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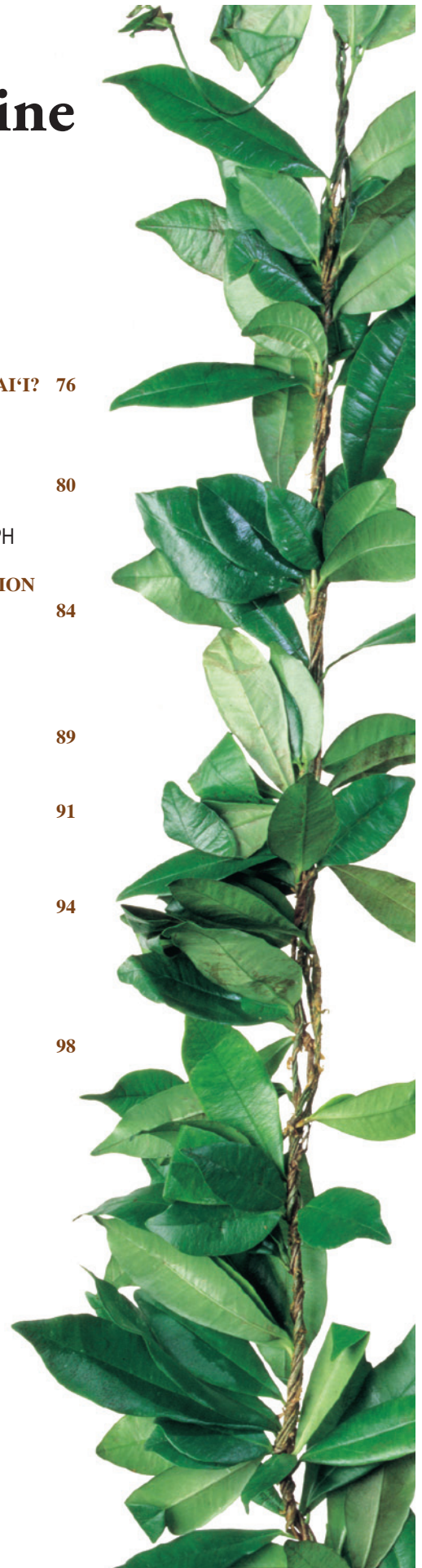
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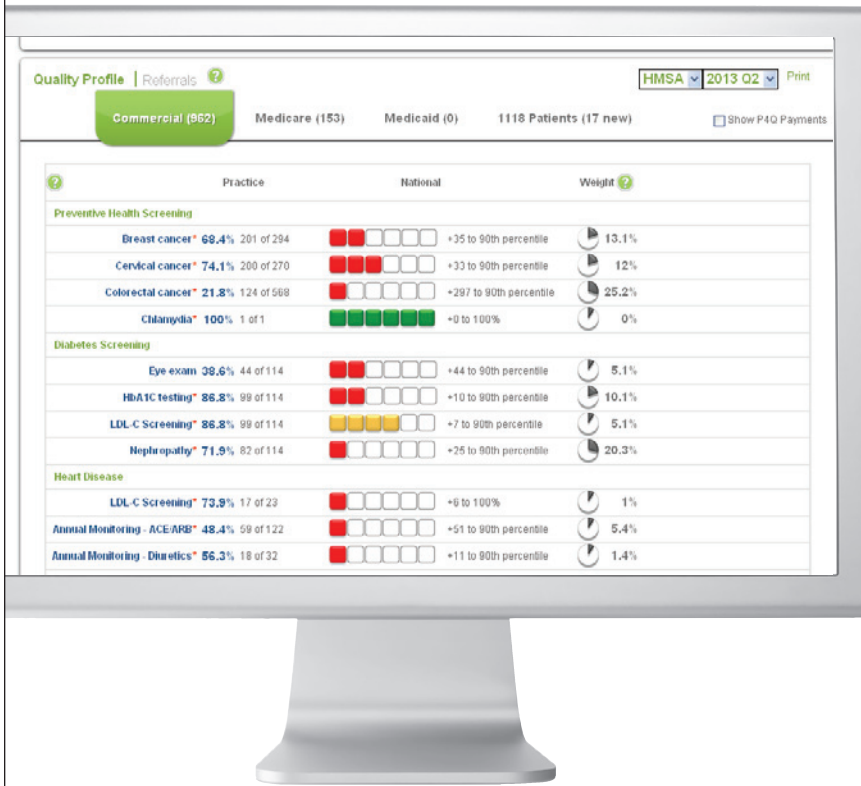
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# Does Ethnicity Play a Role in the Dosing of Warfarin in Hawai'i?

Sydney Y. Tatsuno MD, FACP and Eric M. Tatsuno BA

## Abstract

Warfarin is the most common anticoagulant prescribed and its metabolism has been linked to two specific genes, CYP2C9 and VKORC1. This study analyzed 113 patients from 4 different ethnic backgrounds (Asian, Native Hawaiian, Portuguese, and Caucasian) and investigated the association between the mean daily dose of warfarin and ethnicity. Caucasian patients required the highest mean daily dose of warfarin 4.4 mg/day while Asian patients required the lowest mean daily dose of warfarin 2.5 mg/day. Portuguese patients and Native Hawaiian patients required mean of 3.8 mg/day. All three groups required a significantly lower dose than Caucasians. When adjusted for weight in kilograms, Native Hawaiian patients required a dose of  $4.3 \times 10^{-2}$  mg/kg, Portuguese  $4.4 \times 10^{-2}$  mg/kg and Asians  $4.0 \times 10^{-2}$  mg/kg. These three populations had similar mean milligrams/kilogram dose requirements while Caucasians required a significantly higher dose of  $5.3 \times 10^{-2}$  mg/kg. This data suggests that ethnicity should be taken into consideration when dosing warfarin.

## Introduction

Despite the introduction of new anti-thrombotics including Pradaxa, Xarelto, and Eliquis, warfarin continues to be the most commonly prescribed medication for the treatment and prevention of thromboembolic states, including atrial fibrillation, deep venous thrombosis, pulmonary emboli, valvular heart disease, and hypercoagulable states.<sup>1</sup> The problem with warfarin is it has to be titrated within a narrow therapeutic index, usually between the International Normalized Ratio (INR) of 2.0 to 3.0.<sup>2</sup> This narrow therapeutic window increases the risk of either under anticoagulating or over anticoagulating. In the past, certain clinical variables including age, weight, sex, diet, co-morbid conditions, and concomitant medications have been considered as factors that affect warfarin metabolism.<sup>1</sup> Compliance is often an issue and lifestyle variations including frequent travel may also play a role. In addition, there is an increasing body of evidence that genetics plays an important role in warfarin metabolism. Currently there are two studies being conducted to investigate this; the first is the Clarification of Optimal Anticoagulation through Genetics (COAG) study which is sponsored by the National Heart, Lung, and Blood Institute. The second study is the European Pharmacogenetics of Anticoagulant Therapy-Phenprocoumon (EU-PACT) study that is being conducted in Europe. These two studies are looking into whether genetic information should be considered when warfarin is administered.<sup>3,4</sup>

Two genes have been extensively studied regarding their roles in warfarin metabolism. The first is the cytochrome P-450 gene (specifically, CYP2C9) and the second is vitamin K epoxide reductase subunit 1 gene (VKORC1).<sup>5</sup> The CYP2C9 enzyme acts as a catalyst in many different reactions including the metabolism of warfarin. Two single nucleotide polymorphisms (SNPs) affecting warfarin metabolism have been identified. The alleles with these SNPs are referred to as CYP2C9\*2 and CYP2C9\*3, with

the wild type being referred to as CYP2C9\*1. VKORC1 is the enzyme that regenerates reduced vitamin K and the VKORC1 enzyme is inhibited by warfarin.<sup>6</sup> As a result, in the presence of warfarin, the coagulation factors become hypofunctional. SNPs in the VKORC1 gene decrease the enzymatic activity of the VKORC1 enzyme, ultimately requiring less warfarin. The effects of CYP2C9 and VKORC1 on warfarin metabolism are exhibited in Figure 1.<sup>6</sup>

Many physicians even in Hawai'i are not aware that ethnicity plays a role in the dosing of warfarin and many of the major health insurers in Hawai'i currently do not pay for genetic testing to assist with warfarin dosing. Therefore, ethnicity can serve as a useful proxy. This study evaluates whether significant differences in dosing of warfarin exist by ethnicity.

## Methods

This study was conducted in 2013 and was limited to just these four ethnic-racial groups: Asians, Native Hawaiians, Portuguese, and Caucasians. Ethnicity was self-reported, and either determined by chart review or by direct questioning. Native Hawaiian was defined as having any Hawaiian ancestry, no data on full Hawaiians were available for this study. Asians in this study were predominantly of Japanese ancestry. Portuguese are generally classified as Caucasians, however, they were separated in this study to see if there were any differences between individuals identifying as Portuguese and other Caucasians, to enable comparison to the literature. Most of the patients included in the study were current patients and had to be on a stable dose of warfarin for at least three months with an INR between 2.0 and 3.0. There were no other inclusion criteria other than ethnicity and being on a stable dose of warfarin with an INR between 2.0 and 3.0. Data was obtained from four private practices located in Hilo Hawai'i, and one individual, either a physician or a nurse, from each of the practices was responsible for following the inclusion criteria and compiling the data. The data obtained was pooled and statistically analyzed using an ANOVA test available through MicroCase®. Mean dose of warfarin per day and the mean dose per day per kilogram between the ethnic groups were compared.

## Results

A total of 113 patients fulfilled the inclusion criteria. Of these, 43 (38%) were Asians, 23 (20%) Native Hawaiians, 17 (15%) Portuguese and 30 (26%) Caucasians. There were 73 (65%) men and 40 (35%) women between the ages of 51 and 101 years (mean age of 76). Patients were stratified according to age, ethnicity, required daily dose of warfarin (mg), and daily dose of warfarin divided by total weight in kilograms (mg/kg).

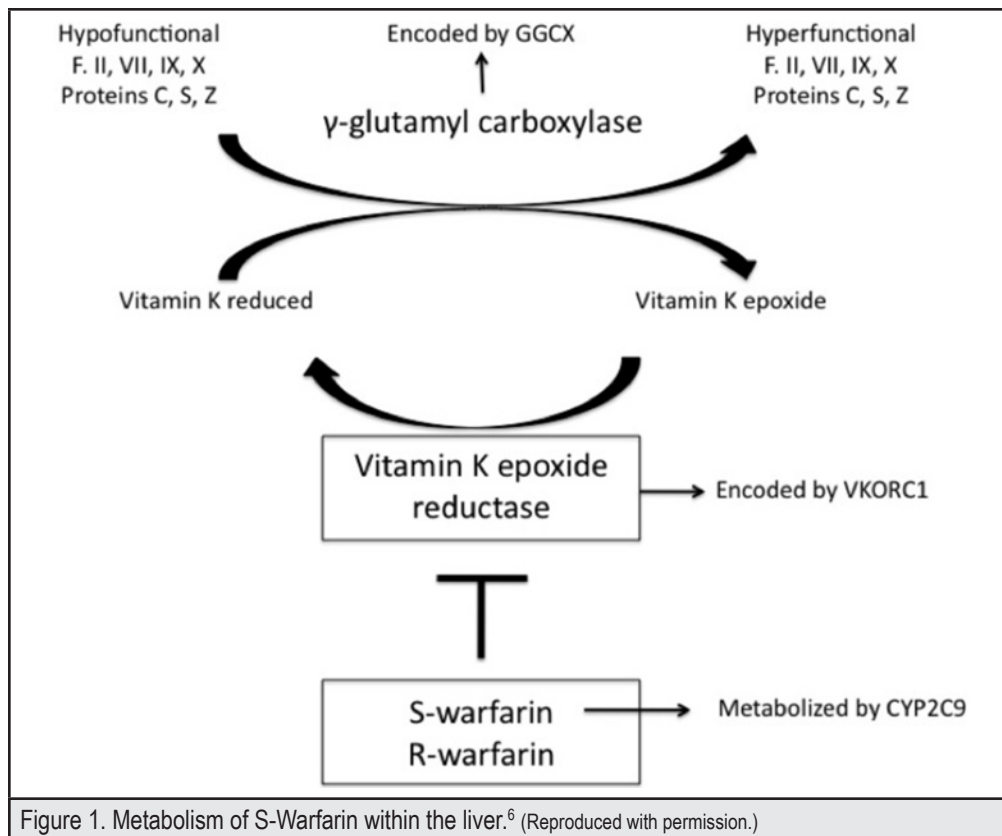


Figure 1. Metabolism of S-Warfarin within the liver.<sup>6</sup> (Reproduced with permission.)

