11</sup> and substance abuse.<sup>12,13</sup>

## Scope of Obesity Among Youth

Though definitions have changed over the years, current definitions describe an age and sex specific BMI of 85% to <95% as overweight and 95% and above as obese.<sup>14,15</sup> According to CDC data, there has been a four-fold increase of overweight over the past 3 decades among 6-11 year olds.<sup>15</sup> Obesity has doubled in the 12-19 year old age group over this same time span.<sup>15</sup> While the etiology for this increase in obesity is quite complex, some of the modifiable factors include: decreased physical activity, increased intake of larger quantities and less nutritious foods, little value for and poor overall care of the body (food, sleep, substance use), increased sedentary activities ("screen time"), as well as larger environmental and policy issues (cost and access of healthy food, family and peer influences, weight related teasing).<sup>15,16</sup> Overweight in youth is linked to future adulthood obesity<sup>17</sup> and numerous poor health outcomes including: asthma, apnea, hypertension, orthopedic complications, and poor psychological functioning (poor body image, decreased self-esteem, stigmatization and teasing).<sup>16,18-20</sup>

## Common Pathways to Eating Disorders and Obesity (EDO)

The literature consistently identifies key risk factors associated with development of eating disorders, such as body dissatisfaction, low self esteem, and eating attitudes and behaviors.<sup>9,21,22</sup> Haines and Neumark-Sztainer proposed 4 key shared risk factors between eating disorder (ED) and obesity: dieting, media, body dissatisfaction, and weight related teasing, as they are also con-

sidered “amenable to change and suitable for addressing within prevention interventions among youth”.<sup>17</sup> Primary prevention may be able to decrease the likelihood of children developing EDO, however combining approaches is a relatively new field and there is no literature on best-practices. The purpose of this study is to determine if significant differences exist in known EDO risk factors (body satisfaction, self-esteem, and eating attitudes and behaviors) following participation in the Healthy Body Image (HBI) curriculum in a classroom setting.

## Methods

### Setting and Participants

Kaua‘i is a rural island of Hawai‘i with a population of approximately 60,000 and a unique blend of ethnicities and cultures. Eight Kaua‘i schools (1 private and 7 public) participated in this project, and the sample included 297 community male and female students in grades four through six. Fifteen teachers participated, with the number of students per teacher ranging from 6-83.

**Intervention:** The Healthy Body Image Curriculum (HBI) is designed to promote positive body image and healthy lifestyles among 4-6th graders. This empirically derived curriculum created by Kathy Kater, LICSW, and a team of mental health professionals and educators, is based on widely recognized prevention principles. It consists of 10 carefully planned, engaging, age-appropriate, cross-curricular lessons and handouts that teach children to: maintain a caring, mindful connection to their bodies from the inside-out; develop an identity based on inner strengths, not on appearance; gain historical perspective on current unhealthy body image attitudes; respect genetic diversity of body size and shape; understand how appearance changes with puberty; become aware of the dangers of dieting, develop incentives for healthy eating and active lifestyles, think critically about media messages, and resist unhealthy cultural pressures regarding weight and dieting.<sup>23</sup> This curriculum has been tested by Kater, et al,<sup>23</sup> and found to improve knowledge, attitudes and behaviors toward eating and body image.

### Study Design and Procedures

This evaluation used a pre-test and post-test design, with students serving as their own controls to provide comparisons matched on known and unknown variables. Demographic and parent information was collected by the parents at baseline (T0). All other measures were administered to students at baseline (T0) and one week following the completion of the HBI ten session program (T1).

## Methods

This study was reviewed and approved by the University of Hawai‘i IRB and approved by the Kaua‘i DOE superintendent and all of the individual principals. After approval of the project by the DOE superintendent, all schools were invited by email to participate in the project. All of Kaua‘i’s 11 public schools and one private school were approached, and 7 public schools and the one private school agreed to participate. Though not

needed to implement the curriculum, the teachers were all given a formal training session in order to more clearly understand the curriculum and to assure delivery in a uniform manner. Youth who had consents and assents properly signed participated in the study. Teachers completed the ten-session HBI curriculum in their regular classroom setting. Each session was approximately 40 minutes, delivered once a week over ten weeks.

## Measures

1. The Children’s Body Figure Rating Scale (FRS), adapted from the adult Stunkard figure rating scales,<sup>24</sup> was used to measure student body dissatisfaction. This instrument gives students a series of progressively larger body drawings and asks the student to choose the image that most looks like them (perceived body) and the figure that they would most like to have (ideal body). The difference between perceived and ideal body represents the degree of BD; the greater the difference, the greater the degree of dissatisfaction. This widely used instrument has shown good test-retest reliability and can be used with children as young as 8 years.<sup>25,26</sup>

2. The Children’s version of the Eating Attitudes Test<sup>27</sup> (ChEAT) is a 26 item questionnaire adapted from the adult Eating Attitude Test<sup>28</sup> and assesses key attitudes/behaviors associated with development of eating disturbances and ED. This instrument which can be used with children as young as 8 years, has good test-retest reliability and internal reliability.<sup>27,29</sup>

3. The Piers-Harris second edition<sup>30</sup> (PH-2) is a widely used and validated instrument assessing self-esteem. It consists of 60 questions answered with a “yes” or “no” and has good test-retest reliability and internal consistency.<sup>30</sup> It measures global self worth and esteem in six key domains: behaviors, intellectual and school status, physical appearance and attributes, popularity, anxiety, and happiness and satisfaction.<sup>30,31</sup>

4. The Drive for Muscularity Scale (DMS) is a 15-item scale that assesses the desire to be more muscular. It was found to have good reliability (overall alpha .84, for boys .84 and for girls .78) as well as face validity (boys having higher DMS scores than girls), convergent validity (correlated with trying to gain weight/build muscle), and discriminate validity (not correlated with drive for thinness).<sup>32</sup> The DMS uses a five point Likert scale. However, it was adapted to a 3-point scale for use in the elementary population.

## Analysis

Baseline differences in responses by participant characteristics were tested using chi-square tests and t-tests. Descriptive statistics such as means were included to help the reader better understand the study/population. However, the intervention effects shown in table 5 are based on mixed models, due to the complexity of the data (small sample size, wide range of students/teacher, and to address clustering by teacher and by school). The four primary outcome variables were the total

scores on FRS, ChEAT, Piers-Harris, and DMS. Data for children who did not complete both pre and post-tests completely or clearly were excluded from intervention analysis. SAS 9.1 (SAS Institute Inc. Cary, NC) was used to analyze the results.

## Results

### Sample

Table 1 shows the characteristics of the student sample which was collected from parent surveys. The sample consisted of a fairly equal number of boys and girls and came primarily from public schools.

### Baseline Measurements

**Body Dissatisfaction (BD):** Overall, 22% of all students were significantly dissatisfied with their bodies, 25.5% for boys and 18.7% for girls. The majority of students who were dissatisfied wanted to be thinner, with only a few wanting to be bigger, see table 2. There were no significant differences in mean BD scores based on grade ( $P=.35$ ) or sex ( $P=.23$ ). Chi-squared statistics revealed no differences in BD categories by gender or direction ( $P=.32$ ).

Table 3 shows baseline results for the ChEAT, PH-2 and DMS. Mean ChEAT scores did not vary by sex. Mean scores did not differ significantly by grade but were highest for 4th graders ( $P=.064$ ). Table 5 shows percent of students in each risk category. Among all students, approximately 47% fell in the no risk category, 35% were in the moderate risk category, and 18% fell in the highest risk category. The mean score on the DMS was calculated separately by sex, and as expected, the average mean score was higher for boys ( $P<.001$ ). There were no significant differences by grade. The mean T-score on the PH-2 was 51.7. There were no significant differences by sex ( $P=.60$ ) or grade ( $P=.49$ ).

### Intervention Effects

Intervention effects are aimed at assessing the impact of interventions on disease risk factors. All four major outcome variables demonstrated a significant change after the intervention, see table 4.

**Body Dissatisfaction:** There was significant improvement in total BD as well as BD in the direction of wanting to be thinner for all students. The mean difference between perceived and ideal body decreased by 0.2 units from 0.6 to 0.4 ( $P=.001$  CI: 0.32-0.82) for boys and girls combined. Table 5 shows the percent of students in each risk category before and after the intervention. BD was significantly improved post-intervention, OR=0.61 (CI:0.45-0.83). There were no significant differences by grade or sex.

**ChEAT:** The mean score decreased by 2.1 units, which was statistically significant ( $P<.001$ ; CI: -2.82 to -1.48). Table 5 shows changes in risk categories pre- and post-intervention ( $P<.001$ ).

**DMS:** There was a significant improvement on mean DMS post-intervention ( $P<.001$ ), see table 4. Although boys had higher baseline scores, there was no difference in intervention effect by sex ( $P=.60$ ).

**PH-2:** The mean T-score on the PH-2 improved from 51.7 to 53.4 after the intervention, which was statistically significant ( $P<.0001$ , CI: 0.8-2.4). Table 5 describes the changes in risk categories pre and post-intervention ( $P<.001$ ).

| Table 1. Student Characteristics (N=297) |                  |
|--|------------------|
| Student Characteristics                  | Percent (Number) |
| <b>Sex:</b>                              |                  |
| Male                                     | 48.8 (145)       |
| Female                                   | 51.2 (152)       |
| <b>Grade:</b>                            |                  |
| 4th                                      | 40.5 (121)       |
| 5th                                      | 20.7 (62)        |
| 6th                                      | 38.8 (116)       |
| <b>Type of School:</b>                   |                  |
| Public                                   | 93.9 (279)       |
| Private                                  | 6.1 (18)         |
| <b>Live with:</b>                        |                  |
| Mother Only                              | 20.0 (45)        |
| Father Only                              | 6.2 (14)         |
| Both Parents                             | 70.7 (159)       |
| Other                                    | 3.1 (7)          |
| <b>Ethnicity:</b>                        |                  |
| Hawaiian                                 | 29.1 (58)        |
| Filipino                                 | 28.1 (56)        |
| Caucasian                                | 22.7 (47)        |
| Japanese                                 | 6.5 (13)         |
| Other                                    | 13.6 (22)        |
| <b>Father's Education:</b>               |                  |
| vocational training                      | 9.0 (19)         |
| high school                              | 54.8 (115)       |
| 2 yr degree                              | 15.7 (33)        |
| 4 yr degree                              | 12.9 (27)        |
| post graduate                            | 7.6 (16)         |
| <b>Mother's Education:</b>               |                  |
| vocational training                      | 10.0 (22)        |
| high school                              | 39.4 (87)        |
| 2 yr degree                              | 23.5 (52)        |
| 4 yr degree                              | 17.6 (39)        |
| post graduate                            | 9.5 (21)         |

| Table 2. Baseline Body Dissatisfaction Percentages by Sex and Direction of Dissatisfaction |                        |                 |                   |
|--|------------------------|-----------------|-------------------|
| Body Image Characteristics   | % all students (n=233) | % Males (n=110) | % Females (n=123) |
| Satisfied  | 78.1                   | 74.5            | 81.3              |
| Want to be thinner   | 20.2                   | 22.8            | 17.9              |
| Want to be bigger  | 1.7                    | 2.7             | 0.8               |

| Table 3. Comparison of Baseline Outcome Measures |     |             |       |     |       |
|--|-----|-------------|-------|-----|-------|
| Baseline Measure                                 | n   | Student Sex | Mean  | SD  | Range |
| ChEAT  | 123 | Males       | 13.2  | 6.3 | 33    |
| ChEAT  | 134 | Females     | 13.9  | 5.8 | 32    |
| DMS  | 124 | Males       | 25.1* | 5.9 | 16    |
| DMS  | 135 | Females     | 20.2* | 3.7 | 23    |
| PH(2)  | 122 | Males       | 51.4  | 9.7 | 40    |
| PH(2)  | 135 | Females     | 52.0  | 9.1 | 51    |

