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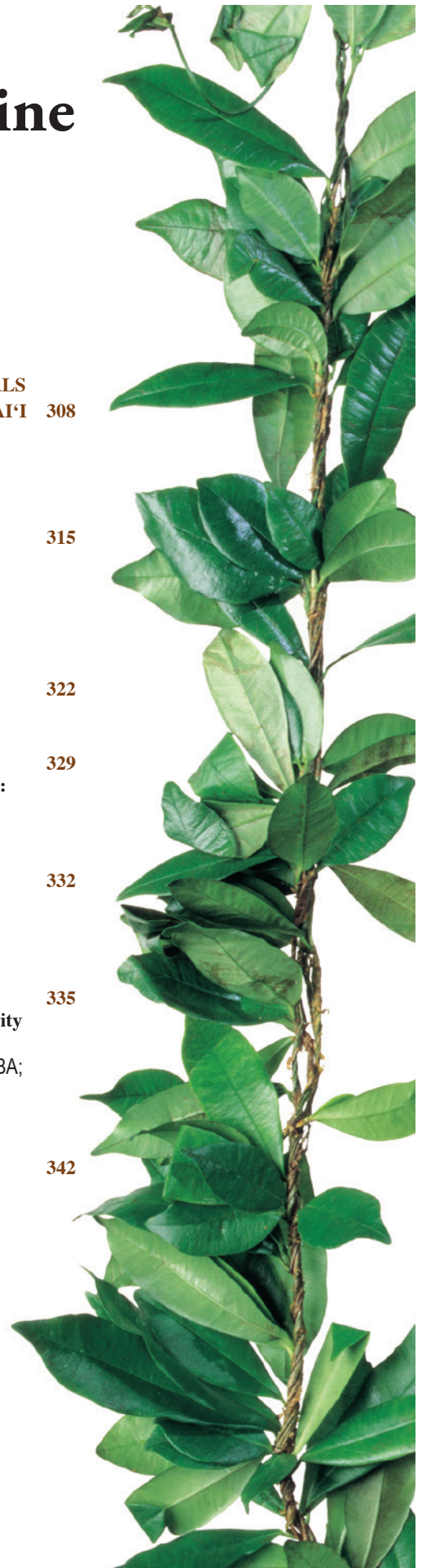
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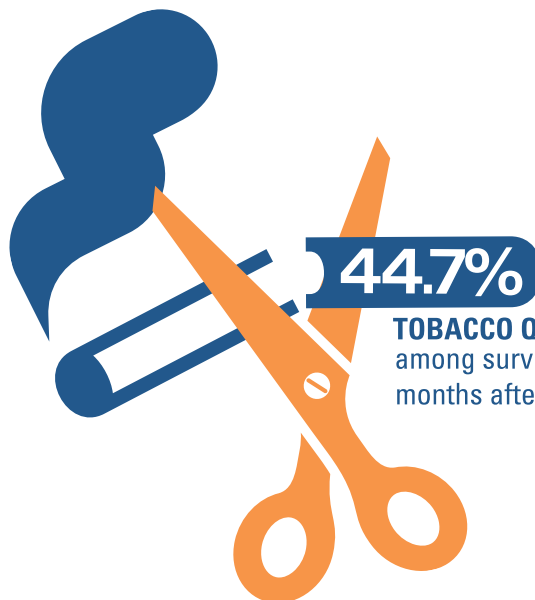
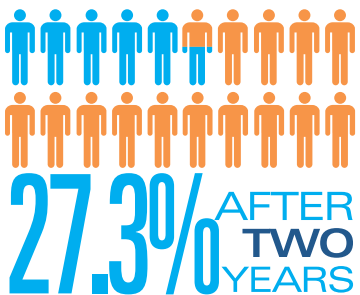
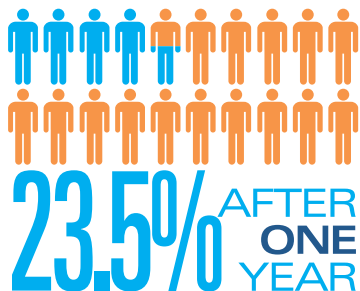
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Disparities in Hospitalizations Among HIV Positive Individuals for Native Hawaiians and Asians Compared to Whites in Hawai'i

Tetine Sentell PhD; Lisa Marten DrPH; Hyeong Jun Ahn PhD; Yuanshan Qui MD; John J. Chen PhD; Jill Miyamura PhD; Dominic Chow MD; and Cecilia Shikuma MD

Abstract

Hospitalizations of those living with HIV are expensive and often indicate failures in access to, or retention in, primary care. Higher rates of hospitalizations among individuals with HIV have been reported in some US ethnic minorities, yet little information is available for Native Hawaiians and Asian subgroups. All hospitalizations in Hawai'i of individuals aged ≥ 13 years from December 2006–December 2010 were considered. Hospitalizations of individuals with HIV were identified using ICD-9 diagnosis codes of 042 and V08; 613 hospitalizations with an HIV diagnostic code were found. Using Hawaii State Department of Health 2010 data, estimated rates of hospitalizations among HIV positive individuals by race/ethnicity among the 2,600 Hawai'i residents living with HIV were calculated along with estimated rate ratios (using Whites as the reference group). Multivariable adjusted estimated rate ratios (aRR) were calculated with negative binomial models, adjusting for age, sex, and payer type. Demographic and clinical differences among hospitalized patients with HIV were also compared by race/ethnicity. Native Hawaiians (aRR: 3.21; 95%CI: 2.11–4.88), Japanese (aRR: 2.27; 95%CI: 1.38–3.72), and Filipinos (aRR: 1.62; 95%CI: 1.01–2.59) living with HIV all had higher likelihood of a hospitalization compared to Whites, even when controlling for age, sex, and payer. Chinese did not vary significantly from Whites. Also of note, the average age of HIV positive individuals who were hospitalized varied significantly across groups (P-value < .001), with Native Hawaiians as the youngest (45 years), followed by Filipinos (47 years), Whites (49 years), Chinese (50 years) and Japanese (54 years). Disparities appear to exist in hospitalizations among HIV positive individuals for Native Hawaiians and Asian subgroups. Further research is warranted to investigate the reasons for these health disparities.

Keywords

Native Hawaiians, Asians, HIV, hospitalizations

Introduction

HIV disproportionately impacts racial/ethnic minority groups in the United States (US).^{1,2} Racial/ethnic disparities are specifically seen in HIV-related hospitalizations with minorities having higher hospitalizations rates than non-Hispanic whites.^{3,4} Hospitalizations among HIV positive individuals often indicate failure in access to, or retention in, primary care and contribute substantially to the overall cost burden for HIV. For instance, in 2005, national HIV hospitalization costs were 3.2 billion dollars.⁵

Currently, little research on HIV hospitalizations has considered Asian Americans or Native Hawaiians. Yet Asian Americans make up 5% of the US population (over 15.5 million) and are one of the fastest growing racial/ethnic groups in the US.⁶ Native Hawaiians include more than half a million individuals in the US and experience notable health disparities in many chronic and infectious diseases.^{7,8} Native Hawaiians also are more likely to have socio-demographic risk factors, such as poverty, that contribute to poorer health outcomes.⁷ Existing evidence suggests that important disparities in hospitalizations

among HIV positive individuals might exist among these diverse, understudied and often underserved populations.⁹

Access to high-quality, culturally relevant primary care is limited among many Asian American, Native Hawaiians, and other Pacific Islander (AA/NHOPI) groups who may also face linguistic, economic and legal barriers to HIV prevention, testing, services, and ongoing care.^{9,10} These barriers are manifest across the spectrum of HIV services and may lead to sicker individuals and higher rates of HIV-related inpatient utilization. AA/NHOPI populations are less likely to be tested for HIV compared to other racial/ethnic groups at similar risk.^{9,11} At-risk AA/NHOPI groups are diagnosed with HIV at a later stage of disease than similar populations of other race/ethnicities.¹² AA/NHOPIs are less likely to use HIV case management, housing assistance, day/respite care, food/nutrition services, substance abuse treatment, and health education services compared to other racial/ethnic groups.¹

The research on HIV health disparities in hospitalizations that has considered AA/NHOPI groups typically combines diverse AA/NHOPI subgroups into one category.¹³ This obscures disparities among distinct populations.^{14–17} In particular, the poorer health access and outcomes of some subgroups, such as Native Hawaiians, are often obscured by the stronger health profile of others, such as the Japanese.^{15–17}

Native Hawaiians may be at particular risk for HIV inpatient disparities. Western health care services may not provide sufficient access to care and/or culturally appropriate care for disease management, which may impact introduction of, and adherence to, effective HIV therapeutics, such as highly active anti-retroviral therapy (HAART).¹⁸ This may lead to greater use of the more costly inpatient services and to poorer outcomes of those hospitalizations, such as longer lengths of stays, more expensive visits, and more hospitalizations that end in death. A recent state-wide needs assessment done in Hawai'i found evidence that differences are likely to be seen across AA/NHOPI group and that these are likely to lead to disparities in inpatient care.¹⁹ Specifically, Asian and Pacific Islanders (not including Native Hawaiians) were less likely to be in regular care than other ethnicities, while Native Hawaiians were more likely to have skipped their HAART medications.¹⁹

The National HIV/AIDS Strategy included eliminating health disparities as one of its three primary goals.²⁰ This study fills in critical evidence gaps to help meet this goal by investigating characteristics and disparities in hospitalizations among HIV positive individuals for Asian American subgroups and Native

Hawaiians using data from all hospitalizations in Hawai'i between December 2006 and December 2010. Our specific study goals were to (1) compare estimated rates of hospitalizations, among HIV positive individuals, for Native Hawaiians, Asian subgroups, and Whites, and (2) describe the demographic and clinical characteristics of hospitalized HIV positive individuals across these racial/ethnic groups to better understand any differences seen in estimated hospitalization rates. Due to the known disparities in access to care, socio-demographics, and clinical indicators among Native Hawaiians compared to other racial/ethnic groups in Hawai'i we hypothesized that there would be higher rates of hospitalized HIV positive individuals in Native Hawaiians compared to other groups, and also that Native Hawaiians with HIV who were hospitalized would be younger and sicker compared to other racial/ethnic groups.²¹

Methods

Study Setting

Hospital data in Hawai'i has unique detail about AA/NHOPI, racial/ethnic groups not captured in state-level data in most other locations. Almost 40% of the state's population is Asian American.²² Hawai'i is home to approximately 25% of the total US Native Hawaiian or Other Pacific Islander population.⁷

The Hawai'i Health Information Corporation (HHIC) Data includes inpatient discharge data and all hospitalizations by all payers in Hawai'i.²³ We used the inpatient hospitalization data from December 2006 to December 2010. HHIC inpatient data includes discharge data at the patient level on patient race/ethnicity, insurer, age, sex, and International Classification of Diseases—9th revision—Clinical Modification (ICD-9) primary diagnosis, secondary diagnosis, and procedure codes. Unique individuals can be identified across hospitals using a master patient identification variable. Because some individuals were hospitalized multiple times during the study period, we used this variable to identify these individuals. Our primary analyses focused on the individual patient, rather than the hospital visit as the unit of analysis.

Sample

All civilian hospitalizations of any individual aged >13 years were initially considered. However, because there were no hospitalizations including an HIV diagnosis among those 13-18 years, we considered hospitalization detail only among those 18 and older (N = 442,641). Hospitalizations were excluded if the payer was the Department of Defense (DOD), as the DOD hospital in Hawai'i does not report detailed race/ethnicity (N = 49,233). As the number of individuals with HIV by race/ethnicity used as rate denominators is compiled for Hawai'i residents specifically, individuals not living in Hawai'i (N = 14,070) were also excluded. An additional 9,359 visits were excluded because the visit did not report valid race/ethnicity data, which was due to the following categories for race/ethnicity: "Unknown," "Not Applicable," or "Data not collected." The total number of hospitalizations in the final sample was 369,979 among 210,770 unique individuals 18 years and older.

Hospitalized HIV positive individuals were identified using ICD-9 diagnosis codes. The ICD-9 codes of 042 and V08 on any the 20 available ICD-9 fields (1 primary and 19 secondary) were used to identify the hospitalizations of HIV positive individuals.

Estimated Rates

We used the number of HIV-infected individuals of each ethnicity living in Hawai'i as the denominator for our estimated rates. Denominator values were obtained from the 2010 Hawai'i AIDS surveillance data from the Hawai'i Department of Health (HDOH) using the same age and Asian American and Native Hawaiian classification groups as in the HHIC data.²⁴ By statute, all laboratories and medical doctors in the state are required to report HIV care for all patients.²⁵ These are then de-duplicated with patients diagnosed in other states as only the original state of diagnosis can claim them for federal funding. In our analyses, to fully capture the number of individuals living with HIV in the state, we include people diagnosed elsewhere, but residing in Hawai'i. (Our population numbers are thus similar, but distinct, from the data published by the HDOH in surveillance reports as the public reporting data is restricted to people diagnosed in Hawai'i.) As the numerator and denominator for the "rate" of hospitalizations of HIV positive individuals is calculated from two distinct data sets and is not a true rate, we refer to it as an "estimated rate."

Racial/Ethnic Categories

Estimated rates were calculated for the five primary racial/ethnic groups in Hawai'i (Japanese, Chinese, Native Hawaiian, White, and Filipino). Additionally, we include an "Other" racial/ethnic category, which includes all racial/ethnic groups without sufficient sample sizes for individual analyses (eg, Samoan, Korean, Black, Hispanic). There is congruence between racial/ethnic categories from the HHIC data and the HDOH data as they are both self-reported as primary race/ethnicity.