Asians needed the lowest dose per day with an average of 2.5 mg/day, followed by Native Hawaiians and Portuguese each with a dose of 3.8 mg/day, and Caucasians with a dose of 4.4 mg/day. The difference in means across groups was determined to be statistically significant ( $P < .05$ ). When adjusted by weight in kilograms, Asians had a dose of  $4.0 \times 10^{-2}$  mg per kg, Native Hawaiians had a dose of  $4.3 \times 10^{-2}$  mg per kg, Portuguese had a dose of  $4.4 \times 10^{-2}$  mg per kg followed by Caucasians with a dose of  $5.3 \times 10^{-2}$  mg per kg. Again, the difference in means across groups was statistically significant ( $P < .05$ ). The effects of ethnicity on warfarin dosing are exhibited in Tables 1 and 2.

### Discussion

The most common genotype of CYP2C9 is homozygous CYP2C9\*1/CYP2C9\*1 which is also referred to as the wild type genotype. There are two common variants of the CYP2C9 allele, the CYP2C9\*2 and the CYP2C9\*3 both of which encode enzymes that have less activity, ultimately requiring a lower dose of warfarin. Both homozygous and heterozygous states also exist for CYP2C9\*2 and CYP2C9\*3. The heterozygous states may significantly lower the warfarin dose anywhere from 20% to 57%. The homozygous states of the CYP2C9\*2 and CYP2C9\*3 alleles may lower the dose anywhere from 36% to 78%.<sup>5</sup> However, most Asians (85%) are predominantly homozygous for the CYP2C9\*1/CYP2C9\*1 alleles<sup>7</sup> and as a result, the decreased warfarin requirements in the Asian population cannot be explained by variants in this genotype.

Ethnicity	N	Mean (mg)	Std. Dev.
Hawaiian	23	3.8	2.3
Caucasian	30	4.4	1.9
Portuguese	17	3.8	1.7
Asian	43	2.5	1.1

$P$ -value  $< .05$

Ethnicity	N	Mean (mg/kg)	Std. Dev.
Hawaiian	23	$4.3 \times 10^{-2}$	$2.3 \times 10^{-2}$
Caucasian	30	$5.3 \times 10^{-2}$	$2.1 \times 10^{-2}$
Portuguese	17	$4.4 \times 10^{-2}$	$2.0 \times 10^{-2}$
Asian	43	$4.0 \times 10^{-2}$	$1.4 \times 10^{-2}$

$P$ -value  $< .05$

Instead, the decreased dose of warfarin in the Asian population can be adequately explained by the VKORC1 enzyme. Mutations in VKORC1 cause a deficiency in the vitamin K dependent clotting factors ultimately resulting in increased sensitivity to warfarin and lowered dosages. Patients can be homozygous for this enzyme (A/A or non A/non A) or heterozygous (A/non A). Those individuals who are homozygous for the (A/A) genotype require about 50% less warfarin than the non A/non

A genotype, and those that are heterozygous (A/nonA) require about 26% less warfarin than the non A/non A genotype.<sup>8</sup> These findings regarding the VKORC1 have been most extensively studied in the Japanese and Chinese populations.<sup>5,10-12</sup> However, not all Asians require a lower dose of warfarin. In the East Indian population, the mean daily dose of warfarin was higher compared to two other Asian groups, the Chinese and Malay (4.9 mg/day, 3.7 mg/day, and 3.1 mg/day respectively).<sup>9</sup> This could be explained in part by the finding that East Indians have a higher frequency of the non A/non A genotype.<sup>13,14</sup> In addition, it may be hypothesized that other Southeast Asian populations including Filipino, Thai, Vietnamese, and Indonesian patients will have similar VKORC1 genotypes as the Chinese, Japanese and Korean populations and will ultimately require lower doses of warfarin.<sup>13</sup>

In this study, Portuguese in Hawai'i seemed to require less warfarin than the rest of the Caucasian population. However, a recent article confirms that the genetic variations in the Portuguese regarding the CYP2C9 and the VKORC1 genes are similar to the rest of the Caucasian population.<sup>15</sup>

African Americans generally require higher warfarin doses compared to other ethnic groups including Caucasians. This may be in part due to the lower frequencies of the CYP2C9\*2, CYP2C9\*3 and VKORC1 A alleles present in African Americans. A variant allele of gamma glutamyl carboxylase (GGCX), an enzyme that catalyzes the formation of vitamin K-dependent clotting factors, has been found to be present at a higher frequency within the African American population. This may be responsible in part for the higher dosing requirement needed in African Americans.<sup>16</sup> In that study, it was estimated that approximately 25% of African Americans require doses greater than 7.5 mg of warfarin per day. The Puerto Rican population which is a mixture of European, Amerindian, and African ancestry may require a lower warfarin dose;<sup>17</sup> this also appears to be true in the Mexican population.<sup>18</sup>

The findings of the current study suggest that Native Hawaiians appear to require a lower dose of warfarin than Caucasians; moreover, when adjusted for weight, at least three Hawai'i ethnic groups (Asians, Portuguese and Native Hawaiians) have similar dosing requirements. The local diet commonly shared among these three ethnic groups could be a factor.<sup>1</sup> Further research should be done on Hawai'i's Native Hawaiian and Pacific Islander populations.

There are significant implications regarding these ethnic differences in the dosing of warfarin and suggest that race-ethnicity should be taken into consideration when initiating the dose of the warfarin and when trying to calculate the maintenance dose. Current algorithms for warfarin dosing used in hospitals do not consider these ethnic differences. In addition to ethnic differences, age and BMI should also be considered. There are several articles proposing algorithms based on pharmacogenetics and warfarin dosing, including ones from Korea and Italy.<sup>19,20</sup> The COAG study and EU-PACT<sup>3,4</sup> should be completed soon. Further studies are being conducted on the role genetics plays in warfarin dosing, which include other genes like GGCX and

CYP4F2, another enzyme in the cytochrome P-450 family.<sup>21</sup> Currently most HMSA plans including HMSA Quest do not pay for CYP2C9 and the VKORC1 gene testing. Some of the Medicare plans including Part A do pay for it as does University Health Alliance, United Healthcare and Tricare. The results of the EU-PACT and COAG studies may determine whether other insurance companies pay for this testing. According to a correspondence with Doctor Chelestes Grace of Clinical Laboratories of Hawai'i currently costs run at approximately \$250 to \$350 for both tests (written communication, October 2013). Limitations of this study include the small sample size, and inaccuracies inherent to capturing ethnicity through chart review or self-reporting. The low sample size precluded a finer analysis of the distinctions among Asian populations in Hawai'i.

## Conclusions

This study confirms that there are ethnic differences in the dosing of warfarin, and weight is also an important factor to consider. Caucasians need almost 2 mg per day more warfarin than Asians. When adjusted for weight, Asians, Portuguese, and Native Hawaiians have similar dosing requirements. This clustering despite the difference in genetic makeup seems to implicate other factors that may be involved, including diet. However, when adjusted for weight, Asians, Portuguese, and Native Hawaiians need a lower dose than the Caucasians. These findings have significant clinical implications.

## Conflict of Interest

None of the authors identify a conflict of interest.

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# Third and Fourth Degree Perineal Injury After Vaginal Delivery: Does Race Make a Difference?

Kanoe-Lehua de Silva MD; Pai-Jong Stacy Tsai MD, MPH; Leanne M. Kon MD; Mark Hiraoka MD, MS; Bruce Kessel MD; Todd Seto MD; and Bliss Kaneshiro MD, MPH

## Abstract

Severe perineal injury (third and fourth degree laceration) at the time of vaginal delivery increases the risk of fecal incontinence, chronic perineal pain, and dyspareunia.<sup>1-5</sup> Studies suggest the prevalence of severe perineal injury may vary by racial group.<sup>6</sup> The purpose of the current study was to examine rates of severe perineal injury in different Asian and Pacific Islander subgroups. A retrospective cohort study was performed among all patients who had a vaginal delivery at Queens Medical Center in Honolulu, Hawai'i between January 1, 2002 and December 31, 2003. Demographic and health related variables were obtained for each participant. Maternal race/ethnicity (Japanese, Filipino, Chinese, other Asian, Part-Hawaiian/Hawaiian, Micronesian, other Pacific Islander, Caucasian, multiracial [non-Hawaiian], and other) was self-reported by the patient at the time admission. The significance of associations between racial/ethnic groups and demographic and health related variables was determined using chi-square tests for categorical variables and analysis of variance for continuous factors. Multiple logistic regression was performed to adjust for potential confounders when examining severe laceration rates. A total of 1842 subjects met inclusion criteria. The proportion of severe perineal lacerations did not differ significantly between racial groups. In the multiple logistic regression analysis, operative vaginal delivery was related to both race and severe perineal laceration. However, despite adjusting for this variable, race was not associated with an increased risk of having a severe laceration ( $P = .70$ ). The results of this study indicate the risk of severe perineal laceration does not differ based on maternal race/ethnicity.

## Introduction

Severe perineal lacerations (third and fourth degree) as a consequence of vaginal delivery have both short- and long-term consequences including fistula formation, fecal incontinence, fecal urgency, chronic perineal pain, and dyspareunia.<sup>1-5</sup> An estimated 20 to 50 percent of women who require repair of anal sphincter lacerations after delivery will experience symptoms of anal incontinence.<sup>7</sup> Maternal age, nulliparity, operative vaginal delivery, episiotomy, persistent occiput posterior position, and increasing birth weight have been associated with an increased risk of these types of lacerations.<sup>8-11</sup> Recent studies suggest race may play a role in the risk of severe lacerations.<sup>6,11</sup> In a retrospective cohort study, nulliparous Filipino and Chinese women were found to be at increased risk of third- and fourth-degree laceration compared to other racial groups.<sup>6</sup> Other retrospective studies have identified Asian race as a risk factor for severe lacerations. Specifically, Indian and Filipino women were found to be at increased risk of sustaining anal sphincter lacerations.<sup>11</sup> It is unclear whether an increased risk of severe perineal laceration is present among all Asian and Pacific Islander subgroups. Clinical practice would suggest that there are many physical differences between the subgroups. The purpose of this study was to examine the impact of maternal race on the risk of developing third and fourth degree perineal lacerations at the time of vaginal delivery. In particular, the risk of severe perineal

laceration among the various Asian (Chinese, Japanese, Filipino, other Asian) and Pacific Islander (Micronesian, Hawaiian/Part-Hawaiian, other Pacific Islander) subgroups was explored.

## Study Design

A retrospective cohort study was performed at the Queens Medical Center (QMC) in Honolulu, Hawai'i in 2004. This study was approved by the QMC Institutional Review Board. All women who had a vaginal delivery between January 1, 2002 and December 31, 2003 were reviewed. Women were excluded if there was malpresentation of the fetus (breech or transverse position) or if there was a multiple gestation such as a twin pregnancy. Demographic variables including age and race as well as health related variables, such as gestational age, parity, and the presence of diabetes mellitus (diet controlled or insulin dependent) were collected by reviewing hospital and prenatal records. Diabetics were sub-classified as either diet controlled or insulin dependent due to the higher rates of complications that insulin dependent diabetics experience in pregnancy. Physicians were required by this facility to include the patient's prenatal record in the medical record. Labor and delivery events were recorded in the medical record using standardized forms. If the prenatal record was not included in the medical record or if portions of the labor and delivery record were incomplete, physicians were required to complete these deficiencies resulting in complete records for data collection for this study.