\*P<.001

| Table 4. Intervention Effects on Mean Scores |     |                   |      |
|--|-----|-------------------|------|
| Measure                                      | n   | Mean              | SD   |
| Body Dissatisfaction PRE                     | 233 | 0.62 <sup>^</sup> | 1.16 |
| Body Dissatisfaction POST                    | 233 | 0.39 <sup>^</sup> | 1.06 |
| ChEAT PRE                                    | 257 | 11.46*            | 6.30 |
| ChEAT POST                                   | 257 | 13.57*            | 6.06 |
| DMS PRE                                      | 258 | 22.60*            | 5.51 |
| DMS POST                                     | 258 | 21.59*            | 6.10 |
| PH-2 PRE                                     | 255 | 51.74*            | 9.40 |
| PH-2 POST                                    | 255 | 53.40*            | 9.67 |

<sup>^</sup>P=.001; \*P<.001

| Table 5. Intervention Effect by Risk Categories |         |          |                |         |
|---|---------|----------|----------------|---------|
| Risk Categories                                 | Pre (%) | Post (%) | Difference (%) | P value |
| <b>Body Dissatisfaction</b>                     |         |          |                | =.001   |
| No Risk   | 78.11   | 86.70    | +8.59          |         |
| High Risk                                       | 21.89   | 13.30    | -8.59          |         |
| <b>ChEAT</b>                                    |         |          |                | <.001   |
| No Risk   | 46.69   | 63.04    | +16.35         |         |
| Mod Risk  | 35.02   | 22.96    | -12.06         |         |
| High Risk                                       | 18.29   | 14.01    | -4.28          |         |
| <b>Piers-Harris</b>                             |         |          |                | <.001   |
| No Risk   | 24.71   | 30.98    | +6.27          |         |
| Low Risk  | 66.67   | 61.57    | -5.10          |         |
| Mod Risk  | 7.84    | 6.67     | -1.17          |         |
| High Risk                                       | 0.78    | 0.78     | 0              |         |

## Discussion and Implications

Body dissatisfaction, one of the most robust risk factors for EDO, was significantly decreased after the intervention. Though the unit change for BD pre- and post-intervention may seem small, one can easily see the clinical importance of this change when looking at risk categories. Almost 9% of the high risk group moved into the no risk category post-intervention. There were similar intervention effects seen among all grades and both sexes. This supports recent studies showing positive

effects of EDO prevention in elementary school children, of both sexes.<sup>33-35</sup> It is important to note, however, that in some overweight students, there may be some appropriate recognition of differences between their current body shape and size and a healthier body. If this is translated into empowerment to make positive changes, it could represent a healthy understanding. All too often, however, noting this difference is associated with disempowerment and feeling bad about one-self, thus other measures, such as self-esteem and unhealthy coping styles are

important to assess and address in prevention programs. This program addresses both sides, by including lessons to improve knowledge about healthy lifestyle choices, and lessons to boost self-esteem and empower students to choose those healthy options. As discussed previously, BD is a known risk factor for depression, self-injurious behavior, suicidality, and substance abuse. This type of intervention may, therefore, have cross over into other mental health arenas as well. Further prospective controlled studies examining these variables over the long term may help elucidate the broader impact of this type of wellness oriented EDO prevention program.

Although this program was intended to be primary prevention, the baseline ChEAT scores show that as early as 4th grade some students exhibit risky eating attitudes and behaviors, with 35% being in the moderate and 18% being in the high risk range. Schur also found evidence of high risk in elementary school students, with 4.8% of 3-6th graders scoring greater than 20 on the ChEAT.<sup>36</sup> Similarly, Maloney found 6.9% of 3-6th graders with disordered eating patterns suggestive of anorexia using the ChEAT.<sup>37</sup> The intervention was associated with improvement in total ChEAT scores by 2.1 points, indicating decreased risky eating attitudes and behaviors. The impact by risk categories shows increased numbers of students in the no risk or a lower risk category after the intervention. Similar to the results seen in BD, the intervention was effective in lowering ChEAT scores for boys as well as girls. This is similar to a school-based media literacy program that decreased internalization of cultural ideals for both males and females, with males improving on 4 subscales and females improving on one subscale.<sup>33</sup> The effectiveness of a program in this young age group supports Kater's comment that "children can acquire a knowledge base as they enter the critical and often more vulnerable middle school years, and as they face increasing unhealthy pressures about appearance, weight and eating".<sup>3</sup>

This study was the first to measure intervention effects on the specific male EDO risk factor, drive for muscularity. The intervention was associated with improvement in this drive. Higher DMS scores are associated with lower self-esteem and increased depressive symptoms,<sup>32</sup> and indeed this study showed improvements in both self-esteem and DMS scores post-intervention. Wanting to be more muscular is also associated with increased likelihood of using anabolic steroids and other types of performance enhancing supplements<sup>38,39</sup> and predicts future substance abuse.<sup>40</sup> There is clear evidence of multiple health consequences of steroid abuse, including increased risk of liver and kidney damage, coronary heart disease, immune dysfunction, polysubstance abuse, and poor psychological functioning.<sup>41,42</sup> Boys in this study had improvements in all of the major outcomes and could gain multiple potential health benefits by being included in primary prevention efforts. Different pathways may lead to unhealthy eating attitudes and behaviors for boys compared to girls and further research would help find key factors that may be amenable to interventions. Further research into pathways as well as prevention programs with boys is also important because symptomatic boys are far

less likely than girls to have accessed treatment.<sup>43</sup> Externalizing behaviors more frequently seen in males, such as other types of substance abuse, aggression, or conduct disturbance, might be considered as potential outcomes for future prospective studies.

The intervention was also associated with improvement in self-esteem, as measured by the Piers-Harris 2. The clinical significance of this can be seen by examining the intervention effects by risk category, clearly showing an increased number of students in the no risk category and decreased numbers in the higher risk categories. The improvement in overall self-esteem suggests positive impact on prevention of EDO given the association between low self-esteem and negative affect on future development of EDO.<sup>34,44,45</sup> Girls with lower self-esteem are more resistant to accepting messages that challenge socio-cultural ideals.<sup>46</sup> Similarly, depression has been shown to decrease effectiveness of ED as well as substance abuse prevention programs.<sup>33</sup> A combined preventive approach with a component to improve self-esteem, such as in the HBI, may enhance the students' ability to benefit from the other lessons related to body image or healthy lifestyles. As reviewed earlier, there is clear documentation of positive self-esteem as a protective factor for EDO, depression, and substance abuse. A program successful at improving self-esteem can have a broad and powerful impact on the lives of children as they develop. Controlled studies that follow children over longer periods of time, as they encounter the many stressors of development and adolescence, may be able to delineate small changes that are indeed related to improved outcome and decreased risk of eating pathology and related outcomes in the future.

This study supports the need for prevention programs at an early age for both sexes and recommends further prospective controlled studies to examine the correlates (body satisfaction, self-esteem, and eating attitudes and behaviors) to differences in known EDO risk factors overtime.

## Limitations and Strengths of the Study

The approach of this study was a community-based research project designed to fit the needs of the community. Small study size and lack of a control group may make the results of this study more difficult to generalize. The pre and post design may be limited by response shift and social desirability bias. Using the students as their own controls, however, can control for known as well as unknown variables. Long-term follow-up to assess maintenance of any benefits is warranted.

## Conclusion

The rising rates of body image concerns and related negative outcomes among boys and girls emphasize the importance of designing and implementing culturally effective prevention programs. This is the first EDO prevention program implemented or evaluated in Hawai'i among the multiethnic and multicultural children of the Pacific, and unique in evaluating changes in BD in both directions (wanting to be thinner and wanting to be larger) and assessing the specific male risk factor of drive for muscularity. This program demonstrates that a school-based

curriculum taught by community teachers is associated with decreased EDO risk factors in both boys and girls. This study found changes in all scores in a healthy direction, more children in the no risk group, less children in higher risk groups, and decreased severity of problems in every major target area post-intervention. This study supports the need for prevention programs at an early age for both sexes. Further research to explore gender differences, optimal timing of interventions, and potential long-term benefits is warranted.

## Conflict of Interest

None of the authors identify any conflict of interest.

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# Treatment of Median Arcuate Ligament Syndrome Via Traditional and Robotic Techniques

Jae S. You BA; Matthew Cooper MD; Steven Nishida, MD; Elna Matsuda MD; and Daniel Murariu MD

## Abstract

*Median arcuate ligament syndrome (MALS) is a rare entity characterized by extrinsic compression of the celiac artery and symptoms of postprandial epigastric pain, nausea, vomiting, and weight loss mimicking mesenteric ischemia. We present two patients diagnosed with MALS, the first treated with an open laparotomy by a vascular surgeon and the second using a robot assisted laparoscopic approach by a general surgeon with a vascular surgeon on standby. This is the second ever report of this approach. Both patients recovered without complications and experienced resolution of their symptoms. A discussion of the pathophysiology, literature review, and multispecialty treatment approach are presented.*

## Keywords

*median arcuate ligament syndrome, celiac artery compression syndrome, celiac axis syndrome, Dunbar syndrome*

## Introduction

Median arcuate ligament syndrome (MALS), also known as celiac artery compression syndrome, celiac axis syndrome or Dunbar syndrome, is often misdiagnosed due to its relative scarcity.<sup>1</sup> The classic triad of post-prandial abdominal pain, weight loss and epigastric bruit is likely to be incomplete. Due to a wide differential diagnosis, including peptic ulcer, gallbladder disease, appendicitis, IBD etc., most patients will have undergone multiple radiologic investigations or procedures including esophagoduodenoscopy or even diagnostic laparoscopy.<sup>1</sup> Once diagnosed by magnetic resonance angiography (MRA) or CT angiography (CTA) the symptomatic patient usually requires surgery. While the traditional open approach still dominates, minimally invasive techniques are increasing in frequency.<sup>2</sup>

We present two patients with MALS, one treated via open laparotomy and the other utilizing robotic technology, the second reported in the Western literature.