Demographic Characteristics

Hospitalizations of HIV positive individuals were considered by self-reported race/ethnicities of Japanese, Chinese, Native Hawaiian, Filipino, Other, or White; age group (18-30, 31-49, and 50+ years);⁴ sex (female and male); and payer (Public [Medicare and Medicaid], Private, and Other). Older age and sex are associated with increased hospitalization rates among those with HIV, but it is unknown if these disparities persist among AA/NHOPI populations.^{3,26}

Clinical Characteristics

By race/ethnicity, we also considered key clinical indicators of hospitalized HIV positive individuals to better understand the patient populations by race/ethnicity. Clinical indicators were cardiometabolic illness, AIDS defining illness, other infections, and wasting/cachexia, all of which have been strongly associated with HIV.²⁷⁻²⁸ These were defined by ICD-9 codes described in more detail in Table 1. We also considered overall

Table 1. Table of ICD-Codes for Clinical Classifications	
Diagnosis	ICD-9 Codes
Cardio/Metabolic	Cardio/Metabolic Hypertension: 4011, 4010, 4019 Cardiovascular Disease: 41000, 41001, 41002, 41010, 41011, 41012, 41020, 41021, 41022, 41030, 41031, 41032, 41040, 41041, 41042, 41050, 41051, 41052, 41060, 41061, 41062, 41070, 41071, 41072, 41080, 41081, 41082, 41090, 41091, 41092, 4110, 4111, 41181, 41189, 4130, 4131, 4139, 41400, 41401, 41402, 41403, 41404, 41405, 41406, 41407, 4148, 4149, 4292, 43300, 43301, 43310, 43311, 43320, 43321, 43330, 43331, 43380, 43381, 43390, 43391, 43400, 43401, 43410, 43411, 43490, 43491, 4401, 44020, 44021, 44022, 44023, 44024, 44029, 44401, 44409, 4441, 44421, 44422, 44481, 44489, 4449, 44501, 44502, 44581, 44589 Hyperlipidemia: 2720, 2721, 2722, 2723, 2724, 2729 Obesity: 2780, 27800, 27801 Diabetes: 3572, 3620, 6480, 25000, 25001, 25002, 25003, 25010, 25011, 25012, 25013, 25020, 25021, 25022, 25023, 25030, 25031, 25032, 25033, 25040, 25041, 25042, 25043, 25050, 25051, 25052, 25053, 25060, 25061, 25062, 25063, 25070, 25071, 25072, 25073, 25080, 25081, 25082, 25083, 25090, 25091, 25092, 25093, 3572, 36201, 36202, 36203, 36204, 36205, 36206, 36207, 36641, 64800, 64801, 64802, 64803, 64804, 64880, 64881, 64882, 64883, 64884, 79021, 79022, 79029
AIDS defining	1124, 11289, 11284, 1141, 1143, 1175, 0074, 0785, 34830 34831, 34839, 0540, 05412, 05479, 11500, 11501, 11502, 11503 11504, 11509, 11510, 11511, 11512, 11513, 11514, 11519, 11590 11591, 11592, 11593, 11594, 11599, 0072, 1760, 1761 1762, 1763, 1764, 1765, 1768, 1769, 20020, 20021, 20022 20023, 20024, 20025, 20026, 20027, 20028, 20080, 20081, 20082 20083, 20084, 20085, 20086, 20087, 20088, 20011, 0311, 0312, 0318, 0319, 01300 – 01396, 01400 – 01486, 01500 - 01596 01600 - 01696, 01700 – 01796, 01800 – 01896, 1363, 0463, 0031 1300, 7994, 1800, 1801, 1808, 1809, 01000 – 01096, 01100 – 01196, 01200 – 01286
Other infections	0031, 0380, 03810, 03811, 03812, 03819, 0382, 0383, 03840, 03841, 03842, 03843, 03844, 03849, 0388, 0389, 99590, 99591, 99592, 99593, 99593, 99594, 99594
Wasting/cachexia	260, 261, 262, 2630, 2631, 2632, 2638, 2639, 64890, 64891, 64892, 64893, 64894, 76420, 76421, 76422, 76423, 76424, 76425, 76426, 76427, 76428, 76429, 99552, 99584

co-morbidity, defined by the Charlson comorbidity index, and severity of illnesses.²⁹ Severity of illness was defined using 3M classification methods and is “the extent of physiological decomposition or organ system loss of function” within All Patient Refined Diagnosis Related Groups (APR-DRGs).³⁰ The 3M severity-of-illness classification method considers primary and secondary diagnoses and procedures from ICD-9 discharge codes, as well as age, sex, and discharge disposition, providing a four-point scale in which a higher score indicates greater severity.³⁰ We also considered the number of times HIV positive individuals were hospitalized during the time period.

Statistical Analyses

Demographic data was first summarized by descriptive statistics. Unadjusted estimated rates and estimated rate ratios of hospitalized HIV positive individuals (compared to Whites) were calculated. Multivariable adjusted estimated rate ratios (aRR) were then calculated with negative binomial models, adjusting for age, sex, and payer type. Finally, we compared the clinical portrait of those hospitalized with HIV across racial ethnic groups and compared these using ANOVA for continuous variables and Chi-square tests for categorical variables. All data analyses were performed in SAS 9.3 (Cary, N.C., 2011) and a two-tailed *P*-value of less than 0.05 was regarded as statistically significant.

Sensitivity Analyses

Because our denominators and numerators did not come from the same data set and are subject to uncertainty in their racial/ethnic categorization concordance, we performed a sensitivity analysis. We evaluated the impact on significance of our findings if the denominator for each Asian American and Native Hawaiian group was underestimated. We reanalyzed the data by increasing the denominators of the groups by 25% and 50%, as this would make finding disparities compared to Whites among these groups less likely.

Results

Of the 210,770 individuals who were hospitalized, 613 were hospitalized HIV positive individuals. Table 2 describes the demographic portrait of these hospitalized HIV positive individuals across race/ethnicity. Groups differed significantly across sex, payer, and age. Of note, the average age of hospitalized HIV positive individuals varied significantly across groups (*P*-value <.001), with Native Hawaiians being the youngest (45 years), followed by Filipinos (47 years), Whites (49 years), Chinese (50 years) and Japanese (54 years). While all groups were predominately male, Native Hawaiians had higher numbers of females (28%), followed by Filipinos (23%) and Others (22%). By comparison, only 10% of Chinese, 12% of Whites and 12% of Japanese were female. Seventy-seven percent of Native Hawaiian hospitalized HIV positive individuals were covered by public payers compared to 62% of Whites, 51% of Filipinos, 49% of Japanese, and 30% of Chinese (*P* = .002).

	Chinese	Filipino	Native Hawaiian	Japanese	White	Other	Total	P-value
n	10	35	96	33	297	142	613	
	%	%	%	%	%	%	%	
Female	10.0	22.9	28.1	12.1	10.8	21.8	16.8	.001
Public Payer	30.0	51.4	77.1	48.5	62	66.9	63.6	.002
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Age	49.5 (13.4)	46.8 (9.2)	45.3 (9.9)	53.5 (14.0)	49.4 (9.0)	44.4 (11.6)	47.6 (10.5)	<.001

Table 3 shows the estimated rates, estimated rate ratios, and adjusted estimated rate ratios for those hospitalized with HIV. In unadjusted analyses, it appears that more than half of the Native Hawaiians living with HIV were hospitalized during the study period. In adjusted analyses, Native Hawaiians (aRR: 3.21; 95% CI: 2.11-4.88), Japanese (aRR: 2.27; 95% CI: 1.38-3.72), and Filipinos (aRR: 1.62; 95% CI: 1.01-2.59) living with HIV all had higher likelihood of being hospitalized compared to Whites, even when controlling for age, sex, and payer. Chinese did not vary significantly from Whites.

In our sensitivity analyses (Appendix), we tested the significance of our findings if the Asian American and Native Hawaiian group denominators were underestimated. With a 25% increase, Japanese and Native Hawaiians still had significantly

higher estimated rates of hospitalizations among HIV positive individuals compared to Whites. Even with a 50% increase, Native Hawaiians had significantly higher estimated rates of hospitalizations among HIV positive individuals compared to Whites.

Table 4 shows the clinical portrait of HIV positive individuals, who were hospitalized, by race/ethnicity to add insight into the possible reasons for these disparities. Although percentages differed among racial/ethnic groups, the only significant (*P*-value < .05) variation across groups was in wasting/cachexia, which was highest in Native Hawaiians (14%). The average number of times HIV positive individuals were hospitalized during the study period was approximately two across all racial/ethnic groups.

	Chinese	Filipino	Native Hawaiian	Japanese	White	Other
Number of patients with HIV hospitalizations	10	35	96	33	297	142
Number with HIV ^a	36	131	170	89	1509	665
Rate (x100)	27.8	26.7	56.5	37.1	19.7	21.4
Estimated Rate Ratios [with 95% Confidence Interval] ^b	1.41 [0.75, 2.65]	1.36 [0.96, 1.93]	2.87 [2.28, 3.61]	1.88 [1.31, 2.70]	1.0	1.09 [0.89, 1.33]
Adjusted Estimated Rate Ratios [with 95% Confidence Interval] ^b	1.66 [0.85, 3.22]	1.62 [1.01, 2.59]	3.21 [2.11, 4.88] ^c	2.27 [1.38, 3.72] ^c	1.0	1.26 [0.84, 1.90] ^c

^aFrom Hawai'i Department of Health. ^bAdjusted for sex, age, and payer. ^cSignificantly different from Whites at *P*-value < .001.

	Chinese	Filipino	Native Hawaiian	Japanese	White	Other	P-value
	%	%	%	%	%	%	
Cardio/Metabolic	60.0	37.1	29.9	33.3	36.7	33.3	0.49
AIDS defining	20.0	22.9	20.6	15.1	12.0	14.5	0.21
Other infections	20.0	11.4	11.3	3.0	5.7	8.0	0.14
Wasting/cachexia	10.0	8.6	14.4	9.1	5.0	10.9	0.04
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Comorbidity (Charlson)	2.9 (2.5)	1.2 (1.9)	1.5 (2.1)	1.7 (2.6)	1.6 (2.3)	1.4 (2.3)	0.43
Severity of Illness	2.7 (1.1)	2.6 (0.9)	2.4 (1.0)	2.4 (0.7)	2.4 (0.8)	2.4 (0.9)	0.80
# HIV-related hospitalizations	2.1 (1.6)	2.4 (4.0)	2.3 (2.2)	1.9 (1.4)	2.1 (2.2)	2.1 (2.4)	0.95

Discussion

This study has several key findings. First, as expected, HIV positive individuals who are Native Hawaiian appear to be hospitalized at much higher rates than HIV positive individuals who are White. We also found that some Asian subgroups, specifically Japanese and Filipino populations, appear to have higher rates of hospitalizations among HIV positive individuals compared to Whites. While Japanese groups have strong health profiles in Hawai'i,²¹ HIV may still have a stigma within the community, contributing to health disparities among a group that otherwise shows few health disparities in Hawai'i.

Our analysis of the clinical characteristics provides further insight into this issue, allowing us to consider if rate differences are due to delayed entry into care by some groups, which might result in more opportunistic infections among Native Hawaiians and other groups. Alternatively, the rate differences could simply be a manifestation of high rates of other comorbid conditions (eg, cardiovascular disease/diabetes) leading to higher hospitalization rates in some AA/NHOPI populations. We had hypothesized that Native Hawaiian individuals who are HIV positive would be hospitalized sicker compared to other racial/ethnic groups. Although there was variation in clinical characteristics across racial/ethnic groups, we found that, unexpectedly, the clinical portrait was not consistently worse for Native Hawaiians compared to Whites nor was it worse for Asian groups. The one exception was in wasting/cachexia, which did vary significantly across groups, and was highest in Native Hawaiians. Wasting, even in the era of HAART is associated with the diagnosis of AIDS and poorer immune function as assessed by CD4 count,³¹ and this association may reflect delayed entry, poorer access or unwillingness to access medical care in the Native Hawaiian population.

Unlike some other states with waiting lists for the AIDS Drug Assistance Program (ADAP), everyone who applies in Hawai'i has access to HAART and HIV care. Thus, access to care should not be a major constraint once a diagnosis is obtained.³² The differences in rates by race/ethnicity may instead be due to factors such as a diagnosis further along in the course of illness, issues with retention in care, adherence, choice of alternative treatments, or non-monetary access to care issues like time, transportation, or stigma. The disparities in hospitalizations among those with HIV for Native Hawaiians and other racial/ethnic groups may also reflect the underlying disparities in many different areas of health, and not necessarily be related to HIV status. These issues deserve further study.

We also expected to find age disparities for Native Hawaiians compared to other racial/ethnic groups. Indeed, Native Hawaiian individuals with HIV who were hospitalized had the lowest average age (45 years) among all groups studied, four years less than the average for Whites and nine years less than the average for Japanese. Native Hawaiians were also more likely to be on Medicaid with 77% under a public payer compared to 49% of Japanese and 30% of Chinese (the lowest groups).

Overall, 83% of those with HIV who were hospitalized were male, reflecting underlying HIV prevalence differences by sex.

Native Hawaiians had the highest percentage of hospitalizations among HIV positive individuals by females (28%), followed by Filipinos (23%). This is consistent with the higher proportion of females among people living with HIV in these ethnic groups and reflective of increased heterosexual risk for HIV infection in these populations.²⁴

In addition to the specific health disparities identified in this study, the results underscore the critical importance of disaggregating AA/NHOPI groups in health-related research generally and HIV research specifically.¹⁵⁻¹⁷ Doing so revealed very different rates of hospitalizations among HIV positive individuals and distinct demographic profiles for Asian American subgroups and Native Hawaiians. Future work should consider other disaggregated Pacific Islander subgroups (eg, Samoan, Micronesian, Tongan) as well.

Limitations

Our study has a number of important strengths, including the state-level all-payer inpatient hospitalization database with detail regarding Native Hawaiians and Asian subgroups. Also, unlike some previous studies on this topic, our study was able to consider multiple visits by unique individuals,⁵ removing any bias from differential re-hospitalization rates by racial/ethnic group. However, we do have some limitations.

One limitation is the compatibility between the way in which race/ethnicity data is collected by the hospitals and by HDOH surveillance systems. Another limitation is that the HDOH surveillance data used as our rate denominators reflects all diagnosed cases of HIV, which are required by law to be reported by all physicians and laboratories. However, people who are infected with HIV, but have not been tested and diagnosed are not included in the denominator. If certain ethnic groups were less likely to be tested, then the hospitalization rates for these groups relative to other groups would be exaggerated.

Because of these concerns, we performed a sensitivity analysis of our findings assuming higher denominators for Asian American subgroups and Native Hawaiians. (This is the more conservative direction, which assumes errors in the direction of less disparities.) The sensitivity analyses support our findings of important disparities in hospitalizations among those with HIV in some AA/NHOPI groups. After a 25% increase in the denominator, Japanese and Native Hawaiians still had significantly greater estimated rates of hospitalizations for those with HIV compared to Whites. Even after a 50% increase in the denominators, Native Hawaiians still showed significantly higher estimated rates of hospitalizations among HIV positive individuals compared to Whites. Our findings of disparities in hospitalizations among HIV positive individuals by race/ethnicity appear robust.

This study uses administrative data and does not include additional sociodemographic (eg, education) or cultural characteristics that might be useful for understanding study results. Further research might consider how these additional factors impact findings, and consider in more detail the pathways and barriers to HIV-related care. Additionally, while we consider

some clinical options that may explain these differences, these did not appear likely to explain differences, as the clinical portraits were very similar. Other clinical details (such as substance use and immunologic or virologic status) may be useful. Other information, such as delayed entry into care, would also be important to consider in future research.

This study provides important, novel descriptive information about disparities in hospitalizations among people with HIV in Hawai'i by race/ethnicity that can support and direct future work in this area. Future studies should address study limitations. For instance, we were not able to follow a cohort of HIV positive individuals to see how often they were hospitalized each year. Instead, we use two distinct databases over multiple years to determine our rates. (Thus, we used the term "estimated rates.") Additionally, we are not able to compare if the estimated rates of hospitalizations among HIV positive individuals (overall) was different from the rate of hospitalizations in the state in general and could not test whether HIV contributes any additional burden to the hospitalizations in Hawai'i, and if so to what extent. These will be fruitful areas for additional research.

Conclusions

Disparities appear to exist in rates of hospitalizations among HIV positive individuals for Native Hawaiians and Asians, as well as in the demographic and, to some degree, the clinical characteristics of those hospitalized. Native Hawaiians who are HIV positive appear to be particularly vulnerable to risk of hospitalizations and at younger ages. This information can be useful for targeted research, policy, and clinical practice to address these disparities among HIV-infected patients in Hawai'i and elsewhere. Further research is warranted to investigate the reasons for these health disparities.