Maternal race was extracted from the medical record. Patients self-reported race at the time of admission. If it was inappropriate to collect admission information when the patient arrived at the hospital (eg, if a patient was in active labor), hospital staff returned to the bedside sometime after delivery to collect admission information. In the medical record, patients could select as many races as they thought appropriate. For this analysis, if an individual identified with more than one race, they were either; (1) considered to be part-Hawaiian/Hawaiian if one of those races was Hawaiian or part-Hawaiian, or (2) were categorized as multiracial. Patients were thus grouped into one the following 10 categories: Japanese, Filipino, Chinese, other Asian, part-Hawaiian/Hawaiian, Micronesian, other Pacific Islander, Caucasian, multiracial (non-Hawaiian), and other. Maternal height was self-reported by the patient on the day of admission. Maternal weight was measured on the day of admission. Information was collected regarding mode of delivery, in particular whether the patient had an operative delivery (forceps or vacuum assisted delivery), whether the patient had an episiotomy, birth weight, fetal position (occiput anterior, non-occiput anterior), and degree of perineal laceration if present.



Descriptive statistics, including frequency measures were calculated. Association between racial/ethnic groups and demographic and health related variables were determined using chi-square tests for categorical variables and analysis of variance for continuous factors. A Bonferroni adjustment was used when making pair-wise comparisons between racial groups. A multiple logistic regression model was created to adjust for potential confounders that were associated with severe lacerations using a  $P < .05$  cutoff for initial inclusion in the model. All analyses were performed using Statistical Package for the Social Sciences version 16.0 for Windows (SPSS Inc., Chicago, IL).

## Results

A total of 1842 subjects met inclusion criteria. Demographic characteristics are presented in Table 1. The most commonly reported maternal races were Japanese (24.6%), part-Hawaiian/Hawaiian (18.3%), and Filipino (15.0%). Chinese women had the greatest mean age (30.6 [SD 5.7] years), and the “Other” category had the youngest mean age (28.6 [SD 6.8] years) at the time of delivery. Mean maternal body mass index (BMI) at the time of delivery for the study population was 28.2 (SD 7.0) kg/m<sup>2</sup> and there was no difference between groups ( $P = .80$ ). Mean birth weight for the study population was 3262.2 (SD 467.5) grams and there was also no significant difference between groups ( $P = .46$ ). No differences by race emerged in the proportion of women who reported that this was their first

child; approximately 40% of the study population reported a parity of one following delivery ( $P = .79$ ). The only variable that differed significantly was the proportion of women who had an operative vaginal delivery ( $P < .05$ ). Caucasian (18.4%) and Micronesian (23.2%) women had the highest proportion of operative vaginal deliveries while Filipino (9.4%) and other Asian (9.1%) women had the lowest.

Table 2 describes the relationship between severe perineal laceration and various demographic and health related factors. Patient age, operative vaginal delivery, episiotomy and parity affected the rate of severe perineal laceration ( $P < .001$ ). Episiotomy was performed in 756 patients, resulting in an episiotomy rate of 41.0%. Table 3 describes the unadjusted and adjusted odds ratios for severe perineal laceration for various racial groups compared to Caucasians. After adjusting for episiotomy and operative vaginal delivery, no significant differences emerged in the risk of severe lacerations for various racial groups when compared to Caucasians.

## Discussion

Contrary to previous studies by Hopkins, et al, Goldberg, et al, and Green and Soohoo, this study did not find higher rates of severe lacerations in Asian women, specifically Asian and Pacific Islander subgroups.<sup>6,12,13</sup> “Asian” as a racial category has been used in other studies to combine diverse subgroups including Chinese, Filipino, Laotian, Hmong, Korean, Japanese,

	Japanese	Hawaiian/ part- Hawaiian	Filipino	Caucasian	Chinese	Micronesian	Multi-Racial (non-Hawaiian)	Other Pacific Islander	Other Asian	Other	Total Study Population
N (% of total population)	453 (24.6)	338 (18.3)	277 (15.0)	152 (8.3)	94 (5.1)	56 (3.0)	225 (12.2)	57 (3.1)	143 (8.7)	47 (2.6)	1842
Mean Age in Years, mean (sd)	30.0 (5.8)	29.8 (6.2)	30.5 (5.9)	29.4 (6.2)	30.6 (5.7)	28.9 (5.3)	30.2 (6.1)	30.5 (6.6)	30.0 (6.3)	28.6 (6.8)	30.0 (6.1)
Gestational Age in Weeks, mean (sd)	39.0 (1.6)	38.9 (2.9)	39.0 (2.3)	39.1 (1.6)	38.6 (3.8)	38.7 (3.0)	38.8 (2.9)	39.1 (1.2)	39.0 (1.4)	38.7 (5.9)	39.0 (2.5)
Birth Weight in Grams, mean (sd)	3287.6 (486.2)	3243.0 (460.15)	3270.1 (444.8)	3238.2 (488.8)	3260.1 (439.0)	3197.6 (439.5)	3237.1 (463.8)	3391.33 (477.3)	3244.8 (491.0)	3283.9 (413.9)	3262.2 (467.5)
Parity (n [%])**											
None	184 (40.9)	135 (40.3)	117 (42.2)	69 (45.7)	35 (37.6)	31 (55.4)	89 (39.7)	22 (39.3)	63 (44.1)	20 (42.6)	765 (41.8)
1	147 (32.7)	119 (3.5)	94 (33.9)	39 (25.8)	36 (38.7)	13 (23.2)	78 (34.8)	20 (35.7)	43 (30.1)	13 (27.7)	602 (32.9)
2 or more	119 (26.4)	81 (24.2)	66 (23.8)	43 (28.5)	22 (23.7)	12 (21.4)	57 (25.4)	14 (25.0)	37 (25.9)	14 (29.8)	465 (25.4)
Maternal BMI at Delivery kg/m <sup>2</sup> , mean (sd)	28.5 (6.4)	28.3 (7.0)	27.8 (8.1)	27.9 (7.5)	27.5 (6.9)	28.4 (6.3)	28.0 (6.9)	29.2 (4.9)	27.7 (7.5)	28.3 (8.6)	28.2 (7.0)
Diabetes, n (%)											
Diet Controlled	20 (4.5)	17 (5.1)	17 (6.2)	3 (2.0)	6 (6.5)	3 (5.5)	11 (5.0)	1 (1.8)	10 (7.2)	0 (0.0)	88 (4.9)
Insulin Dependent	11 (2.5)	7 (2.1)	11 (4.0)	2 (1.4)	2 (2.2)	1 (1.8)	4 (1.8)	3 (5.5)	4 (2.9)	0 (0.0)	45 (2.5)
Operative delivery* n (%)	52 (11.5)	44 (13.0)	26 (9.4)	28 (18.4)	15 (16.0)	13 (23.2)	25 (11.1)	8 (14.0)	13 (9.1)	6 (12.8)	230 (12.5)
Occiput Anterior Position, n (%)	432 (95.4)	317 (93.8)	267 (96.4)	146 (96.1)	91 (96.8)	53 (94.6)	211 (93.8)	53 (93.0)	137 (95.8)	44 (93.6)	1751 (95.1)
Episiotomy n (%)	186 (41.1)	145 (42.9)	108 (39.0)	72 (47.4)	41 (43.6)	24 (42.9)	79 (35.1)	26 (45.6)	64 (44.8)	11(23.4)	756 (41.0)

\* Indicates  $P < .05$  (p-value determined using chi-square tests for categorical variables and analysis of variance for continuous factors), \*\*Missing data for 10 subjects.

Table 2. Association Between Severe Lacerations and Demographic and Health Related Factors			
	N	Severe Laceration, n (%)	P value*
<b>Race</b>			
Other Asian	143	13 (9.1)	.51
Japanese	453	31 (6.8)	
Hawaiian/Part-Hawaiian	338	30 (8.9)	
Filipino	277	21 (7.6)	
Caucasian	152	19 (12.5)	
Chinese	94	4 (4.3)	
Micronesian	56	6 (10.7)	
Multiracial (non- Hawaiian)	225	20 (8.9)	
Other Pacific Islander	57	4 (7.0)	
Other	47	3 (6.4)	
<b>Age</b>			
25 or younger	451	28 (6.2)	.05
26-35	1023	98 (9.6)	
Older than 35	368	25 (6.8)	
<b>Diabetes</b>			
Diet Controlled	88	8 (5.4)	.90
Insulin Dependent	45	3 (6.7)	
Non-Diabetic	1709	138 (8.2)	
<b>Operative Delivery</b>			
Yes	230	62 (27.0)	<.001
No	1612	89 (5.5)	
<b>Episiotomy</b>			
Yes	756	112 (14.8)	<.001
No	1086	39 (3.6)	
<b>Parity**</b>			
0	765	134 (17.5)	<.001
1	602	12 (2.0)	
2 or more	465	5 (1.1)	
<b>Birth weight (Grams)</b>			
<4000g	1732	140 (8.1)	.47
>4000g	110	11 (10.0)	

\*P-value determined using chi-square tests for categorical variables and analysis of variance for continuous factors, \*\*Missing data for 10 subjects.

Table 3. Unadjusted and Adjusted* ORs and 95% CIs for Race and Severe Laceration				
Race	Unadjusted OR	Unadjusted [95% CI]	Adjusted OR*	Adjusted (95% CI)*
Other Asian	0.70	[0.33, 1.48]	0.84	[0.38, 1.85]
Japanese	0.51	[0.28, 0.94]	0.60	[0.32, 1.14]
Part-Hawaiian /Hawaiian	0.68	[0.37, 1.25]	0.78	[0.41, 1.50]
Filipino	0.57	[0.30, 1.11]	0.72	[0.36, 1.44]
Caucasian	Reference	Reference	Reference	Reference
Chinese	0.31	[0.10, 0.95]	0.34	[0.11, 1.08]
Micronesian	0.84	[0.32, 2.22]	0.75	[0.26, 2.13]
Multiracial (non-Hawaiian)	0.68	[0.35, 1.33]	0.89	[0.44, 1.79]
Other Pacific Islander	0.27	[0.53, 1.72]	0.56	[0.17, 1.81]
Other	0.48	[.135, 1.69]	0.751	[0.20, 2.82]

\*Adjusted for episiotomy and operative delivery.

and Vietnamese, into a single large group. Frequently, this is done to overcome the challenge of finding an adequate sample size. Given the racial diversity and large number of Asian and Pacific Islander patients in Hawai'i, this study was able to analyze subjects by racial subgroups. Of note, this is the only study to the authors' knowledge that has addressed perineal laceration rates in Hawaiian/part-Hawaiian and Micronesian women.

This study confirmed findings noted in other studies regarding increased rates of severe perineal laceration associated with episiotomy and operative vaginal delivery.<sup>2,6,14</sup> The higher than expected rate of episiotomy noted in this population is reflective of the time period in which this study took place. If this study was repeated today we would expect the rate of episiotomy to be lower. Interestingly, the study found that rates of operative vaginal delivery varied by racial group. Although this study was not designed to explore why this was the case, it suggests women of different races are treated differently when they receive medical care.

Several limitations must be noted. Importantly, data were collected between 2002 and 2003 making our results reflective of the population and medical practices for that time period. In the last 10 years, the rate of episiotomy has decreased, markedly affecting the generalizability of our findings to current clinical practice. Our findings still have merit as the purpose of this study was to explore differential rates of severe lacerations between racial groups rather than the effect of episiotomy on severe laceration. We did attempt to control for differences in episiotomy using multiple logistic regression. Secondly, patient information was extracted from the medical record and thus relied on the accuracy of the record. At QMC, patients self-reported race upon admission to the hospital. Maternal race was also reported in the neonate's record. Self-report is considered to be the best way to collect information on race.<sup>15</sup> The completeness of reporting for this variable in our study, however, raises the question of whether those who entered race into the medical record truly collected this variable by self-report. This is an observation; we were not able to determine the reason for the completeness of our data through this chart review. Additionally, because of the complexity of race, particularly in a multiracial population, it can be difficult to incorporate this variable into an analysis. Most studies group women into larger racial groups such as Asian, Pacific Islander or even Asian/Pacific Islander. Although our division of the study population into racial subgroups decreased the power of the study to detect differences, it was our intention to explore rates of severe laceration among these subgroups. Clinical practice would suggest that differences in body shape and stature exist among the Asian/Pacific Islander racial sub-

groups. These findings represent an important contribution to the medical literature because it is the first to describe rates of severe perineal laceration in several racial subgroup categories including Micronesians and part-Hawaiian/Hawaiians.