## Case Report

### Case 1

A 62-year-old previously healthy woman presented to the emergency department with abdominal pain, indigestion and hot flashes. The patient described postprandial pain without relief from antacids. The physical examination was significant for tenderness to palpation of the abdomen, without peritoneal signs or bruit. Further questioning revealed a 2.5 kg weight loss over the previous two weeks. Abdominal CT scan, electrocardiogram and laboratory values were unremarkable. The patient returned to the ED two days later with epigastric pain radiating to the left sternal area alleviated with nitroglycerin. Cardiac workup including coronary angiogram was normal. Later, a gastroenterologist ordered an MRA that identified a

near obstruction of the celiac artery (Figure 1) with the typical “hook” deformity of MALS. After referral to vascular surgery, duplex ultrasound confirmed severe stenosis of the celiac artery with elevated velocities of 336 cm/s (normal <250) in the supine position.

Because the patient had previously undergone a midline laparotomy for complicated appendicitis, an open approach was undertaken. Celiac trunk vessels were identified and traced to the celiac trunk where the celiac artery was severely compressed by the MAL. The taut ligamentous tissue stretched across the cephalad portion of the celiac artery was divided and excised. Tissue extending one centimeter from the celiac trunk was circumferentially excised ensuring removal of all compressive tissue. Meticulous care was taken to remove the surrounding ganglia. Intraoperative ultrasound showed post release velocity of 180 cm/s. The patient did well post operatively, was discharged on post-operative day four and one month later had near complete resolution of her symptoms.

### Case 2

A 49-year-old woman with a medical history of gastritis, colonic polyps, and hypercholesterolemia was referred to a general surgeon with a 10-week history of postprandial epigastric pain and 2 kg weight loss. Initial management with proton pump inhibitors provided symptomatic relief. She denied any hematochezia, hematemesis, melena, nausea, vomiting, or abnormal bowel habits. After finding an abdominal bruit on physical exam, gastroenterologist ordered duplex ultrasound, MRA and CTA of the abdomen revealing a celiac artery flow velocity of >300 cm/s with poststenotic dilation and increased blood flow on expiration (Figure 2).

A general surgeon, with a vascular surgeon on standby, undertook a robot assisted laparoscopic approach. Similar to the open technique, the celiac artery was identified and the strictures about the median arcuate ligament and surrounding nerve tissue were circumferentially cleared using hook cautery. Intraoperative laparoscopic ultrasound confirmed the location of the celiac artery prior to release and confirmed adequacy of the treatment post release. The patient was discharged the following day without complications. On follow up, after two weeks, the patient had complete resolution of her symptoms with normal flow velocity of the celiac artery (184 cm/s).

## Discussion

MALS occurs most frequently in females aged 40 to 60 with duration of symptoms ranging from 3 months to 10 years.

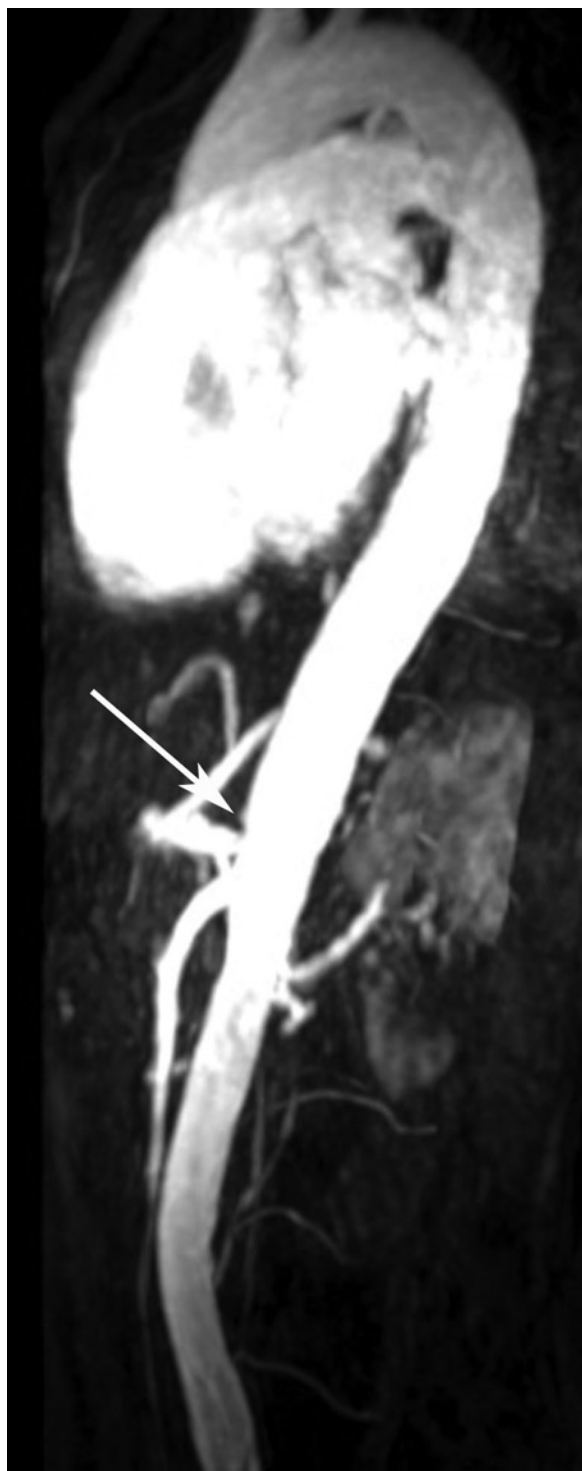


Figure 1. 62-year-old woman with a "hook" deformity of the celiac artery caused by the median arcuate ligament.



Figure 2. Compression of celiac artery by the median arcuate ligament in a 49-year-old woman.

Common symptoms include nausea, vomiting, and postprandial epigastric pain leading to an aversion of food and resulting 5-10 kg weight loss.<sup>1</sup> Epigastric bruits increasing with expiration are reported in 83% of cases and may be the only clinical sign. Nonetheless, it is important to note that epigastric bruits can be found in 30% of normal healthy adults.<sup>1,3</sup>

The etiology of MALS remains unknown but a case report of monozygotic twins suggests a congenital origin.<sup>4</sup> Whether the pathophysiology is primarily vascular or neuropathic origin remains undetermined.<sup>3</sup> Isolated vascular compression of the celiac artery as the sole etiologic factor seems unlikely. First, in 10%-24% of the population the MAL can cause asymptomatic compression.<sup>5</sup> Second, collateral circulation by the superior mesenteric artery provides adequate blood supply; therefore, postprandial abdominal pain should not be expected with celiac artery compression alone.

The cause of MALS is likely multifactorial, including compressive effects on the celiac artery and surrounding neurogenic structures. In celiac artery compression, it has been noted that either the celiac artery is located slightly higher or the MAL is located lower than expected.<sup>6</sup> In a large series, significantly higher symptomatic relief was achieved through combined release of the MAL and revascularization.<sup>7</sup> If celiac artery compression alone is corrected, evidence suggests up to 53% will be asymptomatic on long-term follow up.<sup>7</sup> Combined release and revascularization however increases the long-term success to 79%.<sup>7</sup> Therefore some patients may require additional revascularization procedures such as mesenteric artery stenting or bypass to provide long-term symptomatic relief. Since delay

of revascularization is unlikely to adversely affect outcome, most choose ligament release first, followed by revascularization via stenting or bypass if symptoms persist. Endovascular celiac artery stenting alone without release of the ligament is discouraged because of clinical failure and recurrent stenosis.<sup>8</sup>

The series also demonstrated resolution of postprandial pain in 81% of patients. Symptom resolution was more likely in those aged 40 to 60 and weight loss greater than 10 kilograms.<sup>7</sup> Patients with atypical pain patterns, periods of remission, age over 60, history of psychiatric or alcohol abuse, or weight loss under 10 kg experienced less symptom resolution after ligament release.<sup>7</sup>

While historically MALS was treated primarily by vascular surgeons, the shift towards less invasive procedures has allowed general surgeons with training in minimally invasive surgery to operate more. Nonetheless, injury to the celiac artery and bleeding is a serious risk and the operating team must be prepared to intervene.<sup>9</sup> In a case series of 10 patients undergoing minimally invasive repair, 8 were converted to open due to bleeding from either the aorta or a major vessel requiring the assistance of a vascular surgeon.<sup>10</sup> Therefore, close cooperation between the general surgeon and a vascular surgeon is imperative unless the general surgeon feels comfortable dealing with potential vascular complications.

The cases presented illustrate two extremely different surgical approaches. Since the initial case report in 2007, there have been no other cases reported in literature of a robot assisted laparoscopic approach.<sup>11</sup> The benefits of a laparoscopic approach include faster recovery, discharge, and less postoperative pain.<sup>10</sup> Compared to laparoscopic procedures the enhanced three-dimensional perception of robotics offers improved dexterity and control to divide the ligament and maneuver around the celiac artery.

Both cases illustrate how the diagnosis was reached only after multiple imaging and diagnostic procedures ruled out more common pathology and highlights how the rarity of MALS is complicated by non-specific clinical patient presentation. By combining the diagnostic skills of the vascular expert and the laparoscopic skills of the general surgeon, the precise diagnosis can be reached and treatment delivered by less invasive techniques optimally and safely. If symptoms persist, revascularization of the celiac artery by either endovascular stenting or bypass can be considered as secondary procedures.

## Conflict of Interest

None of the authors identify any conflict of interest.

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## Homelessness in Hawai'i: Challenges, Progress, and Prospects

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

### Introduction

According to the US Department of Housing and Urban Development, homelessness is defined as, "an individual or family who lacks a fixed, regular, and adequate nighttime residence."<sup>1</sup> In Hawai'i, homelessness is an increasingly prominent and complex issue due to a variety of reasons. This includes economic (high cost of living, low minimum wages), social (high levels of immigration from the Pacific region), and geographical (limited land) challenges.