Conflict of Interest

None of the authors identify a conflict of interest.

Acknowledgments

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Appendix

Sensitivity Analysis of Estimated Rate Ratios (compared to Whites) with a 25% and 50% Increase in the Denominators												
	Original				25% increase				50% increase			
	RR Estimate	95% CI		P-value	RR Estimate	95% CI		P-value	RR Estimate	95% CI		P-value
Chinese vs. White	1.66	0.85	3.22	.1367	1.33	0.68	2.58	.4063	1.24	0.64	2.42	.5221
Filipino vs. White	1.62	1.01	2.59	.0472	1.29	0.80	2.07	.2918	1.07	0.67	1.72	.7677
Native Hawaiian vs. White	3.21	2.11	4.88	<.0001	2.56	1.68	3.89	<.0001	2.14	1.40	3.25	.0004
Japanese vs. White	2.27	1.38	3.72	.0012	1.82	1.11	2.98	.0179	1.51	0.92	2.47	.1047
Others vs. White	1.26	0.84	1.90	.2578	1.26	0.84	1.90	.2578	1.26	0.84	1.90	.2578

Trends in Underage Tobacco Sales: An Update on the Past Decade of Compliance Checks in Hawai'i

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Abstract

Tobacco use remains the leading cause of preventable death in the United States and is a major concern in the adolescent population. Preventing youth from starting to smoke is a key public health priority, as a majority of adult smokers started smoking by age 18. Controlling access to tobacco in retail outlets has been shown to be an effective measure for reducing the use of tobacco among minors. In order to control the sales of tobacco to minors in the retail environment, the Synar Amendment requires states to conduct annual, random, and unannounced tobacco sales compliance inspections. Synar compliance inspections started in Hawai'i in 1996, reducing the sales of tobacco to minors almost 40.0% by 2003. The current paper aims to expand on past surveillance findings to examine the Synar compliance inspection results in Hawai'i from 2004 to 2013 and to identify factors associated with minors' successfully purchasing tobacco. Surveillance of the past ten years showed that noncompliance rates remained low, ranging from a high of 11.2% in 2008 to a low of 4.3% in 2012; this number was 7.5% in 2013. Three factors were significantly associated with successful tobacco purchases by a minor in 2013: whether a clerk requested a minor's identification, the gender of the minor, and whether self-service of tobacco products was available. Other significant factors varied by year. Findings from this study are needed for continued surveillance, to implement effective anti-tobacco policies, and to develop policies aimed at emerging tobacco products, such as electronic cigarettes.

Keywords

adolescents, tobacco, surveillance, tobacco enforcement

Introduction

Tobacco use remains the leading cause of preventable death in the United States (US), yet nearly 46 million people currently smoke cigarettes,¹ causing one of every five deaths annually.² Despite major efforts against smoking, tobacco use is still a major concern in the adolescent population. Nearly 13.0% of youth in the US smoke cigarettes.³ In Hawai'i, almost 8.7% of high school students and 3.6% of middle school students currently smoke cigarettes.⁴ In the US, 88.0% of adult smokers started smoking by the age of 18 and almost 4,000 youths under the age of 18 start smoking every day.^{3,5} Preventing youth from starting to smoke is a top public health priority.

One of the main avenues for youth to acquire cigarettes is through retail outlets.⁶ Past research has shown that youth believe that they can easily purchase tobacco in retail outlets.^{3,6,7} Therefore, restricting access to tobacco and limiting tobacco sales are major avenues to decreasing youth smoking rates.⁶ Enacted in 1992 by the US Congress, the Synar Amendment requires states to enact and enforce laws prohibiting the sale or distribution of tobacco products to individuals under the age of 18.⁸ The State of Hawai'i uses Substance Abuse and Treatment Block Grant (SABG) money to conduct the tobacco sales compliance inspections. Compliance with the Synar Amendment

requires states to have a retailer violation rate of no greater than 20.0%; otherwise, states risk up to a 40.0% decrease in Federal SABG funding.⁸ With most states actively enforcing the prohibition of tobacco sales to minors,⁹ the national average retailer violation rate (RVR) has decreased from 40.1% in 1997 to 9.1% in 2012.¹⁰

Synar compliance inspections first started in Hawai'i in 1996. A report of the first eight years of compliance checks in Hawai'i showed a consistent decrease in the sale of tobacco to minors from over 44.0% in 1996 to 6.0% in 2003.¹¹ Past reports both nationwide and in Hawai'i have found that requesting a minor's identification or age at the time of purchase was significantly associated with fewer tobacco purchases.^{11,12} Other significant factors associated with lower tobacco purchases varied by year. This paper expands on past surveillance findings to examine the Synar compliance inspection results in Hawai'i from 2004 to 2013. Additionally, this paper aims to identify factors that are associated with minors successfully purchasing tobacco. The findings discussed in this paper illustrate the ongoing development in the efficacy of public policies aimed at reducing underage tobacco use. Understanding factors associated with tobacco purchases by minors is necessary to develop and implement effective anti-tobacco policies and educational campaigns for vendors. Current findings are also needed to help develop policy aimed at emerging tobacco products, such as electronic cigarettes.

Methods

Sample

The University of Hawai'i maintains and regularly updates a database of retail outlets on the four major counties in the State of Hawai'i (O'ahu, Maui, Hawai'i Island, Kaua'i) that are licensed to sell tobacco products and are accessible to minors. The database is continuously updated with retail outlets found during compliance inspections, coverage studies, through systematic checking online, in current phone books, and through current Hawai'i Department of Taxation tobacco permit lists. Retail outlets were eliminated from the study if they did not sell tobacco products, could not be located, or were inaccessible to minors (eg, if the outlet is a bar). Although added to the database in 2010, due to cost restraints and logistics, inspections on the islands of Moloka'i and Lana'i (part of Maui County) are not conducted.

The method used to select each year's sample for the annual compliance inspections was stratified systematic random sampling. To ensure good geographic distribution, retail outlets in

the database were sorted by county, zip code, city, street name, and then street number. Per federal guidelines, the required sample size for each year was based on the size of the sampling frame, a precision level of 3.0%, and an estimated RVR based on the previous inspection year (through 2009) or an average of the past three inspection years (beginning in 2010) RVRs, with an additional over-sampling of 7.0% to 30.0% to account for incomplete inspections. Completion rates ranged from a low of 92.6% to a high of 96.7% across the ten years (2004-2013).

Inspection Procedures

Minors ages 15-17 years and adult staff were recruited and trained prior to inspections. Approximately 15-20 minors were annually recruited primarily from community service organizations within local public and private high schools. Adult staff/drivers were all University of Hawai'i employees. Both minors and staff participated in a one-hour training consisting of a review of: (1) the purpose of the noncompliance monitoring program and Hawai'i State law prohibiting the sale of tobacco to minors; (2) the data collection form and procedures; (3) the consent forms; and (4) the need to truthfully represent age, maintain confidentiality, and observe safety procedures. Role-playing of tobacco-buying transactions also took place prior to conducting inspections.

Teams of one minor and one to two adult staff members carried out the inspections. Each team was assigned a particular geographic area to survey and was provided with a team packet. The packet contained the following items: (1) a list of retail outlets to be inspected; (2) a map of the area where the inspections would take place; (3) paper data collection forms and, beginning in 2008, electronic devices (ie, personal digital assistants [PDAs]); (4) a sample warning sign with the wording as required by state law; (5) petty cash for purchase of tobacco and/or snacks; (6) a petty cash expenditure form; and (7) mileage claim forms for the staff drivers. Data forms/PDAs, completed by the minors for each purchase attempt, collected information such as the date, time of day, whether tobacco was purchased, and whether age and/or identification was requested. Several other variables were also recorded, including estimated age group of the clerk, the presence/absence of advertising materials, warning signs with proper wording, and the presence of self-service cigarette displays.

The minors gave their identification card to the adult staff before beginning the inspections. If asked for identification by the store clerk, they were instructed to tell the truth by saying, "I do not have it on me" or, until 2011, "I left it in the car." They were also told to tell the truth about their age if asked. The adult staff drove the minor to each retail outlet and, depending on the size of the outlet, either accompanied the minor into the outlet, waited right outside the outlet, or stayed in the car while the minor attempted to purchase tobacco products. Depending on the location of tobacco products in the store, the minor either asked a clerk for a pack of cigarettes or selected a pack of cigarettes or other tobacco products (such as a cigar or cigarillo) from a self-service display and took it to the counter.

The minor or staff occasionally purchased a pack of gum, a soft drink, or other snacks in order to appear less conspicuous. After each purchase attempt, the minor exited the store, returned to the car, and completed the paper or PDA data collection form. The adult staff recorded any expenditures made and, if the purchase attempt was successful, immediately took possession of the cigarettes. At the end of the inspections, all tobacco products, packets, and unspent cash were returned to project staff.

After returning to the office, staff opens the PDA application and sends the data to the server application over a secure WiFi connection. Both the PDA application and server application are custom written applications and uploaded into a Microsoft Access database. Paper data collection forms are individually printed with vendor name, vendor identification number, and vendor address. Completed paper forms are scanned using a high-volume Canon DR-6080 Sheetfeed Scanner and processed by Verity Teleforms form interpretation software before being imported into a Microsoft Access database.

Results

Compliance Trends

The number of retail outlets inspected ranged from 356 in 2009 to 174 in 2013, compared to 339 during the first year of inspection in 1996 (see Table 1). Across all years, a majority of retail outlets inspected were convenience/sundry stores, followed by grocery/food/restaurant/liquor, and had one cash register (a proxy for store size). About 50% of the inspections were done by female minors, with some years having slightly more females than males. Minors were predominantly of Asian American or Pacific Islander ethnicities, reflective of the State's population. Across years, a majority of store clerks were female and between the ages of 31-55. In 1996 only half of the stores inspected had a warning sign posted. This percentage peaked at 96.0% in 2008 and was at 68.0% in 2013. The correct wording of warning signs was highest in 2013 (81.0%) compared to the four previous years. Materials promoting tobacco use (such as posters or other marketing materials) were seen in about half of retail outlets inspected in 2013, which was an increase from the past two years where only about 35.0% of retail outlets had promotional items. The percentage of stores where self-service tobacco products were sold was highest in 2005 (11.7%), followed by 2008 (6.2%). The percentage of clerks that requested a minor's age remained steady across the years (85.0%-90.0%). Only about 20.0% of clerks asked for a minor's identification in 2012 and 2013, however, this is an increase from the previous few years.

Associations with Illegal Tobacco Purchases

In 1996 (the first year of inspections), 44.5% of retail outlets sold tobacco to a minor. This rate greatly decreased over the past ten years to 5.2% in 2004, 11.3% in 2008, and 7.5% in 2013, a three percent increase from 2012 (see Figure 1).

Bivariate associations with tobacco sales and inspection variables each year were examined (Table 2). Only one variable was found to be significantly associated with less tobacco

Table 1. Tobacco Compliance Inspection Characteristics, 2004-2013											
	1996 (%) ^{a*}	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)
Number of Inspections	339	211	217	221	232	304	356	218	264	209	174
CHARACTERISTIC											
Type of Retail Outlet											
Grocery/Food/ Restaurant/Liquor	42.2	28.9	25.0	30.8	24.1	28.6	29.5	28.4	30.3	33.0	29.3
Convenience/Sundry	20.1	42.2	43.5	39.4	45.3	40.5	46.1	44.0	38.6	35.9	46.0
Gas Station and Gas/Convenience	21.8	20.4	19.9	18.1	18.5	19.4	17.4	16.1	21.2	20.1	15.5
General Merchandise/ Drug/Pharmacy	N.A. ^b	7.1	9.3	9.0	8.2	7.9	5.9	9.6	6.4	7.7	4.0
Other	15.9	1.4	2.3	2.7	3.9	3.6	1.1	1.8	3.4	3.4	5.2
Number of Cash Registers											
One	N.A. ^c	60.2	57.6	61.0	55.4	52.3	55.6	62.8	64.8	56.5	54.0
Two	N.A. ^c	19.9	21.7	19.0	23.8	23.4	23.3	21.6	19.9	23.0	28.2
Three or more	N.A. ^c	19.9	20.7	20.0	20.8	24.3	21.1	15.6	16.3	20.6	17.8
Age of Minor											
14	3.5 [*]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	3.2	6.2	6.9	20.3	28.4	18.1	9.3	39.0	31.8	37.8	24.7
16	61.1	68.7	39.2	50.7	46.1	55.6	36.2	22.9	36.4	44.0	38.5
17	32.2	25.1	53.9	29.0	25.5	26.3	54.5	38.1	31.8	18.2	36.8
Gender of Minor											
Female	82.9	80.1	67.3	57.9	60.3	47.7	55.1	51.4	50	49.3	57.5
Age of Clerk											
Under 18-30	N.A. ^c	27.0	22.2	29.9	23.3	18.1	16.6	24.8	25.8	21.5	24.1
31-55	N.A. ^c	54.5	64.8	53.9	65.1	68.1	63.2	56.4	56.1	59.8	59.8
55 and over	N.A. ^c	18.5	13.0	16.2	11.6	13.8	20.2	18.8	18.2	18.7	16.1
Gender of Clerk											
Female	N.A. ^c	75.8	78.7	77.4	79.3	80.3	74.4	71.6	79.5	76.1	75.3
Was a Warning Sign Posted?											
Yes	48.4	80.9	79.3	72.9	82.8	96.1	89.3	75.2	73.5	79.4	68.4
(If Yes) Sign with Correct Wording?											
Yes	N.A. ^b	46.8	51.4	41.2	55.2	90.8	79.9	80.5	62.4	54.8	81.5
Promotional Materials Posted?											
Yes	N.A. ^b	69.2	77.0	62.9	61.2	82.6	66.6	63.8	34.1	35.9	51.1
Self-service Tobacco Available?											
Yes	27.4	0.0	11.7	1.4	2.6	2.6	6.2	1.8	0.8	0.0	5.7
Clerk Requested Minor's Age											
Yes	21.6	89.6	91.7	89.1	87.1	85.5	85.1	86.2	87.1	84.7	83.3
Clerk Requested Minor's Identification											
Yes	45.2	9.1	11.6	14.6	11.6	16.4	17.1	11.5	11.4	20.1	19.5

*First year of inspections; ^a = includes vending machines; ^b = data not available for that year; ^c = not able to access data for that year.