Women are frequently concerned about their risk of perineal laceration at the time of delivery. Over the last few years, research has provided a better understanding of factors which can increase or decrease that risk. The results of this study allow providers to advise women that their risk of severe perineal laceration does not appear to differ significantly solely based on their race.

## Conflict of Interest

None of the authors identify a conflict of interest.

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# Increasing Primary Care Physician Support for and Promotion of Cancer Clinical Trials

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## Abstract

Only 2.5%-3% of adult cancer patients participate in cancer clinical trials, yet about 20% of cancer patients are medically eligible to participate. Research suggests that the primary care provider (PCP) can influence a patient's awareness of, and potentially, his or her decision to consider a clinical trial. To address low cancer clinical trial accrual rates, 'Imi Hale Native Hawaiian Cancer Network partnered with The Queen's Cancer Center to provide and evaluate education on clinical trials to Hawai'i PCPs. The educational materials were developed from a national curriculum and tailored to local audiences. Objectives of the curriculum were to educate PCPs about common myths (attitudinal barriers) around clinical trials and suggest ways that PCPs can introduce the concept of clinical trials to their patients with cancer or suspicion of cancer. The curriculum was tested on 128 PCPs in 2012. Knowledge of the PCP's role and their willingness to mention clinical trials were measured through a post-test immediately following the presentation, which 74 (58%) PCPs completed. The post-test results suggested an increase in awareness among PCPs of their potential role in cancer clinical trial accrual, and an increase in PCP willingness to mention clinical trials to their patients with suspicion of cancer or diagnosed with cancer. Although findings suggest that this intervention is useful in increasing PCP receptivity to promoting cancer clinical trials, more research is needed to test if increased willingness results in increased accrual of cancer patients into clinical trials in Hawai'i.

## Introduction

Clinical trials are needed to establish the effectiveness of new therapies for human diseases, including cancer. Participation in cancer clinical trials (CCTs) can increase cancer patient survival rates through the development of better screening methods, earlier detection, and more effective cancer treatments.<sup>1</sup> However, adult enrollment in cancer treatment clinical trials remains low among all demographic groups nationally and in the state of Hawai'i. Low accrual rates can prolong the duration of trials, delay the analysis or publication of important results, and/or lead to early closure and failure of important studies.<sup>2,3</sup>

Nationwide, only 2.5%-3% of adult cancer patients participate in CCTs while receiving treatment for their cancer, yet about 20% of cancer patients are medically eligible to participate.<sup>4,6</sup> In Hawai'i, approximately 6,000 residents are diagnosed with an invasive cancer each year and, like the national average annual accrual rate, less than 3% of eligible cancer patients participate in cancer treatment clinical trials.<sup>7,8</sup> Of specific concern for Hawai'i's diverse population is that CCT accrual rates are generally lower among racial and ethnic minorities than among non-Hispanic Whites.<sup>9</sup> Patients from minority groups or who are 65 or older are less likely to be approached, regardless of eligibility.<sup>4,10-14</sup> It has been suggested that increasing minority and under-represented populations in clinical trials is a means to increase representativeness of trials and applicability of findings to diverse populations.<sup>15</sup>

A number of barriers negatively affect participation in CCTs.<sup>16-18</sup> One barrier is reluctance of referring physicians to

mention and promote CCTs as an option to their patients.<sup>1,19-21</sup> For example, a National Cancer Institute survey of 706 Primary Care Physicians (PCPs) found that 98% referred patients to cancer specialists without discussing the topic of clinical trials.<sup>19</sup> The lack of PCP participation in CCT accrual can be partly attributed to the finding that CCTs have the potential to limit physicians' autonomy with patients, which in turn may affect their relationship.<sup>22</sup> Another cited barrier is that a physician's decision to recommend a CCT to their patient may be influenced by their knowledge of and attitudes toward specific CCT protocols.<sup>14,23,24</sup> Some PCPs prefer to leave the discussion to the oncologists; some are unaware of available CCTs; some do not discuss CCTs because they refer their patients to specialists who do not conduct CCTs; some PCPs distrust researchers; some feel CCTs are not relevant to their day-to-day medical practice; some feel CCTs are only for patients who have run out of treatment options; and some feel that promoting CCT takes too much time.<sup>1,25-29</sup>

Research suggests that active participation of PCPs would improve CCT accrual rates.<sup>30</sup> For example, a study by Baquet, et al, found that patients who received information about clinical trials from their health care provider were significantly more likely to participate in clinical trials.<sup>31</sup> Several researchers recommend the development and testing of educational interventions for physicians.<sup>19,20,32</sup> Sherwood and colleagues found that attendance at CCT education sessions positively predicted eventual referral of cancer patients to clinical trials in Michigan.<sup>21</sup> The purpose of this study was to tailor a PCP-targeted educational intervention to Hawai'i physicians and test if it increased PCP awareness about their role in CCT accrual and increased their willingness to discuss CCTs with their patients.

## Intervention

'Imi Hale Native Hawaiian Cancer Network ('Imi Hale) partnered with The Queen's Cancer Center to tailor, implement and evaluate a 30-minute educational presentation to increase the promotion of CCTs among Hawai'i PCPs. A curriculum developed by the Education Network to Advance Cancer Clinical Trials (ENACCT) entitled "Why Cancer Clinical Trials are Important for Your Practice: Primary care Provider Education Program" was adapted with permission.<sup>6</sup> Established in 2004, ENACCT is the only national organization solely dedicated to evidence-based community centered approaches to cancer clinical trials education.<sup>33</sup> ENACCT has developed innovative education programs for community leaders, primary health care providers and clinical trial investigators, offered nationwide. Their mission is to improve access to cancer clinical trials through education and collaboration with communities,

health care providers, and researchers.<sup>33</sup> ENACCT and 'Imi Hale collaborated previously in 2008 to educate community outreach staff and cancer patient navigators about CCT. This paper describes work from a 2012 collaboration to educate PCPs on CCT.

The CCT presentation for PCPs included information about cancer incidence and mortality along with accurate, user-friendly information about CCT. It specifically attempted to disabuse PCPs of common “myths” (attitudinal barriers) pertaining to CCT, including: (1) clinical trials have nothing to do with a PCP’s day-to-day medical practice; (2) PCPs have no role to play in encouraging their patients diagnosed with cancer to consider CCTs; (3) clinical trials are only for patients who have run out of other treatment options; (4) patients participating in CCT are treated like “guinea pigs”; (5) there are only a few trials available to patients in Hawai‘i; and (6) helping patients gain access to CCT takes too much time and effort.<sup>6</sup>

Adaptations made to the curriculum by 'Imi Hale included the addition of Hawai‘i-specific data on colorectal cancer screening, incidence and mortality. For example, data referenced incidence and mortality rates among the different ethnic groups in Hawai‘i, pictures were replaced or added featuring local faces and places, and testimonials were included of Hawai‘i patients who had participated in a CCT. The presentation was developed in two modalities—a PowerPoint® presentation designed for a staff presentation, and a hand-held, spiral-bound flip chart for one-on-one presentations. Both formats contained identical information. Attendees were provided an information packet that included a printed version of the presentation, patient educational materials about CCT, and information on how to locate a current, open CCT.

The CCT curriculum was designed to take 30 minutes and be presented by a team of two, comprised of a clinical research nurse from The Queen’s Medical Center, or clinical research associate from the University of Hawai‘i Cancer Center, and a community health educator from 'Imi Hale Native Hawaiian Cancer Network. Twelve presenters were trained by ENACCT staff, completing an 8-hour workshop that included brainstorming ways to best reach and address the needs of the target population (PCPs) and role playing to practice and deliver the content. Trainees utilized the original ENACCT curriculum for the training and then participated in adapting and tailoring the curriculum prior to implementation. Drafts of the adapted curriculum were also field-tested with three PCPs to get feedback and reactions on relevance and integrity of the content. When the final tailored presentation and flip chart were completed, all trainees participated in a one-hour session to practice with the new materials.

## Methods

### Design

This study utilized a post-test-only design, with PCPs completing a short questionnaire following the presentation to assess changes in knowledge of, and willingness to promote cancer clinical trials. Participants were informed that participation

was voluntary and that they could withdraw from the study at any time without prejudice. The project was reviewed and exempted by the Native Hawaiian Institutional Review Board.

### Sample

The target audience for the in-service was PCPs practicing on O‘ahu. This included board-certified internists and family practitioners, as well as OBGYNs, surgeons, urologists, and other specialists who may play a PCP role for cancer patients. PCPs had a choice of where to receive training: (1) in their offices, where office staff also were invited to attend; (2) over lunch, in a one-on-one session with an educator; or (3) in meetings attended by multiple PCPs, eg, meetings of physicians’ associations.

A promotional flyer for the in-service was developed and distributed by the educators trained in the program and by 'Imi Hale’s e-updates and e-newsletters to their network. The trained educators also were responsible to initiate contact and coordinate presentations with PCPs that they knew through their work. PCPs were approached and informed about the free 30-minute education session. The clinical research nurses also outreached to physician groups in Community Health Centers, hospitals, or associations. The sample size was limited to the number of PCPs that were invited and agreed to attend the education sessions.

A total of 16 sessions were held between October 2011 and October 2012 and attended by 128 PCPs and 115 non-physician office staff from across the state. Of the 16 sessions, six were provided in physician offices to the PCP and his/her office staff, three were provided at Community Health Center sites to multiple PCPs and clinic staff, one was provided in a one-on-one session, and nine were provided at physician group meetings (eg, The Queen Medical Center’s Department of Medicine and the 'Ahahui O Na Kauka, an association of Native Hawaiian physicians from across the state). The 'Ahahui O Na Kauka meeting allowed time for the 30-minute session but other large groups sessions were generally shorter, averaging 15 minutes. The post-test was completed by 74 (58%) of all 128 PCP attendees. Non-PCPs were given a different post-test that evaluated the presentation, and these findings are not presented here.

### Measures

Knowledge of their role and willingness to mention CCTs to patients were measured through a PCP-completed post-test (See Appendix). Like the presentation, the questionnaire was adapted from evidence-based materials developed by ENACCT. Changes were measured using three items about the presentation: (1) It increased my awareness of myths about CCT; (2) It increased my awareness of how to bring up CCT in a conversation with my patient; and (3) It increased my knowledge about how I influence my patients’ decisions to consider participating in a CCT. Change in willingness to discuss CCT was measured in a single item: This presentation increased my willingness to mention cancer clinical trials more often to my patients. A five-point Likert scale was used for all four questions (Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, and

Strongly Agree). PCPs also were asked to indicate their medical specialty. No other demographic information was collected to keep the questionnaire short and increase the likelihood of post-test completion.

### Analysis

Post-test data were managed in SPSS® version 21.0.0.0. Frequencies were run for PCP specialty and the four items on knowledge change and willingness to mention CCT to patients. Due to the small sample, “Strongly Agree” and “Agree” were collapsed into a single category labeled “Agree,” while “Strongly Disagree” and “Disagree” were collapsed into a single category labeled “Disagree.” The neutral response category was maintained. Because some sessions were shorter than the recommended 30 minutes, findings by presentation time were compared (30 minutes vs less than 30 minutes).

### Results

There were 128 PCPs who received the in-service presentation, with 74 (58%) of participants completing the evaluation. Of the 74 PCPs who completed post-tests, 35 (47%) practiced internal medicine, 10 (14%) practiced family medicine, 8 (11%) were OB-GYNs, 3 (4%) were in pediatrics, 11 (15%) were in other specialty areas (including radiology, anesthesia/pain, optometry, enterology, and general surgery), and 7 (9%) did not indicate their medical specialty (Table 1).

Results suggested that the in-service presentation was suc-

cessful in increasing PCPs’ awareness about CCT (Table 2). Of the 74 respondents, 61 (82%) agreed that it increased their awareness about CCT myths, 65 (88%) agreed that the presentation increased their awareness about how to bring up cancer clinical trials in a conversation with their patients, and 65 (88%) agreed that the presentation increased their knowledge on how to influence their patients’ decision to consider participating in a cancer clinical trial (Table 2). Finally, 64 (87%) agreed that it increased their willingness to mention cancer clinical trials to patients facing cancer. No differences in percent agreeing with each statement were seen for PCPs who attended a 30-minute session vs a session that was shorter (not shown in table).