In the state of Hawai'i, the Center on the Family and the Hawai'i State Department of Human Services estimated a statewide total of 13,980 unduplicated individuals who received shelter and/or outreach services in one year.<sup>2</sup> According to the Homeless Service Utilization 2012 Report, the grand total demonstrated a decline of 7.5% since the last peak in 2010; however, the decreased number of clients belies the alarming 43% of "new clients," who lack prior service utilization records. In other words, almost half of the individuals receiving homelessness-related services in 2012 were considered "newly homeless." In addition, as the data collected in these reports are entirely voluntary, the generalization of resource utilization is likely an underestimation of the current homelessness situation.

In 2009, the US Conference of Mayors' Taskforce on Hunger and Homelessness found that the demands for homeless assistance rose by an average of 26% across the 27 surveyed cities; the survey did not include the cities in Hawai'i. In addition, although there was reportedly an average leveling of homeless individuals, there appeared to be an increase in family homelessness in 19 cities. The top causes for family homelessness were reported as lack of affordable housing (74%), poverty (52%), domestic violence (44%), and unemployment (44%). On the other hand, for individual homelessness, the top causes were somewhat different: lack of affordable housing (67%), substance abuse (67%), unemployment (14%), and mental illness (13%).<sup>3</sup> Consequently, the etiologies of homelessness may vary tremendously among individuals and families, which complicates potential overarching and universal solutions.

In addition, to many homeless individuals, homelessness extends beyond the mere absence of a regular dwelling. The lack of a "home" carries profound repercussions and negative connotations, such as, discrimination in finding employment and housing,<sup>4</sup> higher incidence of mental illnesses and substance abuse,<sup>5</sup> and difficulty in obtaining necessary medical and surgical care.<sup>4</sup> As a result, homelessness becomes a perpetual and

self-propagating cycle of economic and sociopolitical inequity for many individuals and families.

### Barriers and Challenges in Hawai'i

The multifaceted aspects of homelessness encompass economic (lack of affordable housing, unemployment), social (poverty), political (domestic violence), and medical domains (substance abuse, mental illness).<sup>3</sup> The commonality in "lack of affordable housing" for both individual and family homelessness underscores its prominence in the state of Hawai'i, where the cost of living (COL) is among the highest in the nation. In a COL comparison using a national average index equaling 100, the housing index and composite COL index for Honolulu were 249 and 165.7 in 2010. In other words, the cost of housing is 149% above the national average and overall COL is 65.7% above the national average.<sup>6</sup> Unique to Hawai'i, the finite land space of being a constellation of islands lead to a competitive and expensive housing and rental market. Limited job opportunities and subsequent lower income potentials further exacerbate the housing situation for the homeless population. Despite the substantially higher cost of living, the minimum wage in Hawai'i is currently only matched at the federal level, which is \$7.25 per hour.<sup>7</sup> Economic factors also serve as an additional barrier of access to health and dental care for the homeless population.<sup>8</sup> In a 2008 study, Withy, et al,<sup>8</sup> found that despite high rates of health insurance (77%), most of the participants still reported financial causes as the main barrier for healthcare access and delivery.

The homeless population in Hawai'i also faces salient political and social challenges. According to a report of The National Law Center on Homelessness and Poverty, Honolulu is ranked eighth nationwide, among 273 cities, for its unfriendly policies against the homeless. Examples of these policies include the illegalization of overnight sleeping at most parks and beaches, the retrofitting of bus stops, and the displacement of homeless individuals from tourist sites.<sup>9</sup> In Hawai'i, where tourism drives the economy, homelessness is often viewed as an economic deterrence to local businesses and an unsightly deviation from the advertised "tropical paradise" to visiting tourists. The high density of restaurants and tourist attractions often attract homeless individuals to congregate nearby, in order to rummage for food, or to panhandle. As a result, the stigmatization of homelessness in Hawai'i is particularly pronounced in tourist areas, such as, Waikiki, Ala Moana, and Aloha Tower.

Race and residential status also pose an important social challenge for the homeless population. Although Hawai'i has a diverse population, the Native Hawaiian and Other Pacific Islanders (NHOPI) population is disproportionately represented in the homeless service client demographics. This underlines a prominent social inequity in these ethnic groups. In addition to the overall poorer health quality of being homeless, the Native Hawaiian community appears to experience worse health status and higher rates of chronic diseases, such as hypertension and asthma, in comparison to other homeless ethnic groups.<sup>10</sup> Per the Homeless Service Utilization 2012 Report, the NHOPI group, of which Hawaiians and part-Hawaiians comprise 28%, constitutes the overwhelming majority (51%) of the homeless population.<sup>2</sup> Many of the individuals from the Compact of Free Association nations, which include the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands, anecdotally report a high level of racism and xenophobia; they are commonly viewed as, "taking the local resources." This degree of discrimination may further divide the homeless community and establishes an unnecessary internal competition for the already scarce resources.

With a significant portion (25%) of the homeless service clients being minors (ie, less than 18 years old), the problem of homelessness has become intergenerational. Homeless teens are especially at high risks for perpetuating the cycle due to lack of home stability, fewer educational opportunities, higher chances of risky sexual behaviors, and substance abuse and dependence.

### **Current Progress and Projects at the John A. Burns School of Medicine (JABSOM)**

There have been many community and organizational efforts to address the homeless issue in Hawai'i. These efforts stem from governmental, institutional, student organizations, and community centers. Currently, these are some of the ongoing projects to support the homeless population from the community and JABSOM.

#### **Partnership For Social Justice (PSJ) Symposium**

The Partnership for Social Justice (PSJ) is a multi-disciplinary coalition of professional and graduate schools in Hawai'i whose missions are to address sociopolitical inequalities and health inequities in local and global communities. PSJ's objectives focus on promoting awareness of sociopolitical, economic, educational, and healthcare-related issues in marginalized and underserved groups in Hawai'i and the Pacific region. The PSJ recently hosted the third annual social justice symposium entitled, "Homelessness in Hawai'i: a Drive for a Change."

The symposium, which was held at JABSOM, was attended by more than forty participants. This included students, faculty, and the general public. The event was designed to be interdisciplinary to emphasize the multifaceted collaboration necessary to ameliorate the homeless situation. The symposium included facilitated group discussions interspersed with lectures addressing the primary healthcare needs, the mental

health challenges, healthcare legislation, and methods to get involved to the homeless problem. The symposium outlined the current challenges of the homeless issues and actively engaged the participants to exchange ideas, discuss potential solutions, and effective ways for involvement (see Figure 1 for a diagram of key themes discussed on the problem of homelessness). According to the attendees, the top three barriers to improving the homeless situation were limited resources, discrimination, and high costs of living. The three most commonly cited solutions were prevention of at-risk populations, increasing public education and interdisciplinary training, and increased funding for permanent housing. In engaging students from different fields, the symposium established a forum for future collaborations, professional networking, and interdisciplinary camaraderie.

### **Hawai'i Homeless Outreach and Medical Education (H.O.M.E.) Project**

Originally established at JABSOM in 2005, the H.O.M.E. project aims to "improve quality and access to health care for Hawai'i's homeless, while increasing student and physician awareness and understanding of the homeless and their healthcare needs."<sup>11</sup> The program operates three free student-run clinics each week on O'ahu, which provide services to the homeless at shelters in Wai'anae and Kalaeloa and to the unsheltered homeless in Kaka'ako and Downtown Honolulu. Services provided at the clinics at no cost include care for acute and chronic medical problems, preventive screening and counseling, vaccinations, minor procedures, and medications. The program also supplements the medical school's curriculum through exposing medical students to prominent social issues, such as underserved healthcare and unjust health disparities. The program provides opportunities for students of all class years, premedical student volunteers, and volunteer physicians from the medical school and the community at large to service the homeless on O'ahu. In addition to the medical services provided by the H.O.M.E. Project, special events for the children at the shelters include Halloween carnivals, Christmas parties, sports events, school supply drives, and mentoring activities for the homeless teenagers. Both medical students and the community have lauded the program for its innovative and integrative learning environment through community service and volunteerism.

### **Institute for Human Services (I.H.S.) Mental Health Outreach**

As a part of the I.H.S. and in conjunction with social services, the mental health outreach program regularly tours urban parts of Honolulu to reach the unsheltered homeless population. The program stresses initial relationship building and focuses on meeting immediate medical and mental health needs. In coordination with the social service team, the mental health team, which may include a faculty psychiatrist, residents, and medical students, addresses any acute psychiatric emergencies, and provides appropriate care in counseling and prescription medications for any chronic mental health conditions.