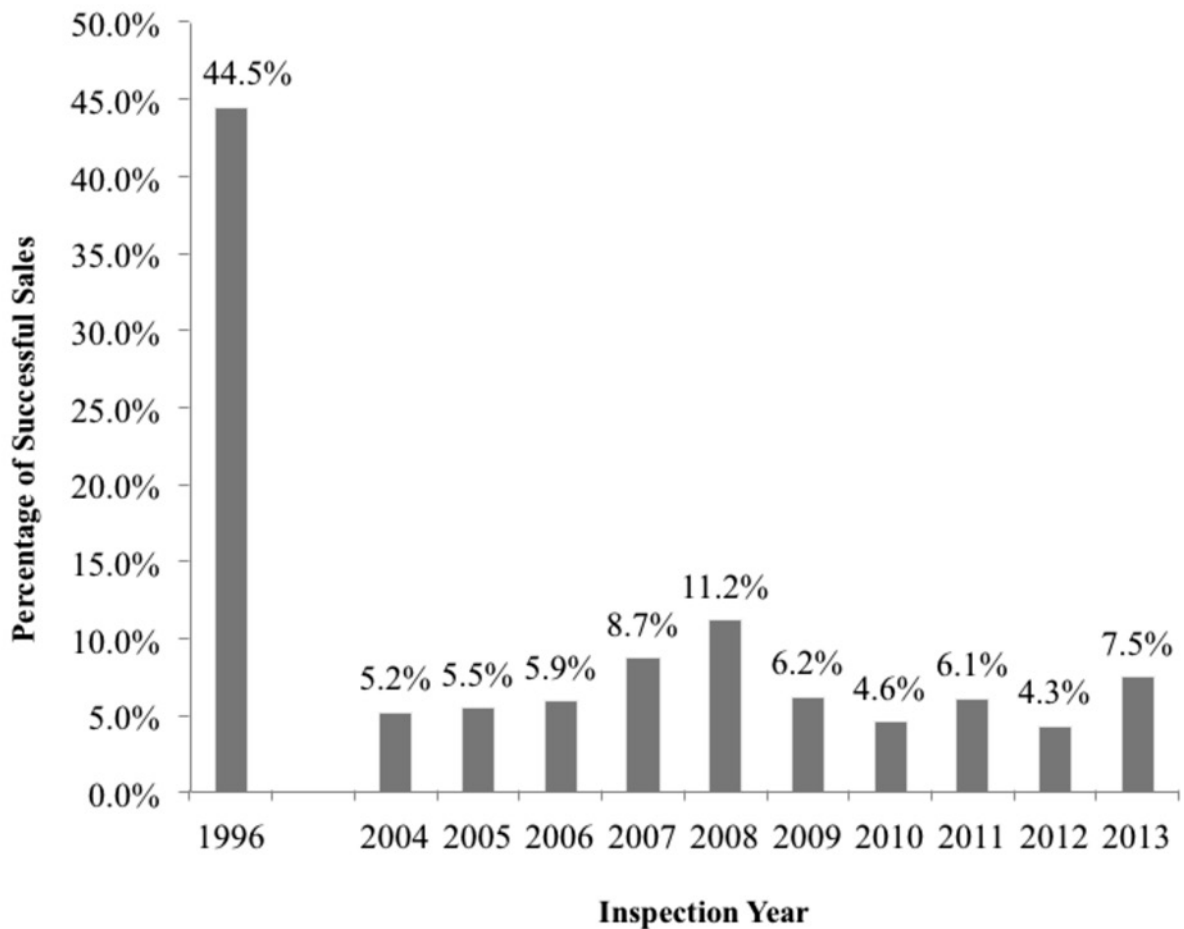


Figure 1. Hawai'i Illegal Tobacco Sales to Minors, Synar Inspections 2004-2013

Table 2. Significant Associations with Successful Sales of Tobacco, 2004-2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Type of Retail Outlet	<i>P</i> < .01	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Number of Cash Registers	N.S.	N.S.	N.S.	N.S.	<i>P</i> < .05	N.S.	N.S.	N.S.	N.S.	N.S.
Age of Minor	<i>P</i> < .05	N.S.	N.S.	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .01	<i>P</i> < .001	N.S.	N.S.	N.S.
Gender of Minor	<i>P</i> < .001	N.S.	N.S.	N.S.	N.S.	<i>P</i> < .01	N.S.	N.S.	N.S.	<i>P</i> < .05
Age of Clerk	N.S.	N.S.	N.S.	N.S.	<i>P</i> < .05	N.S.	N.S.	<i>P</i> < .05	N.S.	N.S.
Gender of Clerk	N.S.	N.S.	N.S.	N.S.	<i>P</i> < 0.01	N.S.	N.S.	N.S.	N.S.	N.S.
Was a Warning Sign Posted?	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
(If Yes) Sign with Correct Wording?	N.S.	<i>P</i> < .05	N.S.	N.S.	N.S.	N.S.	<i>P</i> < .05	N.S.	N.S.	N.S.
Promotional Materials Posted?	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Self-service Tobacco Available?	N.S.	N.S.	N.S.	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	N.S.	N.S.	N.S.	<i>P</i> < .05
Clerk Requested Minor's Age	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Clerk Requested Minor's Identification	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001	<i>P</i> < .001

sales in all study years: clerk requesting a minor's identification ($P < .001$). Three variables across all study years were never significantly associated with tobacco purchases: promotional material posted, posting of a warning sign, and a clerk requesting a minor's age. Key findings for some, but not all, of the study years were associations between tobacco purchases and age of minor (more sales to older minors), gender of minor (more sales to males), and self-service tobacco (more sales where there was self-service tobacco available).

Table 3 displays the results of a bivariate analysis of inspection variables with illegal purchase of tobacco for the past inspection year, 2013. There were three significant variables associated with tobacco purchases: gender of the minor (more sales for males), self-service of tobacco, and clerk requesting a minor's identification.

Discussion

This paper analyzed the trends of tobacco sales to minors over the past ten years in Hawai'i (2004-2013). Controlling access to cigarettes in retail outlets has been shown to be an effective measure for reducing cigarette use among minors.¹³ Annual surveillance of sales to minors by licensed tobacco retail outlets is needed to continually monitor trends and the possible need for policy changes or enhanced vendor education.

In general, over the years of this study, the percentage of tobacco sales to minors in Hawai'i has remained consistent. The year 2008 had the highest rate of sales at 11.2%, but other years ranged from 4.3% in 2012 to 8.7% in 2007. This is a vast decrease from the first year of inspections in 1996 where the rate of sales was 44.5%. The overall percentage of sales in Hawai'i is lower than the national average of 9.1% in Federal Fiscal Year 2012 (most recent year available), as well as the national average for all previous years except 1996.

Consistent with past research, requesting a minor's identification was significantly associated with fewer tobacco sales to minors in all years.^{12,14} Although the percentage of clerks requesting identification was overall low, identification was requested more often in 2012 and 2013 compared with previous years. However, the rates of successful sales have been consistently low. It is possible that other factors are correlated with requesting identification, warranting additional research. Nonetheless, requesting a minor's identification being significantly associated with fewer tobacco sales highlights the importance of continuing education for retail outlet clerks about the need to always request an ID when selling tobacco.

Requesting a minor's age was not associated with successful buys. A possible explanation for this is that the minors for these inspections were instructed to tell the truth about their age if asked by the clerk. In real life, however, a minor who attempts to buy tobacco may lie about their age when asked, leading to an actual higher sales rate. This an interesting avenue that warrants further studies.

Although warning signs are required by law to be posted, posting a warning sign does not appear to be associated with decreased tobacco sales. It is possible that the signs themselves

Table 3. Significant Associations with Illegal Purchases of Tobacco, 2013

CHARACTERISTIC	Total n	Purchase %	P-value
Type of Retail Outlet			
Grocery/Food/Restaurant/Liquor	51	11.8	N.S.
Convenience/Sundry	80	5.0	
Gas Station and Gas/Convenience	27	7.4	
General Merchandise/Drug/Pharmacy	7	0.0	
Other	9	11.1	
Number of Cash Registers			
One	94	9.6	N.S.
Two	49	8.2	
Three or more	31	0.0	
Age of Minor			
14			N.S.
15	43	2.3	
16	67	7.5	
17	64	10.9	
Gender of Minor			
Male	74	13.5	$P < .05$
Female	100	3.0	
Age of Clerk			
Under 18-30	42	7.1	N.S.
31-55	104	7.7	
55 and over	28	7.1	
Gender of Clerk			
Male	43	11.6	N.S.
Female	131	6.1	
Was a Warning Sign Posted?			
Yes	119	6.7	N.S.
No	55	9.1	
(If Yes) Sign with Correct Wording?			
Yes	77	6.2	N.S.
No	97	9.1	
Promotional Materials Posted?			
Yes	89	10.1	N.S.
No	85	4.7	
Self-service Tobacco Available?			
Yes	10	30.0	$P < .05$
No	164	6.1	
Clerk Requested Minor's Age			
Yes	34	2.9	N.S.
No	140	8.6	
Clerk Requested Minor's Identification			
Yes	145	0.0	$P < .001$
No	29	44.8	

are actually prompting the sales clerk to ask for the minor's age or identification, which is leading to a lower sales rate. Past research has been mixed regarding the effect of type of retail outlet store (eg, grocery store, gas station, drug store) on tobacco sales, which was only significant the first year of inspections (1996) in our study.^{12,15}

Though not significant in all years, older minors were more likely to succeed in buying tobacco more often than younger minors, which is consistent with previous studies.^{12,14} In order to better understand the effect of age on successful purchases, it is important to continually have minors with a range of ages perform the inspections. Future directions may aim to look at the possible relationship between the age of the clerk and age of the minor.

There is less consistency in previous studies regarding the effect of gender on sales.^{12,16,17} We found a significant association with tobacco purchases and more sales to males in some, but not all, study years. It has been suggested by Clark, et al, that gender differences associated with sales may be due to differences in perceived maturity or possibly the result of having only a small number of minors to do the inspections.¹² Future studies may explore the role of gender and tobacco sales and the possible stigma of selling to females.

The consistently low rates of tobacco sales to minors in Hawai'i are a result of a combination of tobacco education and tobacco control policies. Education and tobacco control policies include free training and educational packets available to merchants, requiring retail outlets to clearly post a sign stating the minimum age for selling tobacco products (18 years old), laws against mobile food vendors selling tobacco within 1,000 feet of a school, posting inspection results in the newspapers and online, and issuing citations to clerks that sell to minors (as part of State of Hawai'i mandated compliance inspections of every tobacco retailer in the State). These methods have been supported by past research.¹³

Future tobacco compliance inspections may be altered due to the passage of new tobacco laws in Hawai'i. Effective January 1, 2014, it became illegal to sell electronic smoking devices (eg, electronic cigarettes) to a minor under the age of 18.¹⁸ A new warning sign specifically stating that it is illegal to sell electronic smoking devices to minors has been delivered to all licensed tobacco retail outlets and is required to be posted in clear view. Beginning July 1, 2014 tobacco products can only be sold in a direct, face-to-face exchange between the retailer and the consumer, and self-service displays will no longer be allowed in the State.¹⁸ Also beginning July 1, 2014, the legal

age to purchase tobacco products, including electronic smoking devices, increased from 18 to 21 years of age in Hawai'i County.¹⁹ Future legislation around raising the age of tobacco purchase to 21 is currently being explored for Honolulu County.²⁰ It will be of interest to see how these new laws are associated with the sale of tobacco to minors and whether they set a precedent for other states.

This study has both strengths and limitations. Consistent training is done for all minors as well as adults who supervise the inspections. The data collection instrument is simple and allows for complete data collection during an inspection. Lastly, data have been available since near the start of the compliance inspections in Hawai'i, allowing for surveillance of tobacco sales. A limitation is the accuracy of the sampling frame of tobacco retail outlets. Although the Hawai'i Department of Taxation tobacco permit list is the official registry of merchants who are selling tobacco legally, it may not be up to date. It does not specify which retail outlets are accessible to minors and does not include illegal tobacco merchants. Additionally, inspection data are self-reported by minors. A minor does not fill out the inspection form until after the inspection, leaving room for error regarding details of the inspection (ie, age estimation of clerk or number of cash registers). Lastly, there is the possible effect of stores notifying other store locations if they suspect an underage inspection is occurring in the area.

Conclusion

The current study expanded on past surveillance findings by examining the Synar compliance inspection results in Hawai'i from 2004 to 2013 and identified factors associated with minors' ability to successfully buy tobacco. Continued surveillance of underage tobacco sales is needed to maintain Hawai'i's low rates of noncompliance as one avenue to prevent underage tobacco use. Additionally, policy around emerging tobacco products is needed to control nicotine and tobacco use in minors.

Conflict of Interest

None of the authors identify a conflict of interest.

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Reducing Emergency Department Charting and Ordering Errors with a Room Number Watermark on the Electronic Medical Record Display

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Abstract

A survey of Emergency Department (ED) clinicians (ie, physicians, nurses and clinical assistants) at a single hospital in Honolulu, Hawai'i was conducted to assess the frequency of errors in charting, and entering orders on the wrong patient's chart in the electronic medical record (EMR), and clinician opinion was sought on whether a simple watermark of the patient's room number might help reduce the number of these EMR "wrong patient errors." ED clinicians (68 total surveys) were asked if and how often they charted in the wrong patient's chart or entered an order (physicians only) in the wrong patient's chart. Physicians had a combined self-reported average error rate of 1.3%. Mean rate of patient charting errors occurred at 0.5 errors and 0.4 errors per 100 hours, for nurses and clinical assistants, respectively. The majority (81%) of the 68 clinicians surveyed felt that a room number watermark would eliminate most of the wrong patient errors. In conclusion, charting on the wrong patient and order entry on the wrong patient type errors occur with varying frequencies amongst ED clinicians. Nearly all the clinicians believe that a room number watermark might be an effective strategy to reduce these errors.

Introduction

Electronic medical records (EMRs) are becoming more common throughout medical systems.¹⁻⁷ Each medical system and its services and departments have user displays and interfaces optimized for their specific needs. The hospital in which the present study was undertaken has used the Epic EMR (Epic Systems Corporation, Verona, WI) since November 2008 for charting and computerized physician order entry (CPOE). It has also utilized a computer-linked automated drug dispensing unit coupled to a triple scan system in which the patient's ID band code, the medication bar code, and the nurse's ID badge are electronically scanned to confirm that medication is being given to the correct patient. The Epic EMR has a special interface for the Emergency Department (ED). The unique aspects of ED patient care work flow include the following features:^{8,9}

- A large proportion of ED patients are new patients, or are presenting with new problems.
- ED patients typically have a short length of stay.
- A given room in the ED is serially assigned to approximately 5 to 20 patients during a 24 hour period (ie, rapid turnover).
- Most ED patients are discharged to home, but some are hospitalized.
- ED physicians and nurses manage several patients simultaneously.

Because of these factors, clinicians managing ED patients do not have the opportunity to get to know patients well by name. Most of the time spent with the patient is in acquiring their

medical history, their physical exam findings, and carrying out diagnostic and treatment measures. In the ED, time limitation prioritizes medical information over getting to know patients socially and personally. Because of this, accurate identification of patients by ED clinical staff frequently relies on the patient's room number. However, the patient's name, and not his or her room number, is prominently displayed in the identification portion of the patient's chart (paper or EMR).

The room number layout in the ED is constant and well known to clinicians in the ED. A room number instantly identifies a patient, and is routinely used in place of name for communication about patients. For example, clinical staff may state: "[The patient in] 6 needs to be taken to X-ray," or "Is it OK for [the patient in] 2B to start drinking fluids now?" or "Can you please call respiratory therapy for [the patient in] 5B?" or "[The patient in] 9 is ready for discharge." To hasten communication, the text in brackets is often left out. Therefore, ED staff knows the patient's clinical issues based on their room number. The patient's name is primarily used only when communicating with the patients and family directly or during other processes such as consent, procedure time-outs, medication administration, etc.

The ED track board is a tool which displays all the patients in the ED in real time (Figure 1). It is one of the main screens that is displayed on the user's screen. A de-identified version is also displayed on a large screen centrally within the ED nurse station. Because of this heavy reliance on the patient's room number, the display of the room number in the track board and other parts of the EMR is critical to the proper identification of ED patients.