Oral feedback from attendees suggested that they were very appreciative of the local information included in the training, the sample patient educational materials about CCT, and resources for learning about CCTs available locally. PCPs who practiced on the neighbor islands were especially interested in learning more about local CCTs, as CCT availability is limited where they practice. Other items on the evaluation instrument also reinforce that the training was well received by our target population. For example, 84% of attendees found the presentation to be the appropriate length, 99% of attendees found the format of the presentation easy to follow, and 89% thought that the presentation was appropriate for our target population.

### Discussion

CCTs are an important strategy to increasing cancer patient survival rates, which are important for both the patient and the provider.<sup>1</sup> Studies have shown that almost all PCPs (98%) that refer their patients to cancer specialists do not introduce the topic of cancer clinical trials.<sup>1,20</sup> In concurrence with Sherwood and colleagues,<sup>21</sup> this study shows that education directed to PCPs can increase their awareness of their important role in promoting CCTs and increase their willingness to mention CCTs to their patients.

Education on CCT already is being integrated into the education of medical students at the University of Hawai’i John A. Burns School of Medicine (JABSOM). Since 2006, JABSOM medical students receive a briefing in CCT early in their first year and work through two problem-based learning cases that include a clinical trial component. Second-year students hear from a panel on CCT that includes a physician, a clinical research assistant, and a patient who participated in CCT. The school is also looking into adding a shadowing component to their CCT education efforts. Thus, medical students graduating from JABSOM since 2009 hopefully understand their important role in CCT promotion.

However, many practicing PCPs may not have had education on CCTs in medical school, making this an important topic for continuing medical education. The curriculum tested by The Queen’s Medical Center and ‘Imi Hale may be a good continuing education tool.

Although the curriculum was designed to be delivered in a 30-minute session, post-test findings suggest that the shorter session may be just as effective. The shorter sessions occurred

Specialty	n (%)
Internal medicine	35 (47%)
Family medicine	10 (14%)
OBGYN	8 (11%)
Pediatrics	3 (4%)
Other	11 (15%)
Missing data	7 (9%)
Total	74 (100%)

Item	Agree n (%)	Neutral n (%)	Disagree n (%)
This presentation increased my awareness of myths about cancer clinical trials.	61 (82%)	10 (14%)	3 (4%)
This presentation increased my awareness of how to bring up cancer clinical trials in a conversation with my patient.	65 (88%)	7 (9%)	2 (3%)
This presentation increased my knowledge about how I influence my patients’ decision to consider participating in a cancer clinical trial.	65 (88%)	7 (9%)	2 (3%)
This presentation increased my willingness to mention cancer clinical trials more often to my patients.	64 (87%)	7 (9%)	3 (4%)

at set department meetings, where it was one of many items on the agenda. Only one physician selected one-on-one education over lunch. The health educators delivering the curriculum felt that the most successful deliveries were those provided in-office and in-clinic, which could be attended by the PCPs and their support staff.

In offering the curriculum, it would be important to continue to provide resource materials on locally available CCTs. Although the role of the PCP should be to simply introduce the concept of CCTs to their patients, health educators found that PCPs responded very positively to information provided on active trials in Hawai'i. This resource would need to be updated regularly. Physicians also appreciated the patient education materials, and these should be made available to their offices.

## Limitations

There were several limitations to this study. Most notably, the evaluation tool was administered at the end of the presentation only and relied on self-reported changes. No data were collected on CCT accrual rates, which should be affected by the increases in intermediate indicators (knowledge of role and willingness to discuss CCTs). The evaluation tool does not capture other demographic and professional experience that could be relevant to this study's outcomes, including years of medical experience or previous experience with clinical trials. Findings are based on a convenience sample and may not be representative of all PCPs in the target population. The sample collected may have attracted participants who were already interested in and willing to refer patients to CCTs. Presenters approached physicians with whom they already had relationships, which may have influenced their receptivity to the in-service. Budget restrictions limited the reach of the study to O'ahu, although there was some participation by neighbor island physicians in the 'Ahahui O Na Kauka session. Only 58% of attendees completed the post-test. Health educators found that it was logistically more difficult to administer the post-test in large group meetings, so response rates in these sessions were lower than in those provided in the office or clinic.

## Conclusion

The results of this study imply that this Hawai'i-tailored and PCP-targeted curriculum can increase PCP awareness of their important role in CCT accrual and their willingness to mention CCT to their patients facing cancer. Several researchers have found that patients whose physicians mentioned clinical trials were more likely to join them. Future tests of CCT educational programs in Hawai'i should attempt to link education to CCT accrual outcomes to see if this bears out in our community.

## Conflict of Interest

None of the authors identify a conflict of interest.

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**PHYSICIANS – Please complete this side**

**Cancer Clinical Trials Presentation Evaluation: Physician**

Today's Date: \_\_\_\_\_ Location: \_\_\_\_\_

Name of Presenter: \_\_\_\_\_ / \_\_\_\_\_

For staff use only:  
 BF     SF  
 PPT     H  
 \_\_\_\_\_

Please help us improve our presentation by answering the following the questions.

Your Specialty (i.e., internal medicine, OB-GYN, etc.)? \_\_\_\_\_

1. Length of the presentation:     Just right     Too long     Too short
2. The format was:
  - a. Easy to follow:     Yes     No
  - b. Appropriate for me/this group:     Yes     No, would have preferred \_\_\_\_\_
3. The content was:     Too much     Adequate     Not enough
4. What changes would you recommend? \_\_\_\_\_

5. Your cancer patients:
  - a. How many cancer patients have you seen in the last 3 months?
  - b. Of those patients, how many did you talk to about CANCER CLINICAL TRIALS?

5. On a scale of "Strongly Disagree" to "Strongly Agree," please indicate your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
a. This presentation increased my awareness of myths about clinical trials.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. This presentation increased my awareness of how to bring up cancer clinical trials in a conversation with my patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. This presentation increased my knowledge about how I influence my patients' decision to consider participating in a cancer clinical trial.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. This presentation increased my willingness to mention cancer clinical trials more often to my patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Mahalo!*



# A Case Study of Unusual Etiology of Anterior Uveitis with Ocular Hypertension-Iris Metastasis of Primary Lung Adenocarcinoma

Alexander D. Lin MSIV and William K. Wong, Jr MD

## Abstract

*This is a case of anterior uveitis in a 50 year-old man caused by lung adenocarcinoma metastasis to the iris. The patient was initially worked up for pneumonia and was discovered to have multiple lung lesions on computed tomography scan. Prior to discharge, the patient began complaining of ocular redness, pain, photophobia and decreased visual acuity. The patient was given an initial diagnosis of anterior uveitis with uveitic glaucoma, which was later confirmed to be secondary to lung adenocarcinoma metastasis to the iris. Metastasis to the iris is a particularly rare cause of anterior uveitis and may inadvertently be left out of a physician's differential diagnosis. This case illustrates a rare, but clinically important cause of anterior uveitis with intraocular hypertension, which should be considered in all cases of ocular redness and pain.*

## Introduction

Uveitis is inflammation of the middle portion of the eye, consisting of the iris, ciliary body and choroid. The differential diagnosis for uveitis is extensive and diverse. While systemic immune-mediated and infectious causes are responsible for the majority of non-idiopathic uveitis cases, cancer should be considered in all cases of uveitis as a life-threatening cause associated with significant mortality and morbidity. Uveal metastasis is the most common intraocular malignancy but is only estimated to consist of 5%-10% of all intraocular neoplastic cases.<sup>1</sup> The choroid is the most common site for uveal metastasis, whereas involvement of the ciliary body, retina, optic disc, vitreous and iris are rare.<sup>2-4</sup> Iris metastasis may appear as a yellow gelatinous mass located within the iris stroma and may cause ocular hypertension, hyphema, and cysts. Two thirds of iris metastases originate from breast or lung cancers but up to one third of patients have no previous history of cancer at the time of ocular diagnosis.<sup>5</sup> Because iris metastasis is a rare cause of uveitis, it often may not be considered in the differential diagnosis. This is a case of anterior uveitis caused by metastasis of lung adenocarcinoma to the iris. This case illustrates a rare cause of anterior uveitis, which should be considered in future differential diagnoses.

## Case Presentation

A 50 year-old Samoan man presented to a local hospital-based outpatient clinic with a chief complaint of shortness of breath and odynophagia. He had recently been an inpatient at the same hospital with similar symptoms and was discharged after 3 days with a diagnosis of pneumonia. Since discharge, he again began experiencing shortness of breath, cough, and odynophagia. For one week he experienced difficulty swallowing solids and eventually liquids due to the severity of pain. He was started on vancomycin, ciprofloxacin and clindamycin (for hospital-acquired pneumonia). The next day the patient was sent to the Medical Intensive Care Unit with a rising fever, hypotension,

and hypoxemia. During his admission, he received a computed tomography (CT) scan and a chest X-ray revealing extensive right lower neck supraclavicular and paratracheal necrotic adenopathy, as well as increasing opacity in the right chest with mediastinal involvement. It was at this time that a physical exam revealed mild redness of his left eye without blurry or double vision. Review of past medical history was significant for diabetes mellitus type II, and non-small cell lung cancer with brain metastases. The patient had completed radiation therapy and was scheduled for chemotherapy in the upcoming month.

One week later the patient was being considered for discharge, but began complaining of eye pain and redness of his left eye with decreased visual acuity and photophobia. Ophthalmology consult was requested to evaluate the patient's condition. Examination revealed a normal right eye, but his left eye measured "count fingers only" (CF) visual acuity, a minimally responsive and irregular pupil, and increased intraocular pressure of 44mmHg (normal is <20mmHG). Anterior segment exam of the left eye revealed mild conjunctival injection, moderate corneal edema, heavy cell and flare in the anterior chamber, an irregular pupil with fluffy infiltrative lesions on the pupillary margins, and a moderate cataract. Dilated exam of the retina was difficult due to a very hazy view. The patient was given an initial diagnosis of anterior uveitis with uveitic glaucoma. Topical pressure lowering medications, steroid therapy and pupillary dilating agents were started and the patient was scheduled for re-evaluation the following day.

The next morning the patient was re-evaluated by the ophthalmologist and found to be significantly improved. Visual acuity of the left eye improved to 20/50, intraocular pressure was reduced (estimated by palpation), anterior segment exam revealed better visibility with less reaction, and dilated retina exam was clear. The patient no longer complained of pain and was scheduled for outpatient evaluation by the ophthalmologist. Current topical therapy was continued.

During the outpatient visit the patient's eye condition had further improved, with visual acuity 20/20 bilaterally, intraocular pressure 13mmHg bilaterally and a normal bilateral external eye exam. Anterior chamber exam revealed a normal right eye, and minimal cells in the left eye. It was noted that in the left eye there was posterior synechiae with several cystic, lobular, translucent masses on the anterior iris measuring up to 2 mm in size. The initial impression at that time was of iris mass lesions suspicious for metastasis from lung cancer with associated uveitic glaucoma. The patient was instructed to continue topical pressure lowering medications, steroid therapy and mydriatic agents, as well as continue with the planned chemotherapy.

Over the next 2 months the patient returned to the hospital with recurring bouts of obstructive pneumonia secondary to his lung cancer. He was lost to follow up for his eye examinations. At that point it was determined that he was no longer a good candidate for chemotherapy. The patient was accepting of death and elected to be discharged from the hospital where he returned home and subsequently passed away.

## Discussion

This case illustrates a rare but clinically important cause of anterior uveitis with intraocular hypertension. While the presentation of lung cancer in this patient made metastasis a more obvious possible cause of anterior uveitis, it is important to keep neoplastic etiologies in the differential diagnosis of anterior uveitis with ocular hypertension. Anterior uveitis is a process of intraocular inflammation involving the iris, choroid, and ciliary body, and can result from many causes including systemic immune-mediated diseases, infectious agents, and masquerade syndromes (including cancer). While only occurring in a minority of cases, the implications of underlying malignancy require physicians to be aware of syndromes masquerading as uveitis. Masquerade syndromes are noninfectious processes that can cause uveitis and are most commonly caused by malignancy. They most often present bilaterally and usually lack inflammatory features such as keratic precipitates and synechiae.<sup>1</sup> There are several common types of neoplasms that affect the eye such as B cell lymphomas, uveal melanomas, retinoblastomas, xanthogranulomas, and metastatic tumors.