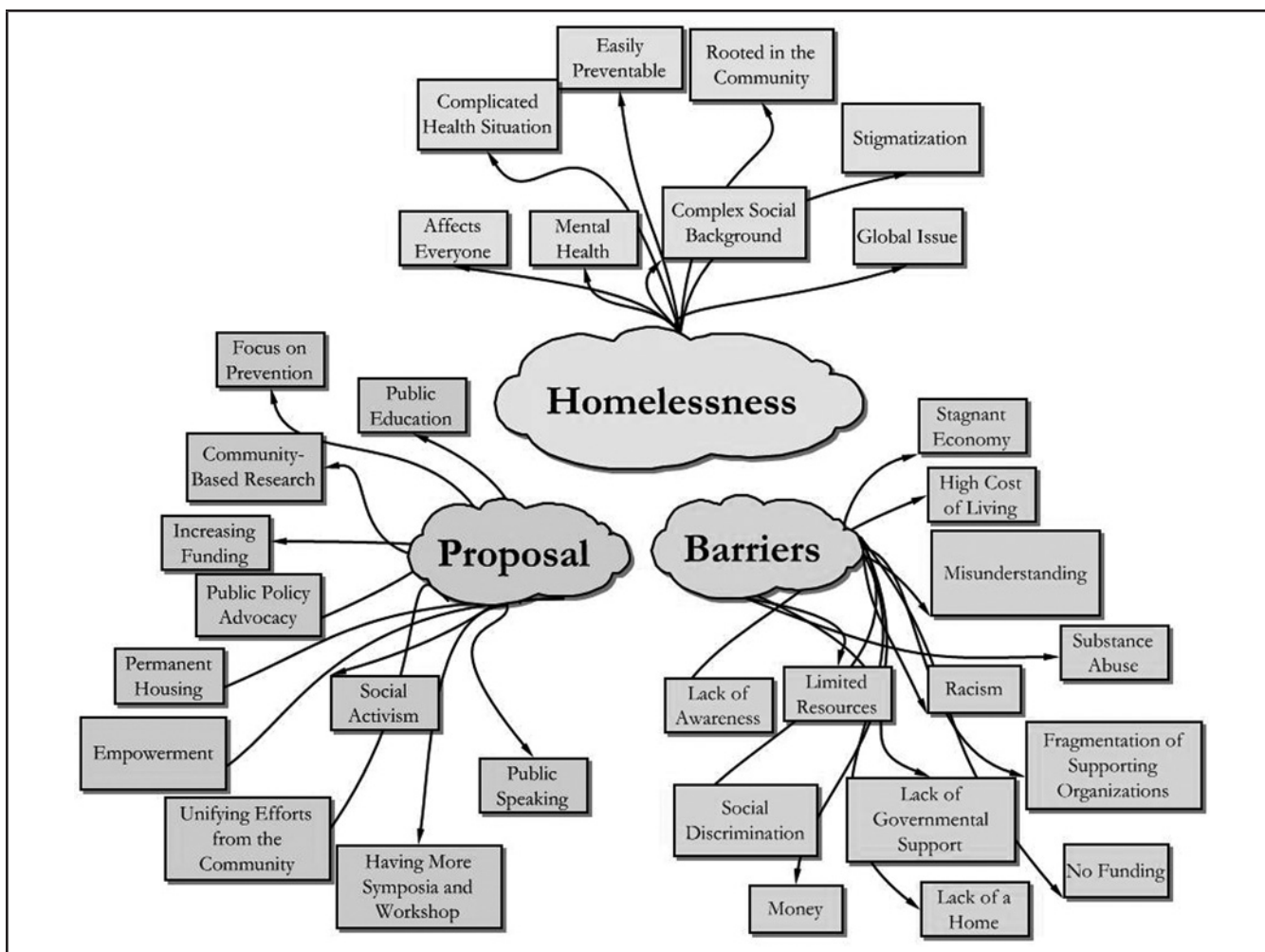


Figure 1. Keyword diagram of the Partnership for Social Justice Symposium: Homelessness in Hawai'i. The participants' evaluation was grouped and categorized based on three thematic questions: (1) Homelessness: What does homelessness mean to them? (2) Barriers: What are the current challenges in solving homelessness? (3) Proposal: What are some potential solutions?

## Conclusion

"We're all humans, too, you know," stated one of the PJS participants, who self-identified as homeless.

This statement, in its simplicity and straightforwardness, underscores the essence of homelessness in Hawai'i: the homeless issue is a medical, a public health, a socioeconomic, a political, and a social justice issue. In addition, the statement echoes the intricately complex situation surrounding homelessness, and the mutual dissatisfaction and frustration of both homeless individuals and the state. As a result, the immense diversity in demographics and reasons for their homelessness necessitate beyond the transient one-size-fits-all solution, which often translates into unsustainable and unpalatable bandages for this population's chronic problem.

Granted, some of the barriers of homelessness cannot be immediately and easily solved, such as the economy, housing costs, and rates of unemployment. Other barriers, such as, discrimination and stigmatization, may be systematically resolved through the collective engagement of the community

and interdisciplinary partnership. For many of the PSJ social justice symposium attendees, the homeless issue was desensitized and dehumanized due to the societal stigmatization. In addition, homelessness was often viewed as an overwhelming and seemingly impossible problem to resolve. Through the group discussions, the participants also echo the necessity for the collective involvement of individuals and their communities. For the individual, the top three proposals to alleviate homelessness were volunteering (eg, preparing food at a homeless shelter, join an organization that addresses homelessness, such as, H.O.M.E., or PSJ), political advocacy (eg, calling his or her congressional representatives), and self-education (eg, begin an earnest conversation with a homeless person). For the community, the top three proposals were service outreach (eg, organize a homeless support service at a church or a local company), fundraising (eg, donate to the limited funding of social services, such as, I.H.S.), and education (eg, promoting sensitivity training for staffs in caring for the homeless).

In a broader sense, a beginning step to improving the homeless situation is improving education about homelessness: (1) educating the homeless population through self-empowerment and community building, (2) educating the students and their educators about the reality of homelessness and how they may be actively involved, and (3) educating the community and political leaders about the chronicity and prominence of homelessness, and about current pragmatic and sustainable solutions.

### Acknowledgement

We would like to thank Dr. Chad Koyanagi, the Partnership for Social Justice members, and the H.O.M.E. and I.H.S. clinic staffs, without whose support and guidance, this project would not have been possible.

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## Taxing Sugar Sweetened Beverages to Improve Public Health: Policy Action in Hawai'i

Doctoral Health Policy Seminar, Spring 2013\*

*Insights in Public Health is a monthly solicited column from the public health community and is coordinated by HJMPH Associate Editors Jay Maddock PhD from the Office of Public Health Studies at John A Burns School of Medicine and Donald Hayes MD, MPH from the Hawai'i Department of Health in collaboration with HJMPH Manuscript Editors Tonya Lowery St. John MPH and Ranjani R. Starr MPH from the Hawai'i Department of Health.*

### Introduction

Following national trends, rates of overweight and obesity in Hawai'i have increased dramatically over the past two decades.<sup>1</sup> Today, over 20% of Hawai'i's adults and almost 15% of its youth are obese, while an additional 34% of adults and 14% of youth are overweight.<sup>2</sup> Obesity is not only a major health issue, but is also an important economic concern. Annual obesity-related medical costs in Hawai'i are estimated to be \$470 million.<sup>3</sup>

The consumption of sugar-sweetened beverages (SSB) is a known contributor to the development of overweight and obesity, especially in children and adolescents.<sup>4</sup> SSB are defined as "beverages which contain added naturally-derived caloric sweeteners such as sucrose (table sugar), high-fructose corn syrup, or fruit juice concentrates."<sup>5</sup> SSB include sodas, sweet teas and coffees, juice drinks, and energy drinks.<sup>6</sup> Consumption of SSB may contribute to weight gain through a number of pathways, including the fact that calories consumed in soda are less satiating than calories from solid food and because consumption of SSB can potentially change taste preferences towards less healthy options.<sup>5</sup>

According to the CDC, SSB consumption accounts for 12%-13% of the energy intake for adolescents aged 14 to 17 years in the United States, and an estimated 7% of the energy intake for all Americans.<sup>7</sup> The highest consumption rates of SSB are seen in racial and ethnic minorities, groups that also have increased rates of obesity.<sup>8</sup> A population-level decrease in SSB consumption thus has the potential to decrease not only obesity rates in general, but also to reduce youth obesity in particular. Reduction in SSB consumption could potentially help to decrease some racial/ethnic health disparities.

### SSB Tax Legislation

Monetary "penalties," such as an increase in bottling fees and taxes on SSB, have been promoted as policy options to decrease SSB consumption.<sup>4,5</sup> Research suggests that these can be important tools in the effort to reduce overweight and obesity.<sup>4,5</sup> While a number of states currently have small taxes on sodas, these taxes are believed to be too small to make an impact in consumption patterns.<sup>5</sup> A report on SSB tax policies by the Yale Rudd Center stated that implementing larger taxes

on SSB can achieve at least two overarching goals.<sup>4</sup> One is to significantly decrease SSB consumption, especially by children and adolescents who are typically more price sensitive than adults. The second is to obtain significant funds for state health efforts by earmarking these SSB tax revenues for public health programs.<sup>4</sup> Several analyses have demonstrated specific potential benefits of a SSB tax which include decreased consumption of SSB in schools,<sup>9</sup> improved health outcomes and decreased costs associated with diabetes,<sup>10</sup> and revenue generation for municipalities.<sup>11</sup> Dr. Thomas Frieden, the Director of the US Centers for Disease Control and Prevention, has stated: "A tax of 1 cent an ounce on sugar-sweetened beverages—about a 10 percent price increase on a twelve-ounce can—would likely be the single most effective measure to reverse the obesity epidemic."<sup>12</sup>

The use of legislation to increase the cost of an unhealthy item as an impetus to change individuals' negative health behaviors has been used successfully in the recent past, especially towards changing smoking patterns.<sup>13</sup> In Washington State, between 1990 and 2009, six separate tobacco tax increases were implemented, ranging from \$0.01 to \$0.60. After all but one of the increases, the percentage of adults smoking in Washington decreased the following year.<sup>14</sup> Overall, in the United States between 1970 and 2011, the average taxes on a pack of cigarettes increased from \$0.18 to \$2.35.<sup>15</sup> During the same time frame the percentage of adults that reported they were smokers decreased from 37.4% to 18.9%.<sup>15</sup> While tobacco taxes are not the only reason for the dramatic reduction in smoking rates in the US in recent decades, tobacco tax policy initiatives have been highly effective. Though SSB and tobacco consumption differ in several important ways,<sup>5</sup> similar taxes on SSB are expected to be an important strategy in comprehensive efforts to reduce SSB consumption.<sup>16</sup>

### History of SSB Legislation in Hawai'i

Based on this evidence base, a growing number of states (eg, Mississippi, Vermont, and Hawai'i), and cities (eg, Richmond, CA; Philadelphia, PA) have proposed laws that would increase the cost of SSB.<sup>17,18</sup> While the proposed policies vary in some aspects, all measures have had the dual goals of increasing fund-

ing for health priorities along with decreasing SSB consumption. Despite considerable policy action, none of these policies have yet passed into law in the United States.<sup>4</sup> However, in several other countries (eg, Denmark, France, Samoa), bills imposing a fee on SSB have passed into law.<sup>19,20</sup>

In Hawai'i specifically, a number of bills have been proposed to increase the costs of SSB. None of these bills has made it through the full legislative process, which includes three readings in the relevant committees, passage in both houses, and the governor's signature. However, these SSB taxes have been active policy options, receiving considerable attention by the press and lawmakers.<sup>21</sup>

In 2010, SB 2238, the first bill addressing the taxation of SSB in Hawai'i, was introduced by Senator Gary Hooser. Upon implementation it would have imposed an additional general excise tax on SSB.<sup>22</sup> An excise tax is "imposed on the beverage or syrup manufacturer, in contrast to a sales tax that is imposed on the retail purchase price."<sup>19</sup> Excise taxes are considered an attractive option for taxing SSB as they increase the base price of the product (unlike a sales tax, which is imposed at the point of purchase, once the consumers has likely decided to buy the product) and because they are easier to enforce and collect.<sup>19</sup> Revenues generated by SB 2238 were to be remitted to the department of education to fund K-12 education programs.<sup>22</sup> This bill was short lived and only passed first reading.

SSB fees were again addressed during Governor Neil Abercrombie's 2011 State of the State address, in which he suggested a penny-per-ounce tax on SSB. That same year a group of seven senators led by Senator Rosalyn Baker introduced SB 1179, which proposed levying a SSB tax and appropriating all monies collected to the children's health promotion special fund.<sup>23</sup> The accompanying bill in the House, HB 1216, was introduced by Representative Chris Lee. Also in 2011, HB 1188 was introduced by Representative Calvin Say. It proposed a fee of 10 cents to SSB less than or equal to 12 fluid ounces and 25 cents to those greater than 12 ounces, with revenues to go to the Hawai'i State Department of Health.<sup>24</sup> All three bills were deferred and carried over to the 2012 session.