In the Epic EMR system, charting on patients and order entry are done by clicking a patient's row on the trackboard to open a full screen display of the patient's record, nested within a tab. In the Figure 2 screen shot, a maximum of 4 tabs that can be opened at any given time are displayed with charts of four fictitious patients (AAPatient, CCPatient, BBPatient, and DDPatient). In Figure 2, the active tab is that of BBPatient. While there are several indicators here that the patient tab that is open is BBPatient, the room number is fairly small (turquoise font in the upper left), and has been circled in Figure 2 for demonstrative purposes only. A clinician must click on the notes item or icon to enter a chart note. A clinician must click on Order Set or Orders to enter orders.

When viewing the ED as a whole to get a perspective on task prioritization, the clinician views the track board (Figure 1). To enter a note or an order in BBPatient's chart, the clinician must

double click on the track board line 5B to open the patient's tab. From the authors' personal experience, it is common for clinicians to double click on 5B and assume that the tab that is opened is the correct patient in 5B. However, the wrong tab can occasionally open. For example, the clinician may intend to open 5B, but open up 5A instead. Figure 2 demonstrates the potential for this error since, although the patient's name is prominently displayed, the room number is less readable. If the physician relied on the name, this would not be a problem; however, since it is common to rely on the room number, the small font size makes it difficult to spot this error. Note that the other 3 tabs (Figure 2) have the patient names only (without the room number).

Opening the wrong patient tab has several consequences. First, the patient information may be entered into the wrong chart. As a result, incorrect patient information is now visible to someone viewing a different chart. While incorrect entries may be erased, Epic does not permit users to permanently delete the wrong entry. Rather it stores the information as "deleted" in the wrong chart, which makes it potentially viewable (medical information in wrong chart). Next, orders may be entered on the wrong patient. Nursing, pharmacy, imaging, and respiratory therapy staff are able to catch some or most of these errors. However, errors may persist, and medications may be dispensed and charged to the wrong patient. Ultimately, the potential exists for medications to be administered to the wrong patient. As long as the error is caught, dangerous mistakes can be avoided; however, finding and rectifying errors is very time consuming for the staff; the impact on the patient could range from a mere inconvenience at best to life-threatening consequences.

Implementing systems that prevent these errors is therefore critical. With the current Epic trackboard and patient tab layout, these errors continue to occur. The hypothesis of this study was that these errors can be reduced by displaying the room number on the EMR screen, as shown in the Figure 3 sample patient screen. The proposed change is a colored transparent watermark that does not block any information. As the screen scrolls up and down or different screen information is displayed, the watermark remains fixed as long as the information pertains to the patient in that room. The inclusion of the watermark makes it quite obvious that one is viewing the chart of the patient in 5B. A clinician making a chart entry or entering orders would be more likely to notice the patient's room number, potentially increasing the likelihood of avoiding a wrong patient error. A less noticeable proposed change in Figure 3 is that the four tabs at the top also have the patient's room numbers next to the patient's name. This permits the clinician to click on these tabs directly.

The purpose of this study was to survey ED clinicians in a single hospital in Hawai'i on the frequency of self-reported charting and order entry errors ("wrong patient errors") and to assess whether they believed that a simple watermark of the patient's room number might reduce the number of EMR wrong patient errors.

Bed	Patient	Age	CC	Tr	Doc	RN	Res	Total	Lab	Img	Comments	PCP	BP	HR	Sat	RV
02B	Mmmmm, C (F)	33 yr old	ABDOMINAL PAIN	3	DOCname	RNname		00:05			KHS resident...	DOCname	126/76 ...	51	97 %	No
03	AAPatient, D (M)	5 yr old	FALL	4	YAMAMO ...	RNname	MCR	01:57	00:00		1330 LET pla...	DOCname	107/62 ...	94	100 %	No
04	Mmmmm, C (F)	47 yr old	LEG PAIN	4	DOCname	RNname		03:13	1/1/11 ...			DOCname	119/74 ...	73	100 %	Yes
05A	Mmmmmmm, G (F)	30 yr old	VAGINAL BLEED, PREG...	4	DOCname	RNname		03:23	3/3/41 ...	[2/2]	Need pelvic	DOCname	102/68 ...	76	100 %	No
05B	Mmmmmmm, R (F)	3 yr old	COUGH	5	DOCname	RNname		02:28	0/1/11 ...	[1/1]		DOCname	85/54 m...	103	99 %	No
05B	BBPatient, P (M)	2 yr old	ABDOMINAL PAIN	3	YAMAMO ...	RNname		02:00	[1/2/2] ...			DOCname	96/64 m...	110	98 %	No
05B	Mmmmmmm, Q (M)	10 mo ...	COUGH	5	DOCname	RNname		02:29	0/1/11 ...	[1/1]		DOCname	100/61 ...	78	96 %	No
05C	Mmmmmmm, E (M)	36 yr old	HEAD INJURY (WITHOUT...	5	DOCname	RNname		01:29	[1/2/2] ...	[1/1]		DOCname	105/61 ...	103	100 %	No
06	CCPatient, C (M)	9 yr old	RASH	3	YAMAMO ...	RNname		02:49	3/4/41 ...		Lab called	DOCname	112/69 ...	91	100 %	No
09	DDPatient, D (F)	13 yr old	HEAD INJURY (WITHOUT...	4	YAMAMO ...	RNname	SNC	00:32	00:00			DOCname	121/71 ...	89	99 %	No
10	Mmmmm, K (M)	14 mo ...	FEVER (9 WEEKS to 74 ...	4	DOCname	RNname		01:44	[1/1/1] ...			DOCname	95/45 m...	132	98 %	No

Figure 1. ED EMR trackboard (portion of screen). © 2013 Epic Systems Corporation.

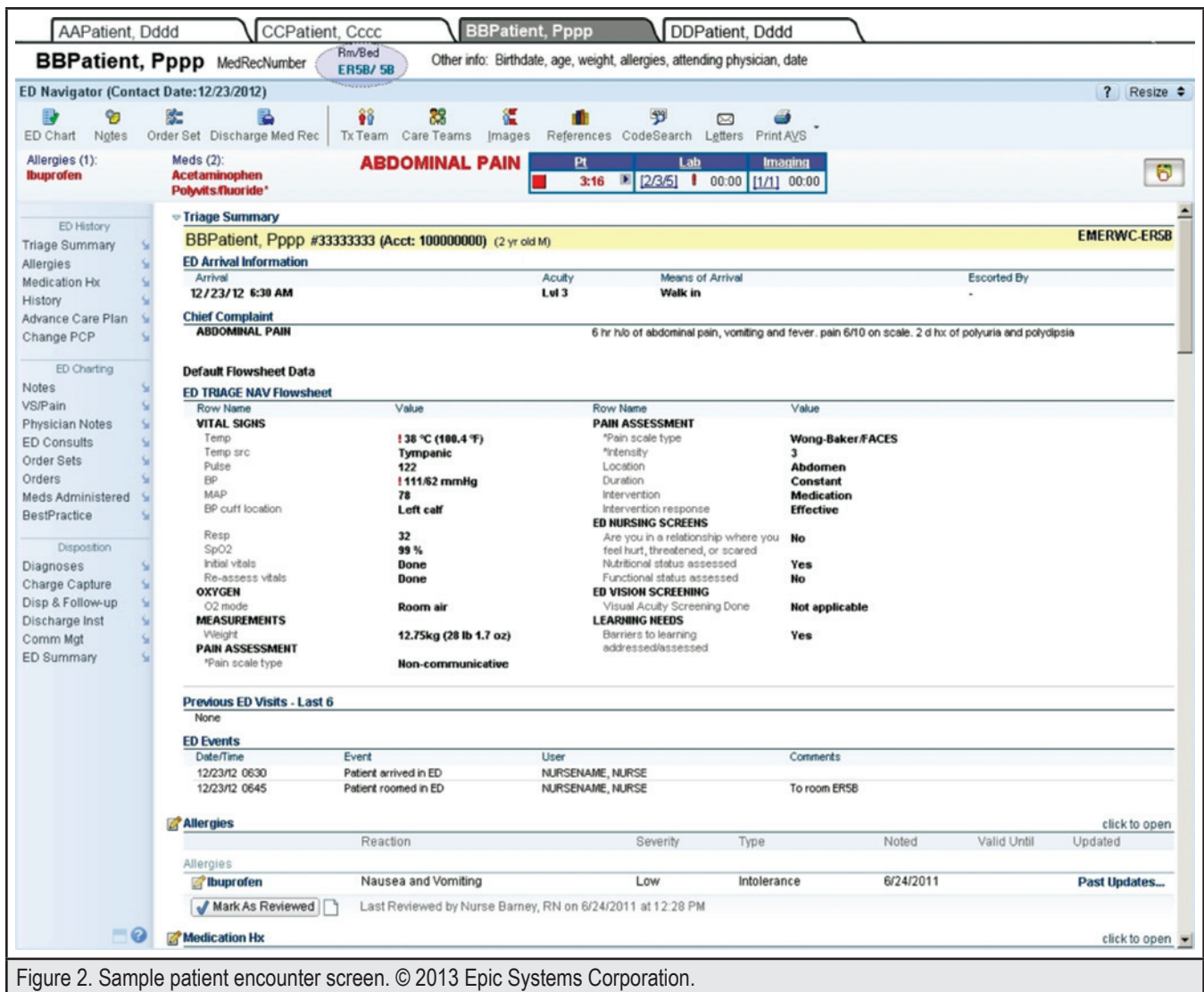


Figure 2. Sample patient encounter screen. © 2013 Epic Systems Corporation.

Methods

During calendar year 2012, attending general emergency physicians, attending pediatric emergency physicians, ED nurses, and ED clinical assistants were asked in person to participate in a voluntary survey as a study subject. Participant responses were collected in person by the study investigator after verbal consent was obtained. This study protocol was determined to be exempt from regulations for category 2 research using the guidelines set by the Office of Human Research Protection (45 CFR 46.101(b)) by a designee of the Institutional Official of the hospital system.

The survey recorded the number of years of clinical experience of the study subjects. Nurses and clinical assistants were asked to approximate the number of hours worked during the previous 3 months. Physicians were asked to approximate the number of patient encounters during the previous 3 months. The different responsibilities of the physicians, nurses, and clinical assistants required the protocol to assess errors within their scope

of respective responsibilities. The survey asked study subjects if they had ever made an error in which charting or order entry (physicians only) was done in the wrong patient's chart. The survey then asked study subjects for an approximate number of times this occurred in the last 3 months. Nurses were also asked if they noticed an ordering error (made by the physician) on the wrong patient's chart and to approximate the number of times this occurred in the last 3 months.

A charting error was defined as key stroke into a note on the wrong patient's chart, even if the error was then discovered immediately and the note was purged. An ordering error was defined as entering an order on the wrong patient even if it was discovered immediately and the order was cancelled. Ordering error counts were defined in terms of episodes rather than the actual number of orders. For example, if a physician ordered three medications on the wrong patient at the same time, this was considered to be one error episode.

Study subjects were then shown the standard EMR screen

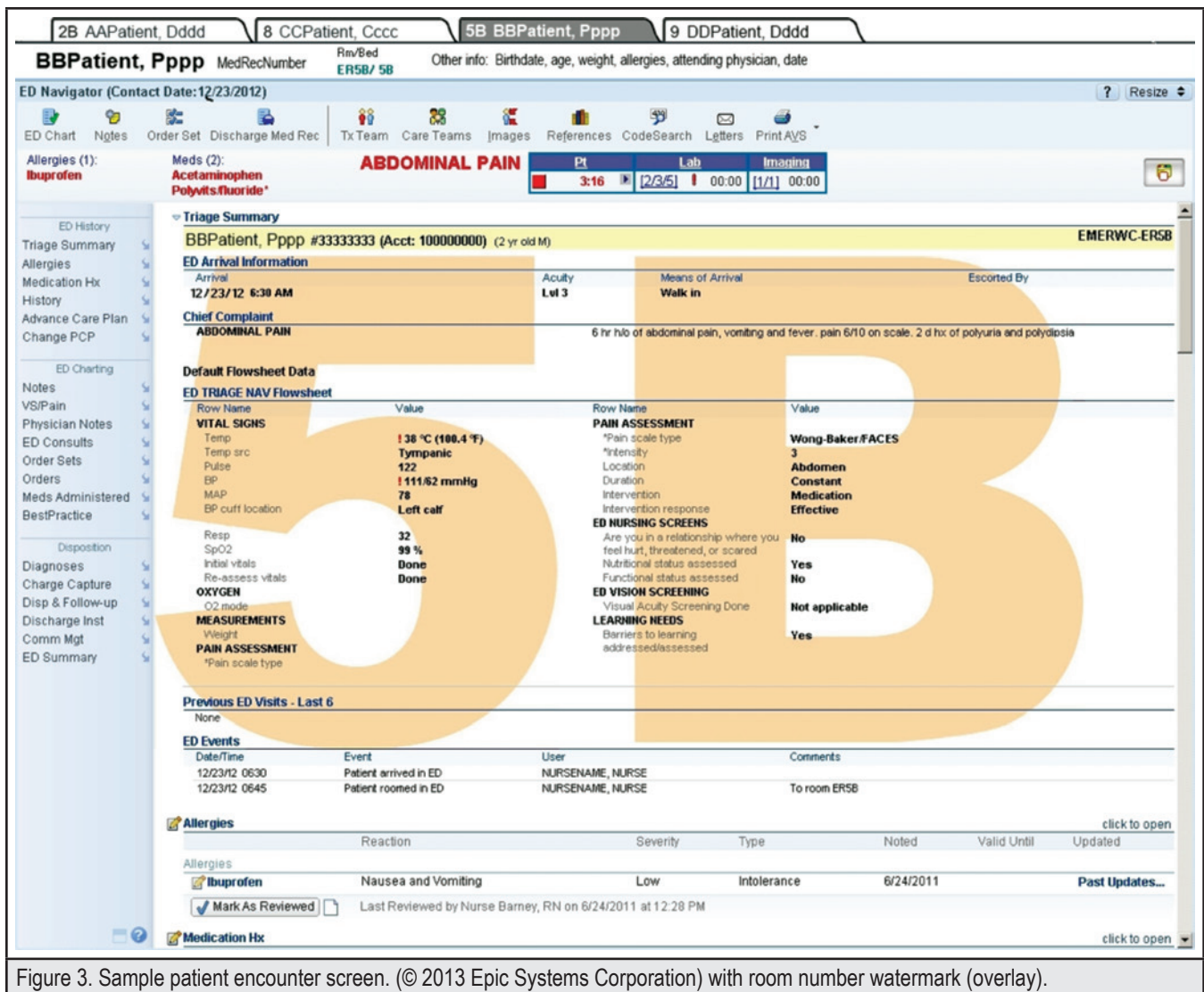


Figure 3. Sample patient encounter screen. (© 2013 Epic Systems Corporation) with room number watermark (overlay).