B cell lymphoma is the most common malignancy that causes uveitis.<sup>3</sup> B cell lymphoma can be confined to the eye and the central nervous system and present as bilateral, insidious visual decline, usually after the 5th decade of life. Subretinal pigment epithelial lesions and systemic involvement are typical of B cell lymphoma. B cell lymphoma should be suspected when inflammation persists despite steroid therapy or when neurological symptoms are present.

Uveal melanomas can present with episcleritis, anterior and posterior uveitis, endophthalmitis, and panophthalmitis. Uveal melanomas may have features of metastatic melanoma and may be necrotic, diffuse or plaque-like.<sup>3</sup>

Retinoblastomas present by age 6 and can have a variety of findings. Lesions are most often unilateral and can present as anterior uveitis, vitreitis, or shifting white hypopyon, and often have a lack of calcification.<sup>1</sup>

Juvenile xanthogranulomas can appear as yellowish iris nodules, diffuse thickenings, heterochromias, or spontaneous

hyphemas. This condition can present with raised, red-yellow skin lesions, 85% of which occur before one year of age.<sup>1</sup>

Metastatic tumors are the most common intraocular malignancy in adults.<sup>2-4,6</sup> Tumors are usually bilateral, multifocal and plateau-shaped. They can present either posteriorly as yellow posterior segment lesions with subretinal fluid, or anteriorly as anterior uveitis, iris nodules, and neovascularization of the iris. Metastasis more commonly involves the posterior chamber, with iris involvement being rare.<sup>7,8</sup> Unlike uveal melanomas, which typically only involve the inferior quadrants, metastatic tumors may involve any quadrant of the iris. Metastasis to the iris, as in the presented case, usually presents with blurred vision, ocular pain, redness, visible iris mass, and photophobia. Diagnosis is usually made via ultrasound and CT scan of the mass, and fine needle biopsy for cytologic verification. Lung and breast carcinomas are the most common sites of primary cancers. Systemic review and a thorough history are also important for elucidating this diagnosis.

## Conclusion

This case illustrates a rare cause of anterior uveitis which might have been mismanaged were it not for the patient's prominent cancer history. Obtaining a careful history, searching for signs of metastasis, and ruling out systemic and infectious illness allows for the best chance of catching these rare and potentially fatal etiologies of anterior uveitis.

## Conflict of Interest

None of the authors identify a conflict of interest.

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# MEDICAL SCHOOL HOTLINE

## The Role of MD1 in the John A. Burns School of Medicine MD Curriculum

Richard T. Kasuya MD, MEd and Damon H. Sakai MD

*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

The medical student curriculum at the John A. Burns School of Medicine at the University of Hawai'i at Manoa (UH JAB-SOM) spans four years and is designed to provide students with the experiences essential to developing life-long learning skills, an understanding of the biological sciences relevant to medicine, the skills required to provide outstanding care to patients, the standards of professionalism expected by society, and the skills required to maintain their own health and well-being. The preclinical curriculum consists of Problem-Based Learning (PBL) tutorials, lectures, and laboratories integrated thoughtfully within courses that concentrate on specific organ systems. PBL is a form of case-based learning that requires students to be actively involved in the learning process and fosters self-directed learning. It is complemented by clinical skills, community health, and elective courses. The clinical curriculum consists of clerkships and a lecture series in the

third year followed by both electives and required rotations in Emergency Medicine, Geriatrics, and Palliative Medicine in the fourth year.

The first-year of the medical student curriculum ("MD curriculum") is divided into four discrete blocks of time, ranging from 8-12 weeks in length. The first of these blocks is designated as "MD1." (Table 1)

### The Role of MD1 in the JABSOM Curriculum

As described in the introduction, MD1 is the first of a series of six educational experiences that serve as the foundation for the preclinical curriculum. It is designed to emphasize an introduction to the PBL method and basic understanding of the concepts underlying and contributing to health and illness. Subsequent courses in this series focus on organ systems (eg, pulmonary, endocrine, or renal systems) or specific age groups (eg, pediatrics, geriatrics). In MD1, students explore a series

Year 1	MD 1 (9 weeks)	MD 2 (12 weeks)	MD 3 (12 weeks)	MD 4 (12 weeks)
	<b>Health and Illness</b> (PBL and Lecture Series)	<b>Cardiovascular and Pulmonary Problems</b> (PBL and Lecture Series)	<b>Renal and Hematologic Problems</b> (PBL and Lecture Series)	<b>Gastrointestinal and Endocrine Problems</b> (PBL and Lecture Series)
	<b>Clinical Skills</b>	<b>Clinical Skills</b>	<b>Clinical Skills</b>	<b>Clinical Skills</b>
	<b>Community Health</b>	<b>Community Health</b>	<b>Community Health</b>	<b>Community Health</b>
	Electives available during MD 2, MD 3, and MD 4			
Year 2	MD 5 (9 Weeks)	MD 6 (15 weeks)	MD 7 (13 weeks)	MD 8 (10 weeks)
	<b>Student Selectives</b>	<b>Locomotor, Neurological, and Behavioral Problems</b> (PBL and Lecture Series)	<b>The Life Cycle</b> (PBL and Lecture Series)	<b>Basic Science Knowledge Consolidation</b>
		Clinical Skills	Clinical Skills	
			Evidence-Based Medicine	
Electives available during MD6 and MD7				
Year 3	<b>Clerkships - Blocks</b> Separate Clerkships in Family Practice (7 wks), Internal Medicine (11 wks), Obstetrics and Gynecology (7 wks), Pediatrics (7 wks), Psychiatry (7 wks), Surgery (7 wks)			
	<b>Clerkships - Longitudinal</b> Longitudinal Clerkship in Family Practice, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Psychiatry, Surgery			
	<b>Colloquia: Topics in Health and Illness</b>			
Year 4	<b>Senior Rotations</b> Emergency Medicine (4 wks), Geriatrics and Palliative Care (4 wks), and Electives (24 wks)			<b>Senior Seminars</b> (3 weeks)

Table 2. Typical Week in MD1					
	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	PBL session	Community Health	Lectures and laboratories	PBL session	Lectures and laboratories
Afternoon			Introduction to Clinical Skills		

of PBL cases (“health care problems”), attend lectures and participate in laboratory experiences designed to help understand concepts of health, normal form and function, principles and determinants of disease, and the complexity of the human illness experience.

While not structured in a traditional discipline-based format, this educational experience provides both depth and breadth of learning opportunities in a full range of biological sciences as well as coverage of important topics in the behavioral and population sciences. The case-based PBL format provides clinical relevance and meaningfulness, as well as strong emphasis on developing self-directed, lifelong learning skills. Students are expected to accept responsibility for their learning to a degree beyond which is rarely expected in undergraduate education, but to the extent that will be fully necessary in their chosen profession of medicine. PBL case content is organized and introduced around the following themes/framework:

- (1) Common and important health problems. For example, upper respiratory infections, cardiovascular disease, diabetes mellitus, falls in the elderly, abdominal pain, adolescent injuries through motor vehicle crashes, and breast cancer all rank very high in lists of health problems in their respective subpopulations.
- (2) Elements of the health care system (primary care, emergency services, hospitals, community health centers, etc.)  
Regional anatomy as it relates to the steps of the basic physical examination.
- (3) The foundational biological principles of inflammation, cell damage/death/repair, cancer/malignancy, and homeostasis (emphasizing blood glucose regulation and blood pressure regulation).
- (4) Key, longitudinal content such as health literacy, adolescent development and aging, health care economics, patient safety, and health care disparities (Native Hawaiian Health, cultural competency, and care of the homeless).

PBL activities are complemented by a carefully-selected and integrated lecture and laboratory series that includes sessions on anatomy, embryology, histology, physiology, pharmacology, genetics, biochemistry, and pathology. Lectures and discussions on topics such as “healthy living,” “homelessness in Hawai‘i,” “health and illness,” and “survivors of cancer” are carefully timed to coincide with key issues in the PBL cases, and provide valuable breadth to the learning experience.

Another important part of MD1 is to help students transition from more traditional educational experiences to a PBL system. Special experiences designed to help students develop the needed learning skills, such as; researching learning topics, presenting new information to peers, understanding assessment

and evaluation tools used within the curriculum, and providing feedback are provided throughout the course.

Together, this combination of learning activities and attention to learning skills development make for a rich and supportive learning experience, and an excellent transition to the organ-system-specific curricular blocks that follow.

As shown in Table 2, a “typical week in MD1” PBL sessions are held twice each week (3 hours per session). Lectures and laboratories are provided on two mornings each week (total of about 7 hours weekly). Clinical Skills training, that includes medical communication and physical examination skills training is a four-hour block of time each Wednesday afternoon. Students also participate in weekly Community Health activities. Not shown on the table are “special events” that occur throughout the block, including a one-hour simulation laboratory experience, a standardized-patient encounter, two four-hour “enrichment days” that provide instruction on PBL learning skills, and a mid-course large group course evaluation session.

The goals/content areas covered in MD1 can be summarized as follows:

- (1) **To gain an appreciation for behavioral, populational, biological and clinical issues as they affect health and illness in relation to the assigned health care problems.** An important philosophical and practical guiding principle throughout the medical school’s curriculum is to help students appreciate that physicians must consider behavioral, populational, biological, and clinical perspectives in the study and practice of medicine. Behavioral issues include concepts such as coping with illness, lifestyle modifications to promote health, and achievement of developmental milestones. Populational issues include concepts such as; epidemiology of disease, medicolegal issues, healthcare policy, and biostatistics. Clinical issues span the spectrum of the diagnosis and management of diseases, as well as the communication skills needed to work with patients, families, and other members of the healthcare team. The biological realm includes the scientific disciplines traditionally defined as anatomy, biochemistry, embryology, genetics, histology, immunology, microbiology, pathology, pharmacology, and physiology. As the first of the curricular series, MD1 provides additional emphasis on learning across these four domains in the PBL cases and lectures. The concurrent clinical skills and community health experiences reinforce this important concept.
- (2) **To learn and develop the skills required for effective problem-based learning.** PBL is a cornerstone method of learning used throughout the curriculum. In MD1, students are “coached” on the skills necessary to succeed in a PBL curriculum. In addition to frequent ongoing formative feedback from small group faculty facilitators, formal required sessions on topics including “introduction to the PBL process,” “PBL and the clinical decision making process,” “finding resources for your learning,” “presenting learning issues,” “case mapping,” “delivering and accepting

feedback,” and ethical issues that might be encountered are provided. Students are formally evaluated on their performance in PBL sessions by their faculty and peers.

(3) **To understand the biological sciences highlighted in the assigned PBL cases, lecture and laboratories, and related learning activities.** Basic sciences are important in any curriculum model. While in a PBL environment student learning is not bound by specific disciplines, the basic sciences maintain a prominent position in the learning opportunities offered by the PBL cases and lectures/laboratories. PBL cases, lectures and laboratories in MD1 introduce students to a wide range of basic science topics.

(4) **To develop students’ “communication in medicine” skills.** Medical students must learn to communicate effectively with peers, supervisors, team members, patients, families and community groups. In MD1, opportunities are provided for students to begin developing these skills in their PBL cases, lecture series, clinical skills instruction, and standardized patient encounter. A sampling of topics in this area include interviewing and counseling adolescents; reassuring patients in times of medical crisis; counseling patients about smoking cessation and cardiovascular lifestyle modifications, including diet and exercise; fostering adherence/compliance with medical treatment; educating patients about exercise safety; counseling patients about new and/or popular diets; and counseling patients about the use of complementary or alternative treatments.

### **Assessment and Evaluation of Students**

Evaluation methods are consistent with those used in the other courses in the two-year series. There are separate short answer and multiple-choice question examinations which cover the material from the PBL cases, lecture series, and clinical skills laboratories. PBL tutorial performance is also evaluated by the faculty member managing that particular group.