In 2012 two new bills, SB 3019 and SB 2480, were introduced. They proposed a SSB tax with any generated revenues to be appropriated to community health centers and trauma center special funds.<sup>25,26</sup> SB 2480 also earmarked funds to the John A. Burns School of Medicine Medical loan forgiveness program.<sup>26</sup> Neither bill made it out of the Senate and the three bills from 2011 were deferred yet again. During the 2012 session the Hawai'i's Childhood Obesity Prevention Task Force (HCR No 21 H.D.1) was created.<sup>3</sup> The group's final report to the legislature recommended a bill to include a fee of \$1.28 per gallon for distributors of sugary beverages with all revenue earmarked for the prevention of childhood obesity and early childhood health as one of its 12 recommendations.<sup>3</sup>

### 2013 SSB Legislation in Hawai'i

In January 2013, Senate bill 646 was introduced by Senators Josh Green, Russell Ruderman, Clarence Nishihara, and Maile

Shimabukuro and Senate bill 1085 was introduced by Senator Donna Mercado Kim. Both bills proposed to address childhood obesity through raising the cost of SSB, syrups, and powders.<sup>27,28</sup> SB 646 sought to do this through a penny-per-ounce sales tax whereas SB 1085 proposed a fee of \$1.28 per gallon for bottled sugar-sweetened beverages, syrups, and powder sold to a distributor, functioning similarly to an excise tax.<sup>27,28</sup> The bills also differed on where the prospective revenues would be appropriated. SB 646 assigned the revenue to community health centers and trauma system special funds whereas SB 1085, after the amendments of SD1, proposed establishing The Obesity and Chronic Disease Prevention Special Fund and through this fund appropriated the revenues to the Department of Health.<sup>28</sup> In February 2013, SB 646 was deferred in the Health Committee. A hearing for SB 1085 was held on February 15, 2013 and passed by the Health Committee. After passing second reading, SB 1085 was not read in the Ways and Means committee and was tabled until the next legislative session.

### Opposition to SSB Legislation

Opponents of SSB tax legislation are comprised of national and local-level interest groups, large and small businesses, and some concerned citizens. This well-funded and organized opposition to SSB taxation uses creative and integrative strategies to block such proposals in Hawai'i and elsewhere.<sup>29,30</sup> Table 1 presents some of the arguments against SSB fee legislation in Hawai'i from recent testimony and debates. These arguments echo the larger arguments used nationally regarding SSB taxes.<sup>31</sup>

The American Beverage Association (ABA) is a trade association which represents and communicates the interests of the non-alcoholic beverage industry. The ABA strongly opposes any form of SSB taxation and has contributed to the efforts of numerous groups to counter the efforts of public health advocates to establish an SSB tax at the city or state levels. Considerable funds are spent on these efforts. "They're successful the old fashioned way. They pay for it." was the statement of the mayor of Philadelphia after the beverage lobby's victory over a proposed SSB tax in that city.<sup>30</sup> According to the Center for Science in the Public Interest, between 2009 and 2012, the ABA spent over \$70 million dollars on lobbying and advertisements opposing SSB taxation across the United States.<sup>29</sup> In Hawai'i, according to the Hawai'i State Ethics Commission Organization's Expenditures and Contributions report, the ABA spent \$26,980.67 toward lobbying efforts during the first 58 days of 2013.<sup>32</sup>

Opponents of SSB taxation have commonly used the practice of "astroturfing" to shield financial connections and create an environment of seemingly widespread "grassroots" support that masks the role of the industry funding.<sup>30</sup> Astroturf groups, such as "Americans Against Food Taxes" and the "Community Coalition Against Beverage Taxes," appear to be disinterested parties that serve the public interest.<sup>33</sup> The following example from the Center for Health Media & Policy at Hunter College<sup>34</sup> describing the website (<http://www.nofoodtaxes.com>) demonstrates the techniques of such groups:

| Table 1. Testimony and Responses Concerning Recent SSB Legislation in Hawai'i* |  |
|--|--|
| Against SSB Tax  |  |
| Individual   | <p>"I can hardly believe what I am reading in this bill. The federal government subsidizes sugar growers and this bill is going to tax sugar. This seems to me to be a double tax on the poor taxpayers. Especially when just about every drink has sugar in it. This bill would better be served by banning High Fructose Corn Syrup as that probably has more of an impact on health." – <i>Personal Testimony</i><sup>38</sup></p> <p>"Anything is harmful when consumed in excess even water can kill you if you drink too much of it. While obesity is harmful and everyone knows it. It is not the governments place to tell me how to live my life if I'm not infringing on others rights or breaking a criminal law. There are far too many taxes on commodities as it is already and we must look into more responsible spending of our current tax dollars rather than dreaming up a new tax every time we want to try another program." – <i>Personal Testimony</i><sup>38</sup></p> <p>"Obesity has nothing to do with how much sugar content is in a beverage or in the food we eat. It is up to the individual (in an adult case) and or the parents /guardians to portion out the amount one consumes. You can go out and purchase a 1000 calorie drink but it doesn't mean you have to consume the entire thing in one sitting and if you do, it is at your own free will.... Only the poor &amp; weak minded are the ones who want to shift the blame onto other things in life when in fact it is ourselves to blame." – <i>Personal Testimony</i><sup>38</sup></p> <p>"It's also not fair to tax people who drink sugary drinks who are not obese. I drink these drinks everyday, but I'm still under 10% bodyfat. This because of my exercise lifestyle and other food choices and not because I don't drink soda. I think educating children and parents as early as possible is the key, not taxing people who are already struggling in this economy today." – <i>Personal Testimony</i><sup>38</sup></p> |
| Large Business   | <p>"I am opposed to SB646. We at already at a major disadvantage being an independently owned and operated small business on Maui. I do not have the resources to take on anymore additional accounting and reporting. It has already strained my operation with the current deposit and container fee requirements. Even worse when you raised the container fee half of a cent. Do any of you realize how difficult it is to administer a half of a cent on uneven sales?" – <i>Michael Nobriga, Maui Soda &amp; Ice Works, Ltd.</i><sup>43</sup></p> <p>"I work for ITO EN (USA) Inc, which has been doing business in Hawai'i since 1987. We are still only one of a handful of local beverage manufacturers and distributors in Hawai'i. Our factory is located in Kalihi (Senator Chun-Oakland's district) and we employ 68 workers, some of them live in this district...A tax as steep as a penny per ounce or even a penny per teaspoon of sugar is unfair and overly harsh to our industry. What other grocery item receives a tax or fee that potentially amounts to 22% of the consumer's dollar? Our industry already has been singled out for bottle and deposit fees on containers, yet lawmakers still want to add another tax/fee..." – <i>Wendy Chuck, Human Resource Manager, ITO EN (USA) Inc.</i><sup>38</sup></p>  |
| Industry Organization  | <p>"The Grocery Manufacturers Association (GMA) and its more than three hundred members respectfully oppose SB646 and SB1085 because it will do nothing to fight obesity and its selective taxation is arbitrary, discriminatory, regressive and largely unpopular amongst voters." – <i>Grocery Manufacturers Association</i><sup>44</sup></p> <p>"The legislature must stop taxing groceries. It is the most unfair and regressive way to fill the budget deficit.... Please don't pass on the tab for items that should be included in the state budget to the food and beverage industry." – <i>Luaren Zirbel, Executive Director, Hawai'i Food Industry Association</i><sup>38</sup></p> <p>"Obesity is a Complex Problem with No Simple Solution... Common sense tells us—and science proves for us—that taxes do not make people healthier. Making smart, educated decisions about diet and exercise do that.... The Public Opposes Discriminatory Taxes on Beverages... The beverage industry is taking bold action to do its part to help address obesity." – <i>David Thorp, Senior Director of Government Affairs, American Beverage Association (ABA) in Washington, D.C.</i><sup>38</sup></p>   |
| For SSB Tax  |  |
| Individual   | <p>"As a pediatrician who has been working on the Waianae Coast for the past 24 years, I have witnessed the increase in overweight and obese children. Most of these overweight children will become overweight adults, which increases all the complications that are associated with obesity, especially type 2 diabetes and early cardiac disease. We are seeing these complications at younger and younger ages.... In my practice over 41% of the pediatric patients are overweight. 50% of the teenagers are obese.... We need to make it cheaper to eat healthier by creating a price difference between sugar-sweetened beverages and lower calorie, healthier drinks. Research has predicted that consumption of sugar-sweetened beverages would decline 8-10% in response to a 10% increase in price." – <i>Personal Testimony</i><sup>45</sup></p> <p>"My take on this SSB tax policy act is for the good health of all children. They are the vulnerable ones who are limited in their ability to understand good health and proper nutrition...It is so important to pass this bill. Yes, this may not solve the obesity problem in children all together, but this may take a different approach to prevention, preventing the increase of consumption, and hopefully its availability to children." – <i>Personal Testimony</i><sup>38</sup></p> <p>"Reducing consumption of SSB has been shown to reduce weight and weight gain. Increasing the price of SSB has the potential to reduce consumption of these beverages. It's time we really started to put our focus on prevention. As someone recently asked; "Do we want to pay now or later for our health?" I vote NOW! And urge you to do the same." – <i>Personal Testimony</i><sup>38</sup></p>  |

| Table 1. Testimony and Responses Concerning Recent SSB Legislation in Hawai'i* (continued) |   |
|--|---|
| Organizations  | <p>"Research shows the very strong association between added sugar in the diet and obesity and many chronic diseases. Sugar sweetened beverages (SSB) are the single largest contributor to calorie intake in the United States.... Hawai'i's children have among the highest rate of dental cavities in the nation. Research shows that SSB weakens tooth enamel and increases the likelihood of tooth decay." – <i>Dean Jerris Hedges on behalf of Deans and Directors of College of Health Sciences and Social Welfare, UH Manoa</i><sup>38</sup></p> <p>"Obesity is a major risk factor in certain types of cancer. According to the American Cancer Society's 2012 Guidelines on Nutrition and Physical Prevention, obesity is clearly associated with increased risks of the following cancer types: Adenocarcinoma of the Esophagus; Pancreas; Colon and rectum; Breast (after menopause); Endometrium (lining of the uterus); Kidney; and Gallbladder. Obesity may also be associated with increased risk of cancer of the liver, non-Hodgkin lymphoma, multiple myeloma, cancer of the cervix, cancer of the ovary, and aggressive prostate cancer. This bill alone will not reduce obesity. However, it is part of a statewide strategy that also includes an emphasis on physical activity, healthy diets, healthy lifestyles, and the institutionalization of wellness in workplaces and community organizations. The concept of taxing sugar-sweetened beverages is new, but the tax system has long been used to encourage desirable behavior and to discourage undesirable behavior. Consider tax credits for photovoltaic systems and tax deductions for mortgage interest on homes, as well as special taxes that are assessed on cigarettes and alcohol." – <i>American Cancer Society, Cancer Action Network</i><sup>38</sup></p> <p>"The Department of Education supports SB 1085. Obesity prevention programs will promote the development of healthy children that contribute to school readiness, healthy lifestyle, and a successful future." – <i>Kathryn S. Matayoshi, Superintendent of Education</i><sup>38</sup></p> |
| Neutral  | <p>"We make no comment on the tax but are providing information on sugar- sweetened beverages. We appreciate the committee efforts to reduce obesity by encouraging people to consume less sugar, in this case in soft drinks.... Sugar sweetened beverages, especially soda, fruit drinks and sports drinks contain excess sugar and calories without contributing any health benefits. We recommend 0 sugary drinks and suggest drinking low fat milk or water as an alternative." – <i>Phyllis Dendle, Kaiser Permanente</i><sup>38</sup></p> <p>"QHS [Queen's Health System] takes no position on the fee but is supportive of the overall efforts by the Hawaii Obesity Prevention Task Force." – <i>Paula Yoshioka, Senior Vice President for The Queen's Health Systems</i><sup>38</sup></p>   |