(what they normally see) (Figure 2), then an identical EMR screen with room number watermarks added to the patient chart and tabs, as depicted in Figure 3. In addition, a verbal description of how the two screens differed was provided. Subjects were asked if they thought that the addition of the room number watermark and the room number on the tabs (Figure 3) could potentially reduce the number of wrong patient charting/ordering errors. If they responded yes, then they were asked whether they thought this would eliminate just a few, roughly half, or most of the errors.

Data from each study subject survey form was manually entered into a spreadsheet (Microsoft Excel, Microsoft Corporation, Redmond, WA). Descriptive statistics were tabulated using the built-in functions of the spreadsheet.

Results

The results are tabulated in Table 1; 100% of those who were approached consented to participate in the study. Of the 68

clinician study subjects who completed the survey, all but two (both were clinical assistants) had made a wrong patient charting or ordering error. Six (25%) of 24 physicians reported never making a wrong patient charting error, but 100% noted one or more wrong patient ordering errors (although not necessarily in the most recent 3 month study period). The highest numbers of wrong patient errors reported by physicians were 6.7, 10, 13.3, and 20 errors per month, respectively (one physician each) during the previous 3 month period. Other than these four physicians, total physician errors in the previous 3 months ranged from zero to 3.3 errors per month. Overall, the 3 month self-reported mean error rate was 4.8 per month (median: 1.7 errors per month). Total nurse errors ranged from zero to 1.7 errors per month in the past 3 months (zero to 2.8 errors per 100 hours). Most (97%) of the 31 nurses reported noticing wrong patient ordering errors by physicians, with observed error rates ranging from zero to 3.3 errors per month during the past 3 months (zero to 2.1 errors per 100 hours). Total 3-month error

Table 1. Clinical experience, EMR experience, wrong patient error frequency and error reduction opinions amongst emergency physicians (EPs), nurses (RNs), and clinical assistants (CAs). SD = standard deviation. *ordering errors do not apply to RNs or CAs.			
	Emergency Physicians (EP)	Nurses (RN)	Clinical Assistants (CA)
n	24	31	13
Years of total clinical experience in this position (mean +/- SD)	11.1 +/- 10.6	9.1 +/- 9.9	4.5 +/- 3.2
<1 year	2	1	1
1 to <=5 years	7	17	8
>5 to <=10 years	6	4	3
>10 years	9	9	1
Years of experience using Epic ED EMR (mean +/- SD)	2.5 +/- 1.1	2.6 +/- 1.0	2.2 +/- 1.3
<1 year	4	3	4
1 to <=2 years	5	5	1
>2 years	15	23	8
Mean activity level (patients for EP, hours for RN/CA) for most recent 3 months (mean +/- SD)	780 + 287 patients	423 + 112 hours	447 + 58 hours
Ever made a wrong patient charting or ordering* error?	yes=24, no=0	yes=31, no=0	yes=11, no=2
How many errors in most recent 3 months ? (mean +/- SD)	9.5 +/- 14.4	1.9 +/- 1.3	2.6 +/- 2.7
RNs only: Ever noticed a wrong patient ordering error?		yes=30, no=1	
How many times in most recent 3 months ? (mean +/- SD)		2.7 +/- 2.3	
Do you think the EMR room number watermark will reduce wrong patient errors?	yes=23, no=1	yes=31, no=0	yes=13, no=0
If yes to above question, how many wrong patient errors would be eliminated?			
Just a few errors would be eliminated	1 (4%)	0 (0%)	1 (8%)
About half the errors would be eliminated	5 (22%)	3 (10%)	2 (15%)
Most of the errors would be eliminated	17 (74%)	28 (90%)	10 (77%)

rates among clinical assistants also ranged from zero to 3.3 errors per month with a mean of 0.9 errors per month (median: 0.7 errors per month).

Using the estimated number of patient encounters during the previous 3 months, physicians made wrong patient charting or ordering errors ranging from 0 to 8.6 per 100 patients (0% to 8.6%). The mean error rate of 1.3% was calculated as the mean of the individual error rates or 1.2% calculated as total errors divided by total number of patients seen by the 24 physicians. Extrapolating this to the 40,000 patients seen annually in the ED where the study was conducted,¹⁰ a 1.3% estimated error rate suggests that there may be approximately 520 wrong patient charting or ordering errors made annually by physicians.

Using the estimated number of hours worked during the previous 3 months, nurses made wrong patient charting errors ranging from 0 to 2.8 (mean 0.5, median 0.43) per 100 hours, and clinical assistants made wrong patient charting errors ranging from 0 to 2.3 (mean 0.57, median 0.43) per 100 hours. Nurses noted wrong patient ordering errors (by physicians) during the previous three months ranging from 0 to 2.1 (mean 0.66, median 0.46) per 100 hours.

Of the 68 clinician study subjects surveyed, all except one felt that the room number watermark would reduce the number

of wrong patient errors. The majority (81%) of the 68 clinicians surveyed felt that the room number watermark would eliminate most of the wrong patient errors.

Discussion

In a 2005 study of CPOE, more than 50% of physician providers made order entry errors because they were not able to quickly identify the patient because of a poor CPOE display.¹¹ In a 2006 study of retrospectively identified pediatric medication errors related to CPOE, wrong patient type of error was not found to be common.¹² Our study surveyed attending clinicians in an ED, did not include residents, and defined "errors" differently; it was limited to attending physicians, and not residents, because attending physicians have greater patient responsibility than residents, and greater experience with the ED work flow, ordering schemes, the specific ED features of Epic, and the trackboard view available to ED staff. Our study indicated that nearly 100% of clinicians made wrong patient EMR errors (charting and ordering) at some point with an average of 9.5 errors in the past 3 months suggesting that these errors are common.

The findings of this study confirm that ED clinicians who are routine users of the system believe that improving the information display in a way that heightens awareness of the most com-

monly utilized ED patient identifier (the room number) would be an effective means of reducing wrong patient errors. The room number watermark can be built into the EMR to display automatically and passively without clinician intervention. Other options to enlarge the room number would reduce the available screen display area, whereas the watermark method makes the room number very prominent without compromising screen display availability. In doing so, it could save time by avoiding the need to undo the error and then to repeat the task in the correct patient's chart.

A 2012 children's hospital study confirmed that patient identification error events occurred, though their numbers were small. The authors utilized a photographic image of the patient displayed in all order entry screens to reduce the number of wrong patient orders.¹³ This is a similar concept to the room number watermark in that it provides a passive display to confirm that the clinician is ordering or charting on the correct patient. Acquiring a picture image takes some time and it must be linked to the correct patient (which itself has potential for error). While this is feasible for inpatients, it may not be feasible for the faster patient throughput and workflow of an ED. The room number watermark takes up no additional viewing space on the computer display and it can be automated with no special user intervention.

A room number watermark may reduce wrong patient errors by providing a second identifier check. The administration of medication and performing a procedure at the bedside requires an identification process to review the patient's identification band with at least two patient identifiers. However, this identification verification is not stressed for the charting or the order entry process. One study confirmed that providers do not verify patient identity during computer order entry.¹⁴ In place of these established verification systems, the inclusion of the patient's picture or the patient's room number in the EMR would serve as an appropriate secondary identifier. Neither are infallible but they provide secondary confirmation that is fast, automated, and passively effective.

Another study by Adelman, et al, demonstrated that identification confirmation/verification during the order entry process was effective in reducing wrong patient errors.¹⁵ However, identification verification during order entry takes additional time; moreover, wrong patient errors occur in the charting function in addition to the order entry function, creating the need for additional identification confirmation/verification. It would be better if this can be done in a more passive and automated fashion without the additional burden on the clinician, which may be accomplished by a room number watermark.

While some checks exist in our current system, it would be far better to employ a technologically incorporated passive strategy (such as a room number watermark) that prevents these errors in the first place. In the opinion of nearly all the clinicians surveyed in this study, a room number watermark had the potential to reduce these errors.

Limitations of This Study

Wrong patient errors could have been theoretically estimated by examining keystrokes, order cancellations, note deletions, and related modifications that could suggest a "wrong patient" error. This would require each cancellation, deletion, and modification to be identified by the information technology (IT) staff, and then reviewed to determine if the change could be attributed to wrong patient error. The complexity of the task, and its inherent flaws led the author to choose an alternative strategy for the study. A survey asking each clinician to estimate the number of errors is subjective and it is potentially embarrassing to admit that errors were made. Thus, it is likely that the study underestimated the incidence of wrong patient errors. We did ask the survey participants to be honest. We pointed out that the survey was anonymous, the information was not shared with anyone, and that this information could not be used for anything related to employment purposes. The study was unable to identify errors that went unnoticed, providing another reason why it may have underestimated these errors.

A study with a watermark versus control group would have been better, but it was not possible to change the actual EMR screens for the purpose of this study. A simulation would not sufficiently mimic the actual ED work flow and patient encounters. Thus, the next best thing was to use a survey method by asking the ED providers about these errors. Emergency clinicians know and admit that the errors are attributable only in part to a poor information display, as confirmed by other studies. Hence, this study does not demonstrate that these errors can be reduced by a room number watermark; rather only that nearly all the clinicians in this survey who work in the field believe that this might be an effective error reduction strategy.

Conclusion

In conclusion, charting on the wrong patient and order entry on the wrong patient type errors are relatively common and occur with varying frequencies amongst ED clinicians. Nearly all the clinicians believe that a room number watermark might be an effective strategy to reduce these errors.

Conflict of Interest

The author reports no conflict of interest.

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MEDICAL SCHOOL HOTLINE

Looking Forward and Enriching John A. Burns School of Medicine's Curriculum: Lesbian, Gay, Bisexual, and Transgender Healthcare in Medical Education

Jennifer Wong MSIII

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.

An estimated 9 million Americans (nearly 4% of the population) openly identify as lesbian, gay, bisexual, or transgender (LGBT). This number does not include the 19 million Americans (8.2% of the population) who have engaged in same-sex behavior or the 25.6 million Americans (11% of the population) who have acknowledged same-sex attraction.¹ The LGBT community is becoming more visible and will continue to grow, especially given the recent repeal of the Defense of Marriage Act (DOMA)² and the legalization of same-sex marriage in seventeen states, including Hawai'i. The current healthcare system, however, fails to address the special needs of the LGBT community including higher rates of cardiovascular disease,^{3,4} infectious diseases,⁵ substance abuse,⁶ and psychological illness⁷ than the general public. This translates into a critical population who are being denied comprehensive healthcare.

A Call for Change in Medical Education

All physicians, regardless of sexual orientation, should be familiar with LGBT health issues in order to provide quality patient care. This responsibility as a physician is not only a moral obligation, but it is also being enforced by the Affordable Care Act,⁸ which promotes LGBT health equity through cultural competency training and increased LGBT coverage and protection.

Surveys reveal that, unfortunately, many medical students and physicians feel under-prepared to care appropriately for LGBT patients and that students displayed "disagreement and confusion on several LGBT health care concerns to merit clarification through curricular modification."⁹ The average North American medical school dedicates five hours to LGBT-related content in their entire curriculum, with 33% of schools reporting zero hours during clinical years.⁸ Structural reorganization of medical education that includes training in LGBT sensitivity and knowledge is of utmost importance given that educational institutions play a large role in shaping the minds and skills of future healthcare providers. If positive LGBT representation is not achieved and physicians continue to practice in ignorance, patient-physician relationships in this population will continue to decline and thus feed into a vicious cycle of health disparities.

A 2011 Institute of Medicine report notes that the LGBT population's special health needs are largely attributed to social stigma.¹⁰ An effective solution to this issue of social stigma would be to increase student exposure to LGBT patients. A New York medical school found that medical students with greater exposure to LGBT patients performed more comprehensive histories, exhibited more positive attitudes, and possessed greater knowledge of LGBT health concerns than students with little or no exposure.⁹ Increased experience with the LGBT population not only improves provider competency but, as a result of positive attitudes, patient-physician relationships are heightened and thus overall care. Such promising results should encourage medical schools to increase their instruction of LGBT patient care.

The nation's top medical schools have successfully integrated LGBT healthcare into their curriculum. Some have extended their advocacy beyond the classroom. Examples of schools that have dedicated themselves to promoting LGBT equity include Stanford University School of Medicine and Jefferson Medical College. Stanford's *LGBT Medical Education Research Group* contributes groundbreaking research in the field of medical education that influences health and educational policies. Similarly, Jefferson's *Council for Diversity and Inclusion*, a thirty-two member organization, comprised of administration, faculty, and students, promotes education and research to enhance diversity both within patient care and amongst student and faculty bodies. Furthermore, the college's *Bridging the Gap Program* collaborates with underserved populations to provide medical students with the opportunity to work with the Mazzoni Center, the only LGBT health center in Philadelphia.

These efforts highlight the challenges still facing integrated LGBT healthcare education at other institutions, including the University of Hawai'i John A. Burns School of Medicine (JABSOM). At JABSOM, formal student exposure to LGBT issues has remained limited. While the subject can be addressed at a speaker's discretion, there are no lectures devoted to the topic of LGBT healthcare. LGBT patient care is addressed tangentially in the context of HIV/AIDS, disorders of sexual development, and interviewing adolescents using the H.E.A.D.S.S. questionnaire.

While these lectures serve as a strong foundation, LGBT health is broader than these topics alone. As such, students may feel underprepared for adequately addressing LGBT health issues when they inevitably encounter LGBT patients during clinical rotations.

Ways to augment the current curriculum would be to include lectures specifically dedicated to basic LGBT patient care issues. A panel of LGBT individuals and community physicians could provide an intimate and personal approach to teaching basic sensitivity and common health concerns. JABSOM's current curriculum would be greatly enhanced by covering an appropriate range of LGBT topics.

In addition to supplementing JABSOM's lecture content, integrating LGBT issues into the problem-based learning (PBL) curriculum should be considered. PBL is an excellent tool for preclinical training since cases that represent Hawai'i's population are included. Yet only two of its eighty-two cases include LGBT patients. The PBL curriculum touches upon the topic of LGBT healthcare, including references to a landmark study that concludes that children with same-sex parents develop similarly to children with heterosexual parents,¹¹ a point taken as common sense by a majority of current JABSOM students, but the references are not current. Another case focuses on a gay male with Crohn's disease.¹² The significance of his sexuality in the case was to illustrate that stressors, such as those associated with homosexuality, are likely to trigger symptoms of the disease. However, the case does not directly address any specific issues related to LGBT health such as how this illness would affect the patient's sex life as a gay male and possible advice and therapies to offer this patient. Addressing LGBT topics in greater breadth and depth within JABSOM's PBL curriculum would enhance care of this important patient population.

Looking Forward and Enriching JABSOM's Curriculum

The problem-based learning style has many benefits, including its multidisciplinary approach. PBL curricula improve students' general competencies, including: problem solving skills,¹³ scientific attitude,¹⁴ and teamwork.¹⁵ JABSOM's PBL cases are written in such a way that encourages students to humanize their patients—to treat the paper cases as if they were real people, as if they were an aunt or uncle. Like real patients, they come with personal stories that guide students to explore populational and behavioral issues such as homelessness, addiction, and abuse. In order for Hawai'i's medical students to excel comprehensively in patient care, JABSOM's PBL curriculum must be utilized to its full potential to enhance student understanding of patients from a humanistic perspective.