There is a strong emphasis on formative feedback throughout the block, including formal mid-course feedback and PBL evaluation sessions, and practice short-answer and multiple-choice-question examinations.

### **Student Perceptions of MD1**

Student feedback suggests that they consistently look back and see MD1 as a valuable transition period into medical school in terms of content, pace and intensity. The moderate starting pace is strategic, as it allows for the following:

- (1) Non-pressured approach to learning the PBL process under the guidance of their PBL tutors. An example would be the expected inefficiency of researching and preparing learning issues that improve with time and experience.
- (2) Acculturation to the JABSOM educational environment.
- (3) Building of collegial relationships with fellow students.
- (4) Development of study skills, strategies, and plans, with the assistance of the Office of Student Affairs.
- (5) Development of skills in accessing learning resources and gaining familiarity with the resources they find most useful at their level of learning.
- (6) Familiarity and comfort in interacting with their faculty, as well as staff from the Office of Medical Education, Office of Student Affairs, and Health Sciences Library.

### **The Future of MD1 at JABSOM**

MD1 has been an effective introduction to problem-based learning and transition into the model and culture of the medical school’s curriculum. Like all components of the JABSOM MD curriculum, continuous effort is expended to improve all aspects of the educational experience. PBL case material is reviewed and updated constantly with the latest advances in medicine. Also being considered are progressive educational methods and ways to effectively incorporate current educational technology. These ongoing quality improvement efforts should ensure that the course continues to provide students with a high-quality, memorable and rewarding learning experience.

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# INSIGHTS IN PUBLIC HEALTH

## **Strengthening the Epidemiology Workforce Through Mentorship: Practicum and Fellowship Experiences in the Family Health Services Division at the Hawai'i Department of Health**

Donald Hayes MD, MPH

*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 Starr MPH from the Hawai'i Department of Health.*

### **Abstract**

*There are significant shortages in the public health workforce and it's expected to worsen. Efforts to reduce this shortage are varied and include building the workforce by increasing exposure of students and young professionals in applied public health experiences. Providing these experiences increases productivity, and may help alleviate some of the workforce shortages in public health. This article seeks to highlight the work done at the Family Health Services Division (FHSD) in the Hawai'i Department of Health over the past 6 and half years in working with students in epidemiology practicum and fellowship experiences.*

### **Introduction**

The work in public health is multi-disciplinary in types of positions (eg, epidemiologists, public health clinicians, biostatisticians, planners, health economists, program administrators, health informaticists, toxicologists, lab techs, microbiologists, etc.) and type of agencies (federal, state, local, academic, community based, etc.). A 2008 publication by the Association of Schools for Public Health estimated there were about 50,000 fewer people in the public health workforce in 2000 compared to 1980; with the ratio of the public health workforce to the US population reported as just 158 per 100,000 in 2000 compared to the 220 per 100,000 in 1980.<sup>1</sup> The situation has become worse. The Association of State and Territorial Health Officials reported a loss of more than 50,600 state and local public health jobs since 2008. This figure of 50,600 represents nearly 22% of the total state and local health department public health workforce.<sup>2</sup> The combination of severe budget cuts and retirements is expected to result in a public health workforce shortage of 250,000 by the year 2020 in order to just get back to the ratio found in 1980 (which likely still underestimates the true need).<sup>1</sup>

Since 1995, the Council of State and Territorial Epidemiologists (CSTE) has surveyed its members on epidemiological capacity to identify needs of states and territories.<sup>3</sup> The latest assessment from 2010 identified 2,476 epidemiologists working at the state level, which represented a decrease of 0.9% from 2004. The diversity of subject matter for these state epidemiologists has also shifted since 2004 with a large increase in infectious disease; a small increase in maternal and child health; and declines in bioterrorism/emergency response, chronic disease, environmental health, injury, occupational health, and

oral health. There are many factors that likely contribute to these patterns. Further surveillance, including an assessment in 2013, will provide additional information on epidemiological workforce issues.

Solutions to improving the overall public health workforce will need to be multi-disciplinary and utilize diverse approaches that account for public health funding as well as ensuring a highly skilled workforce. Some of the ways to improve the workforce are promoted through the workforce development initiative at CSTE and include expansion of training fellowship programs in public health; introducing college and high school students to the field of epidemiology; linking practical mentorship experiences with formal training; increasing faculty with practical public health experience; addressing barriers to recruitment and retention; increasing funding for public health; and developing leadership opportunities for public health professionals.<sup>4</sup> This article highlights work done within the State of Hawai'i to improve epidemiological capacity through mentoring experiences in the FHSD at the Department of Health.

### **Public Health Workforce in Hawai'i**

The epidemiological capacity workforce in Hawai'i is of particular concern due to the closure of the University of Hawai'i School of Public Health in 1999. The Program in Public Health was accredited in 2002, with tremendous ongoing efforts by faculty and staff to re-establish the Office of Public Health Studies as a school by 2015. In 2006, there were approximately 50 students in the graduate public health program, a significant decline from the 200 students at the height of the school; this decline has significant implications for the state's ability to meet the demands of the workforce.<sup>5</sup> The program has gone through substantial changes as it re-emerges as a School of Public Health, but still only includes about 100 graduate level students in 2014; including 37 enrolled in degrees with an epidemiology focus (21 at Masters level and 16 at Doctorate level).<sup>6</sup> The recent addition of an undergraduate curriculum in public health should help in meeting the challenges of growing the public health workforce in Hawai'i. Mentoring students and

providing practical experiences at the Department of Health can help to both grow the states epidemiological capacity and support public health students gaining applied experience as part of their work towards an advanced degree.

### **CDC Assigned Epidemiologist in Hawai'i**

I started my current position in FHSD at the Hawaii Department of Health in 2007 as an epidemiologist assigned through the Division of Reproductive Health at the Centers for Disease Control and Prevention (CDC) (<http://www.cdc.gov/reproductivehealth/MCHEpi/>). In 2012, this assignee program celebrated 25 years of placing epidemiologists and fellows in nearly 40 states, districts, territories, agencies, and border regions. One of the fundamental goals of the program is to promote and build epidemiological capacity. Over the last 6.5 years, I have felt privileged and honored to be in my current position where I have worked with over 25 individuals in practicum and fellowship experiences including undergraduate, graduate, doctorate, post-doctorate students, and applied epidemiology fellows. In all of these experiences, the focus has been on building and developing epidemiological skills, including analysis and interpretation of data for diverse audiences.

### **Defining a Practicum**

A practicum experience can take many forms, including having a student work with an organization to learn first-hand and to apply skills learned in the classroom in a field setting. A practicum can be an opportunity for an employee to work with students in a teaching and mentoring relationship that is mutually beneficial. The mentor often learns from the student while guiding the student through the practicum. A successful practicum experience requires good communication between the mentor and the student, so regular meetings are established and feedback is provided throughout the experience. Developing a topic of mutual interest often requires discussion early on for the mentor to understand the goals of the student and for the student to learn about the objectives of the host agency. This communication occurs with every interaction in areas such as developing a topic of interest to both parties involved, basic orientation to the host agency, identifying objectives of the practicum experience, regular meetings during the practicum, and ongoing dialog to ensure that everyone is benefiting from the experience. A technique that can be useful is the joint development of a work plan at the very beginning of the practicum that includes a description of the topic, schedule, goals and objectives with specific deadlines. The work plans are referred to throughout the experience to ensure that all objective and skills are met and the student and the host agency benefit from the practicum experience. These are dynamic documents that are updated as needed and provide the student with a record of the practicum, which can be helpful when summarizing the results of the experience. These work plans are also often in alignment with, or can be adjusted to meet, school requirements so that the student can receive academic credit for the practicum.

### **Family Health Services Division Practicums and Fellowships**

In FHSD, the practicum experiences are of two major types: Short term (3 months); and long-term (2-year commitment through a post-graduate fellowship). There are also situations where a student may do a short-term practicum as part of the requirement for a doctorate degree, but the mentor may also participate over the duration of the student's study as part of the dissertation committee. With these diverse time commitments, there are definitely distinct expectations that come into play that should be addressed as part of the whole practicum experience. For example, it may be unreasonable to expect a student doing a short practicum to be able to generate a complex report, complete an abstract, and submit a paper for peer-reviewed publication all within the confines of the practicum. It is likely more appropriate for the student to learn about a specific data set, complete an analysis, and generate an abstract that could be submitted to a conference. Oftentimes, a student will want to turn that analysis into a published peer-reviewed manuscript that will depend on a lot of factors including the ability for the student and other co-authors to work on it after the practicum. Working over the longer term with an applied epidemiology fellow allows a much more extensive experience, including contributions to many different reports and projects. Additionally, fellows have exposure to diverse data sources and complex analyses that can lead to multiple presentations and peer-reviewed manuscripts. Past fellows have also been able to gain experience with other activities such as questionnaire design, working with stakeholders, program evaluation, collaboration on outbreak and preparedness activities, and taking leadership roles on various projects.

Efforts have been made in practicum and fellowship experiences to promote epidemiological analyses on a wide diversity of topics using existing data sets (eg, Behavioral Risk Factor Surveillance System; Hospital Discharge Data; National Survey of Children's Health; Pregnancy Risk Assessment Monitoring System; Supplemental Nutrition Program for Women Infants and Children; Vital Statistics; and Youth Risk Behavior Survey; Table 1). In addition to the analyses of existing data sets, primary data collection is a method often used for those involved in doctoral or fellowship level work (eg, provider surveys, participant surveys, and key informant interviews).

Through these mentoring experiences, we have been able to develop many products (eg, fact sheet, reports, abstracts, conference presentations, manuscripts) that have been used by the Department of Health and stakeholders in the community. Without the work of students, the volume of products would be significantly lower due to lack of staff time to devote to all of these analyses. Stakeholders and other staff in the Department of Health have used these products to increase awareness on many issues, help in grant applications and grant reporting, support efforts to promote programs and activities, and to promote legislation and policy.

Table 1. Selected Practicum and Fellowship Topics and Data Sources, FHSD, 2008-2014	
Topic	Data Source
Adverse childhood events and child flourishing	NSCH
Adverse childhood events and depression	BRFSS
Birth outcomes (eg, infant death, birth intervals, low birth weight, hospital charges, disparities)	Hospital Discharge, Vital Statistics
Breastfeeding (eg, initiation, disparities, barriers, social support)	WIC, PRAMS, Primary Data Collection
Bullying behavior	YRBS
Cesarean deliveries	PRAMS, Vital Statistics
Child obesity	WIC, YRBS
Dental care providers for children with special health care needs	Primary Data Collection
Depression and school engagement	NSCH
Diabetes before and during pregnancy	PRAMS, Vital Statistics
Disparities in asthma	BRFSS
Evaluation of child death review	CDR, Vital Statistics
Health care utilization among infants, mothers, and women of reproductive age	PRAMS, BRFSS
Health status of children in Hawai'i	NSCH
High blood pressure before and during pregnancy	PRAMS, Vital Statistics
Infant safe sleep	PRAMS
Intimate partner violence	BRFSS, PRAMS
Maternal chronic conditions and birth outcomes	Hospital Discharge
Maternal weight gain during pregnancy	WIC
Pelvic inflammatory disease	Primary Data Collection
Perinatal substance use	PRAMS
Physical activity and nutrition	YRBS
Preconception health indicators	BRFSS, PRAMS
Preconception obesity	PRAMS
Prematurity	Vital Statistics
Sexual activity and depressive symptoms	YRBS
Sexual violence	YRBS
Substance use before and during pregnancy (eg, smoking, alcohol, and illicit drug use)	PRAMS

Notes: NSCH refers to the National Survey of Children's Health; BRFSS refers to the Behavioral Risk Factor Surveillance System; WIC refers to the Supplemental Nutrition Program for Women Infants and Children; PRAMS refers to the Pregnancy Risk Assessment Monitoring System; YRBS refers to the Youth Risk Behavior Survey.

In addition to primary analyses, opportunities are provided to experience working in public health at the department through attendance at lectures and meetings, involvement in committees and other activities, to highlight the work done by epidemiologists. This includes working with community stakeholders and program staff to conduct analyses useful to their efforts. In addition, attempts are made to include individual presentations at the conclusion of the practicum to various stakeholders to foster collaboration as well as to highlight and reinforce the great work done by the students. These efforts with stakeholders have increased awareness and have led to new analyses for other practicum students and staff. They are also a great opportunity for students to share their experiences and improve their presentation skills, particularly as many will go on to present the material at a national conference.