\*From testimony concerning the two SSB bills proposed in Hawai'i in 2013 (SB 646 and SB 1085) unless otherwise noted.

"At first glance, it looks like a grassroots movement of everyday people concerned about 'big government' and the 'difficulty of feeding a family in today's economy.' The link in the middle... takes you to a slickly produced television commercial that aired in heavy rotation on stations in New York State where a soda tax was proposed. In the ad, a 'concerned mother' posing as just a concerned citizen, talks directly to the camera and engages her assumed audience in a shared sense of outrage at the intrusion of big government imposing more taxes on hard-working families.... The text on this website says that Americans Against Food Taxes is a 'coalition of concerned citizens – responsible individuals, financially strapped families, small and large businesses in communities across the country' who opposed a government-proposed tax on food and beverages, including soda, juice drinks, and flavored milks. However, the real membership is the world's largest food and soft drink manufacturers and distributors, including the Coca-Cola Company, Dr. Pepper-Royal Crown Bottling Co., PepsiCo, Canada Dry Bottling Co. of New York, the Can Manufacturers Institute, 7-Eleven Convenience Stores, and Yum! Brands."<sup>34</sup>

One of the most vociferous opponents of SSB taxation/fees in Hawai'i specifically is the Hawai'i Beverage Tax coalition, which was established shortly after Governor Abercrombie's State of the State speech in 2011. The Hawai'i Beverage Tax coalition represents approximately 2,300 individuals and 340 businesses across the state<sup>35</sup> and effectively uses social media, such as Facebook and Twitter, to express discontent with proposed legislation. Although the organization's website purports that "No Hawai'i Beverage Tax is a coalition of individuals, families, businesses and community organizations in our state...."<sup>36</sup> the domain name for the coalition's website is registered through godaddy.com to the American Beverage Association in Washington, DC. Similar "grassroots" coalitions and websites have been established with the help of the ABA in nearly every community where soda tax legislation has been

proposed, including Chicago, Baltimore, Texas, Philadelphia, Rhode Island, Kansas, Oregon, and Illinois.<sup>37</sup>

The aggregated efforts of individuals and organizations were effective in developing a coherent message that was communicated to the Hawai'i legislature in 2013 through various means. In particular, members of the opposition cited several key concerns with the proposed legislation using written testimony. A common concern among those opposed to SSB taxes involved the complex nature of the link between SSB consumption and obesity. Opponents of the legislation expressed that SSB were either unfairly singled out as a key contributor to obesity and/or that taxation of SSB may not solve the obesity problem due to its multifaceted nature.<sup>37</sup>

Written testimony by organizations also focused on the impact of an SSB tax on business, including small, local businesses. There were concerns about the potential economic impact, costs associated with implementation, and loss of local jobs.<sup>38</sup> In contrast, written testimony by individuals appeared to be more concerned with the concept of taxation. Some feared that an SSB tax could lead to increased taxation in other areas.<sup>38</sup> Others called attention to the federal government subsidies which sugar growers receive and considered the beverage fee "double taxation." Opponents of SB 646 specifically expressed their displeasure with the proposed use of any revenue. They believed that revenues should be designated for programs or institutions which directly fight obesity, rather than toward Community Health Centers and Trauma Centers.<sup>37</sup> Individual testimony also focused on taxation, government interference with personal choice, the potentially regressive nature of the tax, and the need for personal responsibility in making healthy decisions.<sup>38</sup>

## Support for SSB Legislation

There are also many supporters of an SSB tax, including legislators, public health professionals, the Department of Health, and clinicians. Table 1 also presents arguments made for SSB fee legislation in Hawai'i in February 2013. Additional testimony was provided by the Governor, several state departments such as Health, Public Safety, Human Resources Development, and Education, as well as Child and Family Services, the Healthcare Association of Hawai'i, Hawai'i Association of Independent Schools, students, health care providers, and private citizens. Most of the testimony supporting SSB legislation in Hawai'i emphasized the urgent need to halt the personal and economic consequences of obesity and its associated health risks in our state, particularly among children and racial/ethnic groups that have been particularly impacted by these health issues. They also noted the potential promise of this approach to both reduce consumption and to provide monies for public health. Several examples of testimony noted that an SSB tax appears to be favored by the public. In a recent poll in Hawai'i, two-thirds of residents polled were supportive of an SSB fee to fund programs aimed at decreasing childhood obesity.<sup>39</sup> Of note, some key health and business organizations remained neutral on this issue and provided testimony to this effect. Some of these examples are also presented in Table 1.

## Next Steps

At the conclusion of the 2013 Hawai'i Legislative Session, SB 1085 was the SSB bill that had made it the farthest through legislative committees, suggesting it to have the greatest legislative traction. SB 1085 will still be alive in the 2014 Legislative Session. While it stalled in Senate Ways and Means Committee this session, that Committee's Chairman, Senator David Ige, was quoted as saying, "We decided that we won't be moving forward with the soda fee this year. Of course, it's always in play for next year."<sup>40</sup> To ensure that the bill moves out of the Senate and crosses over to the House next year, or that a similar bill is passed, support must be built among both elected officials and the general public.

Stakeholders who want a SSB tax/fee bill to pass are planning to undertake multiple efforts to build support and to attempt to overcome industry lobbying. Emphasizing the bill's intent to use the funds generated for childhood obesity prevention and how that will benefit the state population is an important component of those efforts. Also, as May Okihiro, a local pediatrician and obesity expert, notes: "An important next step against a better resourced beverage industry will be to strengthen and utilize existing coalitions and relationships in order to make the voice of children and families, who value health and wellness, loud and clear." (M. Okihiro, personal communication, July 2, 2013). The Childhood Obesity Prevention Task Force, established by Governor Abercrombie, will also continue its efforts to reach out to partners across all sectors. The Hawai'i State Department of Health, Healthy Hawai'i Initiative, will also play a key role in educating the public about why consumption of SSB is a public health issue and providing nutrition education about the

detrimental impact of drinking SSB (L. Irvin, personal communication, April 11, 2013). Because 2014 is an election year, demonstrating public support for the bill may be especially critical to encourage legislators to vote for it.

## Conclusions

SSB taxation, particularly as part of a comprehensive policy approach to combat obesity, holds promise to reduce SSB consumption and to ultimately improve public health in the US.<sup>4</sup> However, its immediate political future is unclear in Hawai'i and elsewhere. Political scientists suggest that policy options often must undergo a "softening up" process in which once radical ideas, become increasingly acceptable over time.<sup>41</sup> This process, however, can take a considerable amount of time.<sup>41</sup> After several years of introduction in legislatures and city halls, the SSB tax is becoming more familiar to policy makers and the public. However, a "sin tax" on sugar is still a relatively novel political idea and SSB taxes confront a well-organized opposition that includes both large industries with deep pockets (eg, Coca Cola, Pepsi) as well as sympathetic local businesses (eg, Waialua Soda Works, Ball Hawai'i Can Plant) with important economic concerns and strong community ties.<sup>21,42</sup> Yet the urgency of the need to address the health consequences of obesity and the unhealthy US diet is clear to both supporters and opponents of specific SSB-related bills.<sup>38</sup> For the sake of public health, effective, comprehensive, and innovative policies to address this issue must be implemented now.

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## General Recommendations on Data Presentation and Statistical Reporting (Biostatistical Guideline for Hawai'i Journal of Medicine & Public Health)

The following guidelines are developed based on many common errors we see in manuscripts submitted to HJMPH. They are not meant to be all encompassing, or be restrictive to authors who feel that their data must be presented differently for legitimate reasons. We hope they are helpful to you; in turn, following these guidelines will reduce or eliminate the common errors we address with authors later in the publication process.

**Percentages:** Report percentages to one decimal place (eg, 26.7%) when sample size is  $\geq 200$ . For smaller samples ( $<200$ ), do not use decimal places (eg, 26%, not 26.7%), to avoid the appearance of a level of precision that is not present.

**Standard deviations (SD)/standard errors (SE):** Please specify the measures used: using “mean (SD)” for data summary and description; to show sampling variability, consider reporting confidence intervals, rather than standard errors, when possible to avoid confusion.

**Population parameters versus sample statistics:** Using Greek letters to represent population parameters and Roman letters to represent estimates of those parameters in tables and text. For example, when reporting regression analysis results, Greek symbol ( $\beta$ ), or Beta (b) should only be used in the text when describing the equations or parameters being estimated, never in reference to the results based on sample data. Instead, one can use “b” or  $\beta$  for unstandardized regression parameter estimates, and “B” or  $\beta$  for standardized regression parameter estimates.

**P values:** Using *P* values to present statistical significance, the actual observed *P* value should be presented. For *P* values between .001 and .20, please report the value to the nearest thousandth (eg,  $P = .123$ ). For *P* values greater than .20, please report the value to the nearest hundredth (eg,  $P = .34$ ). If the observed *P* value is greater than .999, it should be expressed as “ $P > .99$ ”. For a *P* value less than .001, report as “ $P < .001$ ”. Under no circumstance should the symbol “NS” or “ns” (for not significant) be used in place of actual *P* values.

**“Trend”:** Use the word trend when describing a test for trend or dose-response. Avoid using it to refer to *P* values near but not below .05. In such instances, simply report a difference and the confidence interval of the difference (if appropriate), with or without the *P* value.