JABSOM encourages its students to be proactive and passionate with their ideas. When the faculty was approached with an idea to enrich the school's curriculum by updating and rewriting LGBT-related PBL cases, the Director of the Office of Medical Education guided the author, Jennifer Wong, an MS3 student, through the administrative requirements and basic process of developing a PBL case. Four JABSOM-affiliated physicians

highlighted LGBT issues they deemed important for medical students to understand in order to develop into effective physicians. These four doctors were selected because of their work with a large LGBT patient population and because, as self-identified homosexual and heterosexual physicians, they provided different perspectives of the topic. Various organizations were researched for guidelines on the care of LGBT patients and LGBT health in medical school curricula. For example, the American Medical Student Association (AMSA) recommends specific LGBT health topics that should be incorporated into medical education.¹⁶ The American Academy of Family Physicians guidelines highlight the following areas:¹⁷

- Attitudes: affirming normal spectrum of identities
- Knowledge: terminology, disparities, research, & clinical knowledge
- Special focus on transgender
- Skills: communications, environment, advocacy

These guidelines and clinician guidance were integrated into enhancing JABSOM's curriculum.

Through this process, one LGBT-related PBL case was revised, and a second case is being created. In the first revised PBL case, medical students encounter a young boy with two mothers. In the case that was originally presented, the family is pleasant and well-adjusted. However, there is a scene in which the doctor "awkwardly tries to find a way to bring up the subject"¹⁸ of child custody and parental consent with the non-biological mother. As minute as this may seem, one word has the power to change the entire attitude of any patient-physician interaction. Topics about LGBT can be seen as taboo as the word "awkward" implies, even in medical settings where acceptance and candor are essential. But these topics do not need to be avoided and they should not be, especially when used in a curriculum that is training physicians to care for LGBT patients. Physicians are often thrown into uncomfortable situations, like delivering bad news to a patient or facing ethical dilemmas. Cases for JABSOM's PBL, therefore, should allow students to reflect on how they would handle such situations beforehand. There is never one correct way to handle any situation, but PBL cases should set positive examples for students that they may strive to emulate. Accordingly, the first case was revised to represent a positive patient-physician interaction. In addition, the edited PBL case acknowledges the progress that Hawai'i has made with respect to LGBT rights by referencing civil unions and same-sex marriage, which was legalized in December of 2013.

The second and new PBL case will address a different aspect of the LGBT community: "the silent T." People often forget about or do not understand the trans* (asterisk emphasizes inclusion of the full spectrum of non-cisgender identities) community¹⁹ so a case was created to introduce a male-to-female transgender patient who wishes to begin hormone replacement therapy. The patient's social history was composed in such a way that humanizes the patient and developed dialogue that teaches basic sensitivity. For example, the physician constantly refers to the patient by her preferred name and uses female pronouns, like

“she” and “her.” The case humanizes the patient by describing her as an average, well-adjusted adult while highlighting the difficulties associated with feeling “trapped in the wrong body,” such as depression and societal disapproval. Since trans* medicine is a relatively unknown area, it is anticipated that this case will help students to take home the following points:

- The difference between sex and gender
- The concept of transitioning
- Trans* identity is not a psychological illness
- Basic guidelines for care of transgender patients

Understanding trans* healthcare is just as important as understanding lesbian and gay healthcare. Hawai‘i is a special place because its strong Pacific Island influence contributes to the trans* community. Hawai‘i’s trans* community differs from that of the continental United States because it also includes traditional Hawaiian *māhū*,²⁰ Tongan *fakaleiti*,²⁰ and Samoan *fa’afafine*.²⁰ On an international scale, there has been a recent movement for trans* visibility and equality, which will only increase the patient population and emphasizes the importance of comprehensive healthcare. Given the complexity of the trans* community and the encompassing LGBT community, it is impossible to incorporate all of LGBT patient care into a few PBL cases. Thus, there is a role for a supplemental course on LGBT healthcare at JABSOM.

This author is currently developing an LGBT elective for JABSOM students under the guidance of Dr. Robert Matyas II, a family medicine physician and director of HIV Services for Kaiser Permanente’s Hawai‘i Region. In the proposed elective, students will receive credit towards graduation by participating in eight 1.5-hour sessions. Each session will introduce a different aspect of LGBT healthcare, such as LGBT 101, infectious diseases, pregnancy, and adoption. The course will include assigned readings and videos, classroom activities, group discussions, and guest speakers from the community such as the Life Foundation. The elective’s projected start date is Fall of 2015, and several JABSOM students have already expressed great interest in the curriculum. By including positive LGBT representations in medical education that elicit both competence and compassion in healthcare providers, healthcare in Hawai‘i will move forward and become closer to achieving social justice in health.

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Is the Gap Growing? Patterns in Poverty-related Disparities in Nutrition and Physical Activity in Hawai'i

Vanessa Buchthal DrPH

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

A recent Harvard study on national dietary trends found that the gap in healthy dietary behaviors between low-income and middle/upper-income Americans widened between 2000 and 2010. Hawai'i Behavioral Risk Factor Surveillance System (BRFSS) data from 2001-2009 on differences in obesity-related behaviors between moderate-high income, low-income, and poverty-level Hawai'i residents were examined to explore whether Hawai'i data on obesity-related behaviors reflected this national trend. While most differences between groups were not statistically significant, a consistent pattern was seen across all measures that suggested a growing gap between low-income and moderate/high income Hawai'i residents. Data from community studies on pedestrian injury, park use, transportation, and healthy food access were examined. This data suggests that individuals residing in low-income neighborhoods in Hawai'i experience higher barriers to the adoption of healthier behaviors. Further data is needed to document poverty-related gaps in the adoption of health behaviors among youth and within Hawai'i's ethnic groups, communities and geographic areas.

Dietary behavior and physical activity contributes to obesity in both children and adults, and to chronic conditions such as diabetes, stroke, and cardiovascular disease.¹ Both governmental and nonprofit organizations have invested substantially in campaigns to improve dietary behavior and physical activity in the United States, in order to reduce obesity and related chronic disease risk within our population. The nation's Healthy People 2020 goals increased emphasis on the need to address the social determinants of health in health promotion efforts, addressing socioeconomic and environmental health disparities in order to improve the nation's health.² However, when current physical activity and nutrition outcomes in the population are viewed through the lens of socioeconomic disparity, a concerning picture is emerging.

A recent examination of national dietary behavior data found that while middle- and upper-income Americans have shown modest improvements in dietary behavior between 2000 and 2010, those living in poverty have experienced no changes.³ As a result, the disparity in dietary behaviors related to chronic disease has doubled between low-income and other Americans in the past decade.

Due to recent changes in the administration and weighting of the Behavioral Risk Factors Surveillance System (BRFSS),

Hawai'i does not have an equivalent 10-year data set to draw from. When one looks at state BRFSS data on nutrition and physical activity by income groupings, however, a similar pattern emerges. Dietary and physical activity disparities appear to be widening between moderate/upper-income (income greater than 185% of the federal poverty limit, [FPL]), low-income (incomes between 130-185% of the FPL), and poverty-level (those with incomes below 130% of the FPL) Hawai'i households.

In 2001, the percentage of Hawai'i residents consuming the recommended 2 fruits and 3 vegetables per day was 12.8% among middle/upper income Hawai'i residents, 12.2% among low-income Hawai'i residents, and 10.9% among those in poverty.⁴ By 2009, consumption of the recommended servings of fruits and vegetables increased modestly among moderate/upper-income individuals (15.3%), while remaining nearly flat among low-income individuals (12.7%). Those living in poverty (13.7%) surpassed the low-income group, but still lagged several percentage points behind moderate/high income Hawai'i residents.

Similar results can be seen for physical activity. In 2001 there was no appreciable difference in the percentage meeting physical activity recommendations among moderate/upper income (52.9%), and low-income (51.6%) Hawai'i residents.⁵ Those in poverty (45.2%) had the lowest percentage of individuals meeting physical activity recommendations. Between 2001-2009, the moderate/upper income group showed steady improvement over time (55.1%), while the percentage meeting recommendations among the low-income group (51.5%) remained unchanged. Those in poverty (49.7%) caught up to the low-income group, but lagged substantially behind the middle/upper-income group.

Similar trends can be seen in leisure-time physical activity,⁶ and overweight and obesity⁷ over the same time span. Sugar-sweetened beverage consumption among adults has received more recent attention, but changes between 2011 and 2012 suggest that a similar pattern is emerging.⁸ It should be noted that few of these gaps are statistically significant. However, the patterns are consistent across a wide range of dietary behavior and physical activity indicators, and all point in the direction

of slowly widening disparities in healthy behaviors between low-income and moderate/upper income Hawai'i residents.

This pattern is not unique to nutrition and physical activity behaviors. Other risk behaviors that have been the targets of extensive public campaign development, such as tobacco smoking prevalence and seat-belt use, show similar trends over the same time period—health behavior improving among moderate/higher income group, with little to no change among the low-income residents, and those in poverty improving just enough to catch up with the stationary low-income residents.^{9,10}

Disparities in income and socioeconomic status (SES) between ethnic groups may be a substantial contributor to the link between ethnicity and health disparities.¹¹⁻¹³ In Hawai'i, poverty is disproportionately concentrated among Native Hawaiians, Filipinos, and Pacific Islanders.¹⁴ These same populations bear a disproportionate burden of diabetes and heart disease in Hawai'i.¹⁵ Over the past decade, a significant amount of work has gone into reaching these populations through cultural tailoring of campaign messages and intervention design.¹⁶ However, there is some evidence to suggest that media-based campaigns aimed at the general population, even when culturally tailored for specific ethnic populations, do not effectively reach the lower-income individuals within these groups.¹⁷

While health disparities have complex causes, it is clear that socioeconomic differences in the ability to act on health behavior recommendations contributes to the disproportionate burden of diabetes, heart disease, stroke, and other chronic conditions seen in many populations. These differences come in many areas—differences in behavioral environment, in resources, in economic and social constraints to action.¹⁸

In Hawai'i, for example, low-income households are disproportionately concentrated in urban Honolulu, particularly within the neighborhoods of Kalihi, Moilili, Makiki, Salt Lake, Waikiki, Chinatown, and Palolo, as well as in Waipahu and on the Waianae Coast.¹⁹ A study of pedestrian injuries and fatalities by neighborhood shows that residents in these neighborhoods are disproportionately at risk of injury when walking in their neighborhoods.²⁰ Between 2007-2011, there were 13 pedestrian deaths and 171 pedestrian injuries serious enough to warrant ambulance service in the Kalihi-Palama neighborhood. Similar rates were seen across other low-income areas in urban Honolulu, as well as in the low-income communities of Waianae (10 deaths, 105 injuries), and Waipahu (6 deaths, 113 injuries). By contrast, in the more affluent neighborhoods of East Honolulu, Kahala/Waiālae residents experienced only 3 deaths and 28 injuries, while those in Hawai'i Kai saw no deaths and only 21 pedestrian injuries. This is not a slight difference—pedestrians in Kalihi, Waianae, and Waipahu assume a 4 to 8 times higher risk of being injured or killed by a car when walking in their neighborhoods than do pedestrians in East Honolulu or Kailua. Clearly, in order to act on recommendations to increase walking and active transportation, people living in Kalihi-Palama, Waipahu, and Waianae need concentrated, coordinated efforts to improve their neighborhood's safety for walkability and bikeability.

An examination of grocery store, farmers' market, and public

transportation shows that residents of the Puna and Waianae areas experience disparities in terms of access to bus transportation, grocery stores, and other sources of healthy food, while residents of lower-income urban Honolulu areas have greater environmental access to fast-food outlets and convenience stores than do residents in upper-income neighborhoods like Kahala or Hawai'i Kai.²¹ Parks in low-income Honolulu neighborhoods are significantly less-used than parks in middle- and upper-income neighborhoods, reflecting differences in facilities, safety, and access concerns between neighborhoods that contribute to differences in physical activity rates in these communities.²²

Adopting a healthy lifestyle can be challenging for any household, but for low-income families, making “the healthy choice” can require more time, resources, and skills than are readily available.²³ In addition to environmental constraints, low-income parents often have less time, more responsibilities, and more life stressors and time conflicts than middle- or higher-income parents.²⁴ Access to healthy food is more limited in low-income communities, and the cost of fruits and vegetables is a substantial barrier for those with limited resources.²⁵

While substantial attention has been paid to disparities between ethnic populations, age groups, and island or county of residence in Hawai'i, data on poverty-related disparities have been less well-documented. Data that would allow policy-makers or program planners to examine disparities in health behaviors between upper- and lower-income groups within geographic communities, ethnic groups, age groups, or genders is not easily accessible. There is no population data within the state that can be used to identify poverty-related disparities in obesity, physical activity or nutrition behavior among children or youth. There is an old adage in evaluation: “What gets measured, gets done.” I would propose a corollary—a gap that is invisible tends to be overlooked.

Conclusion

Patterns of change in obesity-related behaviors in the Hawai'i BRFSS suggest that disparities may be increasing between low-income and moderate/high-income Hawai'i residents. Further research is needed in this area. At present, federal poverty level cannot be determined for nearly half (43.1%) of the 2012 Hawai'i BRFSS participants, due to missing data on household size or income (Tonya Lowery St. John, email communication, September 2014). Clearly, we cannot assume that campaigns, programs, and policy/environmental interventions aimed at improving obesity outcomes in the general population are benefitting low-income households, unless these interventions include components that address the specific needs and barriers within low-income communities. The additional barriers and needs of low-income households should not be relegated to a subset of “low-income” projects, but rather need to be integrated into the planning of physical activity and nutrition campaigns overall. The first element, however, is awareness—recognition of poverty as not just a demographic variable, but as a driving force in health disparities, and awareness of the potential for an emerging gap in physical activity and nutrition outcomes between lower-income Hawai'i residents and the rest of our

state. We cannot progress, either as a state or as a nation, towards reaching the Healthy People 2020 goals if our obesity-prevention efforts are not reaching those most at-risk for lifestyle-related chronic disease, disability, and death.

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The Vital Role of Cancer Registries in the Recruitment of an Understudied Minority Population into a Breast Cancer Study: Breast Cancer Risk Model for the Pacific

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Background

Breast cancer is the leading cause of cancer-related death among women in the Mariana Islands;¹ and women of the Mariana Islands, especially the indigenous Chamorros, have a higher mortality rate for breast cancer compared to women in the US Mainland.¹ Filipinos, the other predominant ethnic group in the Mariana Islands, have low age-adjusted incidence and mortality rates for breast cancer.² The BRISK study is the first epidemiologic study conducted on Guam and the Commonwealth of the Northern Marianas (CNMI) to study breast cancer risk factors. It is also the first study to use the newly developing cancer registries on Guam and CNMI to recruit cancer patients.

The recruitment of diverse, under-represented populations into cancer studies remains a challenge.³ Therefore, many scientific findings cannot be generalized to different populations. One such example is the Gail Model, which provides a probability of a breast cancer diagnosis based on known risk factors. The Gail Model was derived from US female breast cancer incidence rates and odds ratios from a case-control study among White women.⁴ Later it was found not to be as predictive in African American women as in White women, and an updated model (the CARE Model) was developed for this group. The Gail model, however, has not been tested for Pacific populations including Chamorro and Filipina women. The Breast Cancer Risk Model for the Pacific (BRISK) project seeks to address this knowledge gap by developing a model of breast cancer risk among Asian-Pacific Islanders living in the Mariana Islands. The purpose of this paper is to describe and discuss the experience of recruiting to the BRISK project.