Some of the outcomes that can be documented within FHSD are the 39 abstracts completed by practicum students (29) and fellows (10) and presented at state and national conferences in either a verbal or a poster format since 2008. An additional 12 abstracts were submitted to two conferences for consideration of presentation just this year. Another way to highlight the work is through the 25 state reports and fact sheets to which these practicum students or fellows have provided substantial contributions. These reports and fact sheets are used by various stakeholders and other department staff to raise awareness about particular issues and are helpful in highlighting disparate populations which can help in public health planning efforts. Another measure of impact would be the 15 published peer-reviewed manuscripts in which a practicum student or fellow substantially contributed to the article on a diversity of topics



in multiple journals. All of these experiences are important in increasing knowledge and awareness through sharing the information and findings from the particular work done by the students during the practicum, but also highlight some of the continued work that some are able to do after returning to their schools. The work completed during practicum experiences can enhance the curriculum vitae of participants while increasing analytic skills. Additionally, the practicum experience increases connections between the public health workforce and programs in academia.

Other less tangible benefits, like the good feelings associated with sharing knowledge, seeing increased confidence and skills in a student over the duration of the practicum, and seeing them grow in their public health careers are just some of the personally fulfilling benefits of mentoring and building the public health epidemiology workforce.

### **Practicum and Fellowship Funding and Academic Support**

Funding is always a challenge as there has not been an easy mechanism or dedicated funds to support practicum experiences. However, FHSD has been fortunate to have had several students receive a small stipend through the Graduate Student Epidemiology Program <http://www.mchb.hrsa.gov/research-data/mchirc/gsip/index.html> sponsored by the Maternal and Child Health Bureau at the Health Resources and Services Administration. Another mechanism has been the support of the CSTE Applied Epidemiology Training Program (<http://www.cste.org/?page=Fellowship>) from which we have had 2 fellows within FHSD since 2008. Additionally, we have some students participate that receive course credit while others just participate for the experience and receive no monetary or school benefit. All the practicum students and fellows are able to improve their skills in epidemiology particularly in data analysis and translation of the data to diverse audiences, but also learn about work done in a larger context at the Department of Health.

### **Conclusions**

The challenges of improving workforce capacity is not unique to public health and has been well documented in this journal over the years for a number of other health professions including clinical providers, biomedical researchers, social workers, dental hygienists, and public health laboratory professionals.<sup>5,7-10</sup> All of these professions, including epidemiology, highlight the importance of partnerships with young professionals and suggest various ways to improve the workforce across many disciplines. The need to improve epidemiology capacity will continue to grow along with the ability to understand the large volume of data available in society today. The experiences in FHSD over the last six years demonstrate a substantial contribution to the work in public health by practicum students and fellowship experiences.

Although the focus of this article was on epidemiology practicum and fellowship experiences within FHSD, the division has also hosted other practicum students in various capacities.

There are also many other programs and divisions within the Department of Health that support students and fellows through practicum experiences and each has its own structure, policies, and experiences.

I feel fortunate to have had excellent experiences as both a mentor and as a mentee and continue to communicate with many of them on a regular basis as colleagues. I often get the question why do I work with so many students and I mention the enjoyment I get with teaching and mentoring, but also talk about my experiences during medical school and in public health training where I was able to make a difference through my contributions as a student trainee. I enjoy giving practicum students and fellows the opportunity to contribute to epidemiology and make a difference while improving their skills and getting the chance to learn more about a career in public health.

In summary, hosting practicum students and fellows is an opportunity to develop professionally and improve productivity while contributing to the development of the public health workforce. Public health professionals should consider partnering with academia and other organizations to host students through practicum and fellowship experiences. host students through practicum and fellowship experiences.

### **Disclaimer**

The opinions, findings, and conclusions in this article are those of the author and do not represent the official position of the Hawai'i Department of Health.

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#### **Author's Affiliation:**

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## HE'S OKAY, COACH. HIS PUPILS STILL REACT.

All coaches are familiar with the athlete who suffers head trauma and is briefly dizzy and confused. Very soon he/she says "I'm fine" and wants back in the game. Scientists at the University of Rochester and colleagues in Germany are developing a blood test that appears to reliably correlate with concussion. A brain protein, S100B, soars in the immediate period following head trauma with concussion, enough that a finger-prick test on the sidelines could help make the diagnosis. Although already used in Europe as a marker to assess the need for a CT head scan, S100B testing lacks US Food and Drug Administration approval. The equipment for testing is unwieldy, but companies are developing easy-to-use finger-sticks. Potentially, coaches, trainers, or team physicians at the field or arena would have a biomarker to help protect injured athletes. Jeffrey Bazarian, one of the research team, says between 1.6 million and 3.8 million concussions are diagnosed annually in the United States, but the number is probably twice that.

## FIRE IN THE OPERATING ROOM: THE TEAM'S WORST NIGHTMARE.

In Yakima, Washington, a 56 year-old woman was admitted for laser surgery of polyps on her vocal chords. While she was intubated and oxygen flowing, a fire broke out apparently not just the gas, but the tube as well. She suffered severe damage to the larynx, oropharynx and trachea. She was flown to Seattle where she had numerous surgeries and extensive therapy. She retains her mental faculties and can swallow, but is unable to speak and requires breathing assistance. She will need long-term care. A King County jury awarded her \$30 million damages. The hospital settled for \$12 million, the medical center \$7.65 million and \$4.35 million against the anesthesia associates. Dr. Randal Moseley, quality medical director at Confluence Health said, "This was a failure at multiple levels, and we've tried to address all the levels." Given the horror involved, "tried" seems a little inadequate.

## AUTOMATIC DEFIBRILLATORS: GREAT IDEA, BUT NO GAIN.

A Swedish research team compared manual cardiopulmonary resuscitation (CPR) with CPR using an added external defibrillator (AED). Baselines were four-hour survival, and secondary end points at six months with good neurological outcome. Patients were randomly selected in a clinical trial of 2589 out-of-hospital patients with cardiac arrest. Data were gathered from January 2008 to February 2013 from Swedish, British and Dutch ambulance services and referring hospitals. At six months 8.5% of patients with AED assisted CPR survived compared with 7.6% using manual CPR. The research team concluded among adults with out-of-hospital cardiac arrest, AED assisted CPR did not result in improved effectiveness compared with manual CPR.

## SOONER OR LATER ALL SMOKERS QUIT.

Fifty years ago the Surgeon General (SG) of the United States issued a report that pinpointed cigarette smoking as a major cause of heart disease and lung and laryngeal cancer. In a just- released report, the SG's office upped tobacco deaths from the original estimate of 443,000 to 480,000 per year. The increase relates to cigarettes as a causal factor in a total of thirty disorders, including diabetes, colorectal cancer and arthritis. Erectile dysfunction is another disorder included, but might be arguable as a cause of death. In 1965, 42% of US adults were smokers, but that number has dropped to 18.1%. Today's smokers have more habit breaking products with skin patches and other alternatives, including electronic cigarettes.

## JACK AND JILL TOOK SOME PILLS...

When considering falls resulting in serious injury the elderly frequently come to mind. However, young and middle aged adults who take two or more prescription drugs at one time may be at similar risk. Researchers at the University of Auckland in New Zealand studied data from 344 working age patients who died or were hospitalized within 48 hours of a fall during years between 2005 and 2006. They were compared with 352 randomly selected working people. Investigators found that those who took two or more medications were two and one-half times as likely to fall than those who took one or no medications. Steroids, antibiotics, asthma inhalers, and anti-depressants had no effect, but drugs to reduce blood pressure or cholesterol were three times as likely to be associated with a fall. Whether the increased risk is a result of the drugs or the underlying conditions was not determined. Clearly, research on falls needs to focus on others as well as children and the elderly.

## AND NOW WE BRING YOU ACT TWO OF OBAMACARE.

In 2011, CGI Group Inc contracted with Centers for Medicare and Medicaid Services (CMS) to provide the website for the Affordable Care Act (ACA). Problems have dogged the portal, HealthCare.gov, since it was launched in October 2013. CGI Group is largely responsible for fixing the problems, but blames CMS for difficulties. CMS, of course, blames the contractor, so they are getting a divorce. A new bidder, Accenture Federal Services, was awarded a one-year contract to put things in order for CMS at a cost of \$45 million for the first phase. The current agreement with CGI Group expires February 28th at which time Accenture will move in. HealthCare.gov is the signature piece of health care overhaul. The clock is ticking and if Accenture can't make the website work, the ACA is in serious trouble.

## HE KEEPS A MOP IN HIS STUDIO.

Leandro Granato, age 27, discovered as a child in Argentina that fluid sucked up his nose could be squirted out his tear duct. He developed a mode of painting with this unusual ability, splattering the aspirated inks on canvas. He uses up to 1 1/2 pints of each color per painting and sells his artwork for up to \$2400. Jackson Pollock, eat your heart out.

## YOU CAN LEAD A MAN TO CONGRESS, BUT YOU CAN'T MAKE HIM THINK.

Public Policy Polling is a respected North Carolina polling firm. A recent effort found Congress less well liked than hemorrhoids, toenail fungus, and the DMV. Earlier in 2013, polls viewed Congress less favorably than root canals, head lice, colonoscopies, and Donald Trump, but they did beat out ebola virus, telemarketers, and meth labs.

## THE ONE FOR THE ROAD MAY LEAD TO THE CEMETERY.

In Atlanta, Rashad Williams crashed his vehicle through the front window of a Walgreen's drugstore. He exited the car while stuck halfway inside the store, went to a bar next-door and resumed drinking. He was arrested for DUI.

## ADDENDA

- Prison inmates in New Hampshire make license plates that say "Live Free or Die."
- Conservative estimate of tax dollars spent on the Obama Hawai'i Christmas vacation is \$4 million.
- New Year's Eve is a time when auld acquaintance be forgot, except when a test comes back positive.
- Whenever I want a really nice meal I take my wife out to dinner.
- All men make mistakes, but married men find out about them sooner.

## ALOHA AND KEEP THE FAITH *rt*s

*(Editorial comment is strictly that of the writer.)*

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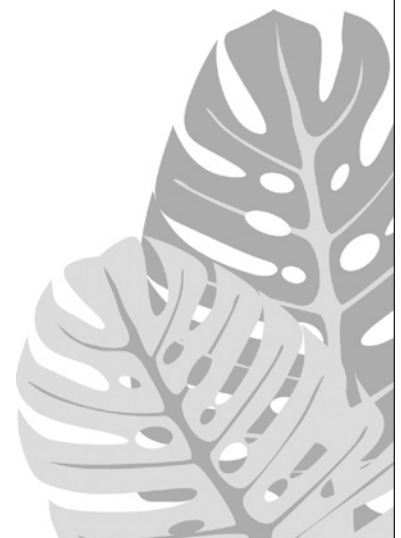
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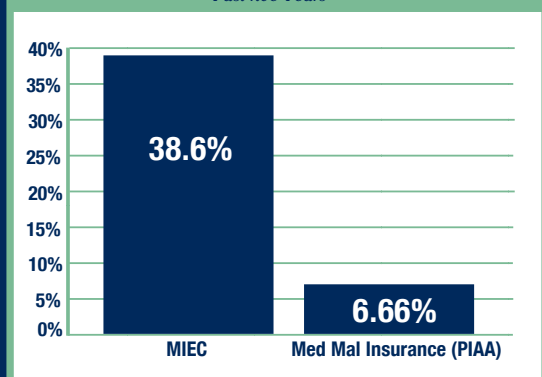
- No profit motive and low overhead
- Local claims office in Honolulu
- 17.5 million in dividends\* distributed in 2014

### For more information or to apply:

- [www.miec.com](http://www.miec.com)
- Call 800.227.4527
- Email questions to [underwriting@miec.com](mailto:underwriting@miec.com)

### Average Dividend as % of Premiums

*Past five Years*



\* (On premiums at \$1/3 million limits. Future dividends cannot be guaranteed.)

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**MIEC**

Owned by the policyholders we protect.