**One-sided tests:** There are very rare circumstances where a “one-sided” significance test is appropriate, eg, non-inferiority trials. Therefore, “two-sided” significance tests are the rule, not the exception. Do not report one-sided significance test unless it can be justified and presented in the experimental design section.

**Statistical software:** Specify in the statistical analysis section the statistical software used for analysis (version, manufacturer, and manufacturer’s location), eg, SAS software, version 9.2 (SAS Institute Inc., Cary, NC).

**Comparisons of interventions:** Focus on between-group differences, with 95% confidence intervals of the differences, and not on within-group differences.

**Post-hoc pairwise comparisons:** It is important to first test the overall hypothesis. One should conduct *post-hoc* analysis if and only if the overall hypothesis is rejected.

**Clinically meaningful estimates:** Report results using meaningful metrics rather than reporting raw results. For example, instead of the log odds ratio from a logistic regression, authors should transform coefficients into the appropriate measure of effect size, eg, odds ratio. Avoid using an estimate, such as an odds ratio or relative risk, for a one unit change in the factor of interest when a 1-unit change lacks clinical meaning (age, mm Hg of blood pressure, or any other continuous or interval measurement with small units). Instead, reporting effort for a clinically meaningful change (eg, for every 10 years of increase of age, for an increase of one standard deviation (or interquartile range) of blood pressure), along with 95% confidence intervals.

**Risk ratios:** Describe the risk ratio accurately. For instance, an odds ratio of 3.94 indicates that the outcome is almost 4 times as likely to occur, compared with the reference group, and indicates a nearly 3-fold increase in risk, not a nearly 4-fold increase in risk.

**Longitudinal data:** Consider appropriate longitudinal data analyses if the outcome variables were measured at multiple time points, such as mixed-effects models or generalized estimating equation approaches, which can address the within-subject variability.

**Sample size, response rate, attrition rate:** Please clearly indicate in the methods section: the total number of participants, the time period of the study, response rate (if any), and attrition rate (if any).

**Tables (general):** Avoid the presentation of raw parameter estimates, if such parameters have no clear interpretation. For instance, the results from Cox proportional hazard models should be presented as the exponentiated parameter estimates, (ie, the hazard ratios) and their corresponding 95% confidence intervals, rather than the raw estimates. The inclusion of *P*-values in tables is unnecessary in the presence of 95% confidence intervals.

**Descriptive tables:** In tables that simply describe characteristics of 2 or more groups (eg, Table 1 of a clinical trial), report averages with standard deviations, not standard errors, when data are normally distributed. Report median (minimum, maximum) or median (25th, 75th percentile [interquartile range, or IQR]) when data are not normally distributed.

**Figures (general):** Avoid using pie charts; avoid using simple bar plots or histograms without measures of variability; provide raw data (numerators and denominators) in the margins of meta-analysis forest plots; provide numbers of subjects at risk at different times in survival plots.

**Missing values:** Always report the frequency of missing variables and how missing data was handled in the analysis. Consider adding a column to tables or a footnote that makes clear the amount of missing data.

**Removal of data points:** Unless fully justifiable, all subjects included in the study should be analyzed. Any exclusion of values or subjects should be reported and justified. When influential observations exist, it is suggested that the data is analyzed both with and without such influential observations, and the difference in results discussed.

# CALENDAR OF CONTINUING MEDICAL EDUCATION ACTIVITIES HELD IN HAWAII

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Interested in having your upcoming CME Conference listed? Please contact Brenda Wong at (808) 536-7702 x103 for information.

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| 11/6-11/8             | University Learning Systems                                    | Waikiki Beach Marriott Resort & Spa              | Primary Care Update: Series V   | <a href="http://www.universitylearning.com/CME-Conferences/hawaii-november-2013/november-6-8-hawaii-accreditation.html">http://www.universitylearning.com/CME-Conferences/hawaii-november-2013/november-6-8-hawaii-accreditation.html</a>   |
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## THERE WILL BE MORE FAILURES BEFORE WE SEE SUCCESS.

The history of medicine is replete with obdurate doctors clinging to a false theory of disease. In the 19<sup>th</sup> century Dr. John Snow defined a cholera outbreak; Ignaz Semmelweis found the cause of puerperal fever; Carlos Finlay named the vector for yellow fever. All were scorned as outside the mainstream of medicine. In 1988 Dr. Claude Wischik and his team at Cambridge published a paper demonstrating that tangles first observed in Alzheimers were made in part by the protein tau. However, by the early 1990s the “amyloid hypothesis” gripped the field and attacking that protein became the main focus for fighting Alzheimers. Today, researchers continue to pursue amyloid as a major factor, but their data have failed to be supportive. Tau has been ignored with little financial support. Dr. Wischik was somewhat of an outcast, but now is getting more attention. He has collected and examined over 300 brains in the last two decades studying tau. If Dr. Wischik is right, Alzheimer’s amyloid research teams will have to do a 180, and that could be progress.

## DON’T SEND A BOY TO DO A MAN’S JOB — SEND A WOMAN.

The journal Health Affairs reported that women age 75 and younger are dying at a higher rate than previous years in nearly half of the nation’s counties. Life expectancy for men has held steady or improved in nearly all counties. Most of the problem is in the South and West, largely in rural counties. Some leading theories to explain the decline in life expectancy are higher smoking rates, obesity and less education. Or perhaps the data are reflecting more women moving into a man’s world.

## IT IS IMPORTANT TO HIDE THE FAMILY JEWELS.

Jeremiah Raber of High Ridge, Missouri, set out to create a “groin protection device” for martial arts competitors. Nuttshellz underwear is made of multiple layers of Kevlar with another fabric layer of Dyneema, a material Raber claims can resist multiple 9 mm. and 22 caliber hand gun projectiles. He soon realized the briefs can benefit police, athletes, and military contractors. In August the Army is planning tests on Nuttshellz with the hope of protecting troops from some of the devastating injuries of IEDs and other devices. Like the Camelbak devised by a biker for his own use, the Nuttshellz intent can have use far beyond martial arts. “Build a better mousetrap...”

## CLEANLINESS IS NEXT TO EAVESDROPPING?

Purell, a company that makes hand sanitizers, will introduce a new program for “hand hygiene.” In a mockup of a hospital room, the company demonstrated a hand-cleaning compliance system. A Purell dispenser is mounted on a stand with an electronic sensor. The sensor can read chips embedded in the identification badges of staff members who come within its range. The happy (?) result is that the hospital will be able to identify doctors and nurses who fail to sanitize their hands. As an infection control device it might be a useful tool, but it also represents another ‘big brother’ oversight. Someone, or some device, is always watching — you.

## WHO IS IN CHARGE OF THIS TRAINWRECK?

The American Medical Association House of Delegates at their current meeting established policy that obesity is a disease. Is this a misdirected attempt to be politically correct, or a sincere belief that over-eating, soda drinking and lack of exercise are genetic or infectious? The AMA has been steadily losing members and at last count was down to ap-

proximately 20% of practicing physicians. Policy decisions like this one will not help. AMA leadership endorsed Obamacare before the Supreme Court vote, and before the law was widely known. Many doctors resigned. The AMA has proved toothless in Congress with inability to effect change in the drastic formula for Medicare pay established by the Clinton administration. American medicine as a profession is in dire need of a strong presence. The AMA is no longer that voice. This perspective comes from an AMA member, active since 1963.

## THIS GREEN LEAF IS TURNING BROWN.

Electric autos are promoted as the chic harbinger of an environmentally benign future. The car is truly green, right? The answer is no. Electric cars do not emit carbon dioxide on the road, but the energy used for their manufacture does, big time. Production of the e-car takes 30,000 pounds of carbon dioxide emission, compared to 14,000 for a conventional auto. The energy needed to recharge the battery is overwhelmingly produced by fossil fuels. The limited range and prolonged recharge time make a long trip very slow or impossible. At the same time, the federal government subsidizes e-car buyers up to \$7500. Another bite in the wallet for taxpayers is the \$5.5 billion in federal grants and loans to battery and e-car makers. Perhaps at some distant date they might help to tackle global warming, but at this time electric cars do nothing but provide status.

## ALWAYS PUT YOUR BEST FOOT FORWARD.

A 19-year-old New York University student told a New York Post reporter about her weekend as a foot-fetish prostitute. She worked at a spa that charged male “johns” \$100 entry fee. They enjoyed the privilege of kissing, licking or fondling the girl’s feet for an additional fee of \$20 for every ten minutes of action. The men were all dressed in business suits. The women were dressed up and selected for their small feet and high arches. She said she had more than 200 customers and earned \$200 including tips.

## HER BEAUTY WILL SET YOUR HEART AFLAME.

The latest beauty rage in China is the fire-facial. Alcohol and a “secret elixir” are daubed on the face and then set on fire. After a brief blaze the fire is extinguished. The claim is this action removes “dull” skin, alleviates cold symptoms and helps reduce obesity. Yes, but dinner is less enjoyable with charred lips, and what about seared eyebrows and burned nasal cilia?

## ADDENDA

- “I fear the day that technology will surpass our human interaction. The world will have a generation of idiots.” *Albert Einstein*
- Your tongue is the only muscle in your body attached on just one end.
- It takes almost one hour of work in India to afford a beer, but less than 10 minutes in the United States.
- Those who don’t study the past will repeat its errors: those who do study it will find other ways to screw-up.
- Don’t marry a waitress/waiter. In the middle of sex they ask, “How is everything? Is it okay over there? Would you like a glass of water?”

## ALOHA AND KEEP THE FAITH **rt**s

(Editorial comment is strictly that of the writer.)

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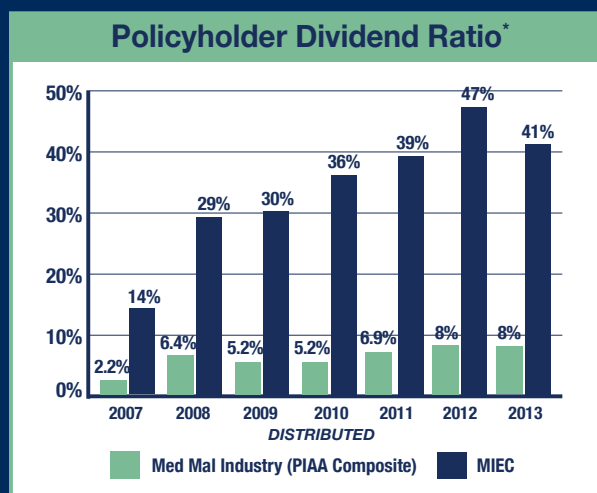


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