BRISK Study Design

The BRISK Project is a retrospective breast cancer case-control study of women who were living in Guam and the Commonwealth of the Northern Mariana Islands (CNMI), especially Saipan. The study was conducted by researchers at the University of Guam (UOG) and the University of Hawai'i Cancer Center

(UHCC) as part of the NCI funded partnership between these universities. The study was approved by Institutional Review Boards at both institutions.

Recruitment required identification of breast cancer survivors (cases), and other women of similar age and ethnicity (controls) who were willing to participate. Breast cancer cases were identified through the Guam Cancer Registry, CNMI Department of Public Health, and health clinics on Guam. Study eligibility criteria for cases were: (1) newly diagnosed with primary, invasive breast cancer (ICD-O3 code of C500-C509) between 2009 and 2012; (2) no prior history of cancer (other than skin cancer); (3) resident of Guam or CNMI for at least 5 years; and (4) able to consent to the study.

Recruitment of Breast Cancer Cases from Registries

In 2010, the BRISK research staff and the Guam Cancer Registry (GCR) staff established a process for referring local breast cancer survivors to the BRISK study. It was agreed that GCR would provide a list of patients from specific clinics to BRISK research staff with the necessary contact information; the staff then would request permission from clinic doctors to contact the patients. Hawai'i Tumor Registry (HTR) staff assisted the GCR in establishing Rapid Case Ascertainment (RCA), a method cancer registries have used to readily respond to the data needs of researchers. The normally lengthy process (several months to a year) involved in identifying and abstracting cancer cases is mitigated by RCA.

"The goal of rapid case ascertainment is to support and facilitate epidemiological and clinical research by providing the rapid identification of cases eligible for studies requiring case identification shortly after diagnosis. ... Rapid case identification is achieved in one of two ways; central registry personnel travelling into the field to collect cases for specific studies, or automated reporting of filtered pathology reports directly to the central registry."⁵

The breast cancer cases in CNMI were initially identified through the CNMI Cancer Registry, which had just been established. At that time, the CNMI Cancer Registry had one staff member who gave the BRISK team a listing of breast cancer cases. However, this list had not been validated and cross-checked and there were many mis-classifications of diagnoses. The BRISK team, in partnership with the CNMI Department of Public Health, conducted chart review and validation to identify actual breast cancer cases. This corrected list of breast cancer cases was then shared with the CNMI Cancer Registry. This process yielded 15 breast cancer cases. The BRISK team then turned to their partners at the Hawai'i Tumor Registry, who helped identify an additional 10 breast cancer cases in the CNMI. Once identified, women with breast cancer were approached individually to participate.

Other Recruitment Strategies

The BRISK staff used several strategies to increase the visibility of the study, in order to improve enrollment of both cases and controls. The BRISK teams frequented health clinics and family practice physicians to encourage women to participate. Additional strategies for recruitment included: (a) face-to-face contact with women (eg, presentations at local breast cancer organizations, social functions, and support groups); (b) printed media at selected work sites (eg, flyers and posters); and (c) broadcast mass media (television). The team also encouraged women to tell friends and family members about the study. Project staff participated in local community outreach events to promote the study and to support other local agencies in their cancer prevention efforts. Events included 5K-runs, Worksite wellness programs, American Cancer Society workshops, and government-sponsored community health fairs. When attending local outreach events, project staff typically set up a display table, which showcased information about the BRISK study and other cancer prevention information. Staff members were available to answer questions from potentially interested study participants. On average, project staff participated in local community outreach events every month during the recruitment phase.

In 2011, the BRISK team developed a video to be used on broadcast mass media (television) to increase awareness and promote participation in the project. The short 30-second video was developed by a professional videographer from Guam. A local woman who was a well-known cancer survivor on Guam and her daughter volunteered to appear in the video. The video appeared on three different cable television channels as a "commercial" in both Guam and Saipan during three separate months throughout the recruitment period. The commercial was aired a total of 150 times, 75 times on Guam and 75 times on Saipan. In April 2012, the video was shown again in Guam as a "commercial" for another 50 showings, and then again for three weeks in November 2012 (45 showings) to help increase participant numbers in the final months of the recruitment phase of the BRISK study. The video commercial was shown on Guam for a total of 170 times.

Recruitment Components

Once a willing and eligible woman was identified as a potential participant, a study package including an introduction letter, the consent form, an informational flyer, and other relevant study materials was mailed to her. A trained interviewer then called the potential participant to further assess eligibility and schedule an appointment for interview. During the face-to-face interview, which took approximately 90 minutes, participants were asked to complete a questionnaire with questions on demographics, personal and family history of selected diseases and conditions (including some cancers), smoking, tobacco and betel nut use, menstrual and reproductive histories, use of hormones, recreational physical activity in various life periods, alcohol consumption in various life periods, weight history, and dietary intake during the past year evaluated by the Marianas Food Frequency Questionnaire.⁶ Weight, height, sitting height, and waist circumference were measured by standardized anthropometrists. After participants completed the interview, in Guam they received a \$50 gift certificate to a local grocery store as compensation for their time and effort; whereas in CNMI participants received a \$50 gift certificate for gasoline.

Recruited BRISK Study Population

Recruited study participants included 108 breast cancer cases and 185 controls between the ages of 27-80 years of age; 87 breast cancer cases were recruited from Guam and 21 from CNMI between November 2010 and April 2013. Guam breast cancer cases were recruited primarily through the Guam Cancer Registry, as shown in Figure 1. Ninety-one percent (91%) of the Guam breast cancer case pool was identified through the Guam Cancer Registry, and were contacted by a study staff member. The additional 9% of Guam breast cancer cases were recruited after they contacted the study staff in response to recruitment materials. Of the 198 names given to the BRISK project staff by the Guam Cancer Registry, six were deceased, 22 were ineligible (had a different cancer), and four cases did not have a mailing address or other contact information. A total of 166 recruitment letters were mailed out, and 162 were followed-up by phone call; the remaining four could not be reached. Of these, 28 women (17%) declined, 65 women (40%) were unavailable due to scheduling conflicts, lack of transportation, family issues, or off-island travel. Ultimately, a total of 69 cases (43%) identified through the Guam Cancer Registry were recruited into the BRISK project.

CNMI breast cancer case participants were recruited through the CNMI Department of Public Health utilizing the cancer prevention and control programs and to some extent the CNMI Cancer Registry. Of the 41 confirmed breast cancer cases identified in the CNMI, 15 were identified directly through the CNMI Cancer Registry, 16 were identified by the CNMI Department of Health, and ten were identified through the Hawai'i Tumor Registry. A detailed listing recruitment numbers for breast cancer cases in the CNMI is shown in Figure 2. Ultimately, eight cases that were provided by the CNMI Cancer Registry were recruited into the BRISK project (50% of the 15 identified cases and 38%

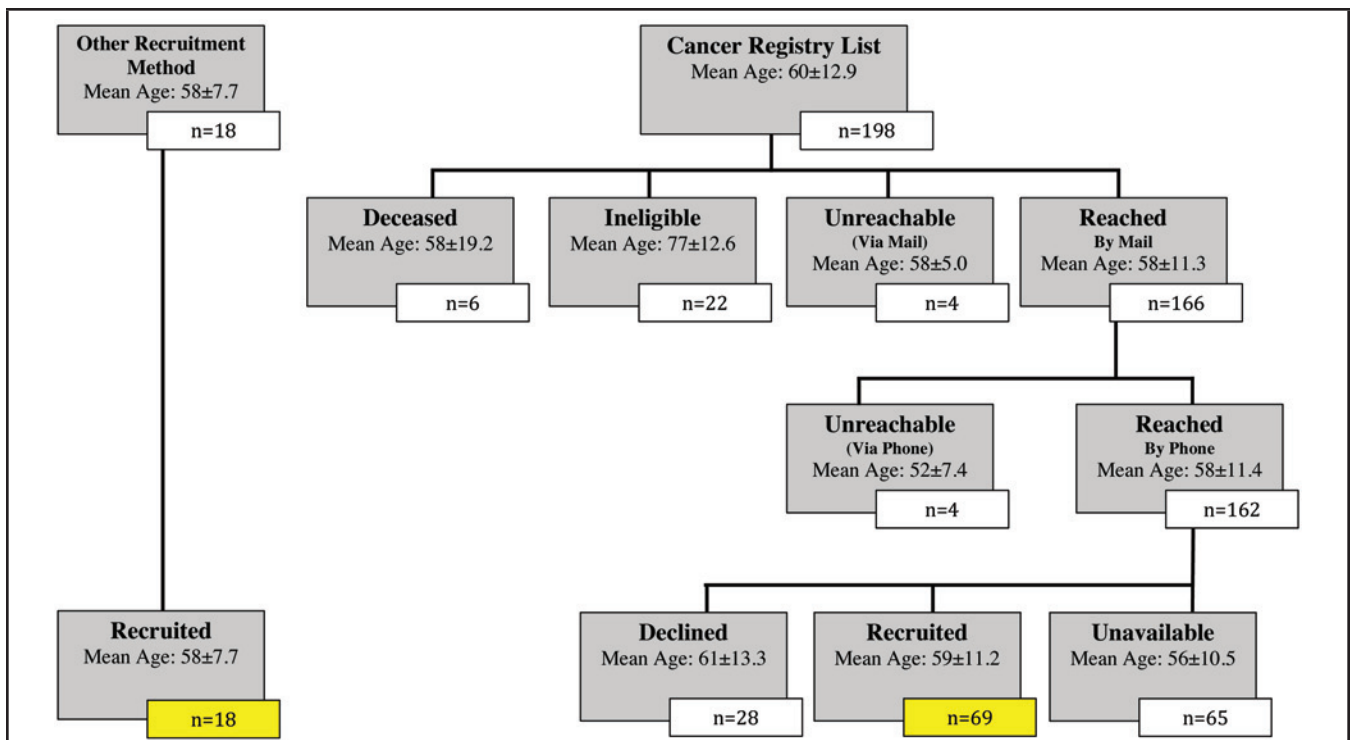


Figure 1. Breast Cancer Case Recruitment Process and Mean Age of Participants for the BRISK Project (n=87) from Guam Cancer Registry and Other Recruitment Methods in Guam.

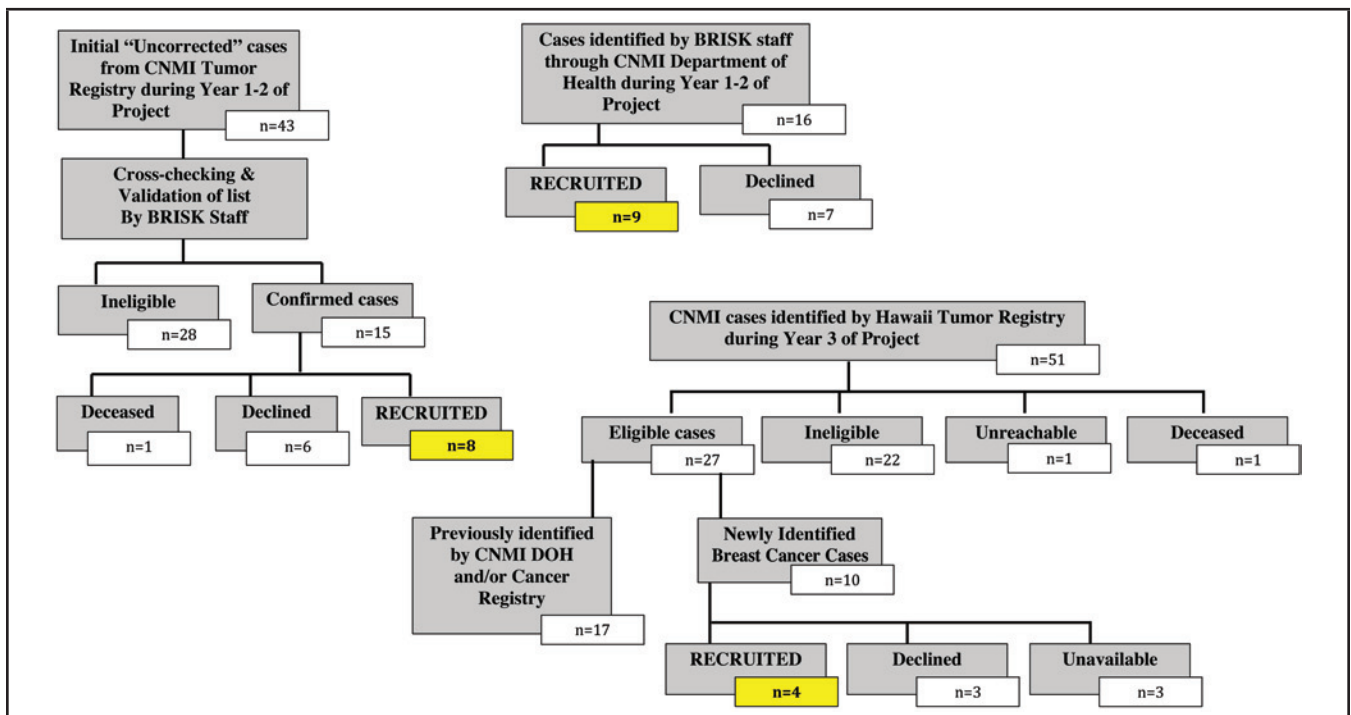


Figure 2. Breast Cancer Case Recruitment Process for the BRISK Project (n=21) from CNMI Cancer Registry and Other Recruitment Methods in CNMI.

of the total 21 recruited). The remaining CNMI breast cancer case participants were identified from other sources such as the Hawai'i Tumor Registry and CNMI Department of Health.

Recruitment Success and Challenges

Achieving the recruitment goal for the overall BRISK project was more challenging than anticipated. The recruitment process lasted three years (October 2010- August 2013) before reaching the project's required sample size. Barriers for participants related to a fairly limited cancer pool, partly due to mortality, sociocultural factors, and, most critically, that the study was dependent on a newly developing cancer registry with limited staff and research experience. As the cancer registries became more mature, the recruitment of breast cancer cases became more successful and efficient.

The BRISK research staff observed that potential participants declined participation because they faced personal barriers such as feeling overwhelmed with their diagnosis. The staff observed that breast cancer cases were more likely to participate in the BRISK project if they had completed their treatment.

Balogun and colleagues⁷ found that when trying to recruit cancer cases into a research study, participants often felt too unwell, they wanted to focus only on their treatment, or they had insufficient time because of conflicting medical appointments. To overcome this barrier, the staff performed interviews at the participants' home or clinic, or went to community senior centers. Balogun and colleagues also found that it was easier to recruit healthy volunteers and patients with completed treatment than newly diagnosed patients.

The sociocultural barriers such as participant mistrust of research and cultural shame associated with having breast cancer may have added to the challenges of recruitment into the present study, especially since this type of research was new on Guam and Saipan. Sociocultural barriers seen in minority participants from other research studies have included family and work responsibilities, language barriers, fear of adverse effects, lack of interest, and suspicion of research motives.⁸ Fear or shame of telling loved ones about their breast cancer diagnosis or treatment has been seen in several studies conducted among Latin American women.^{9,10} The women who did participate in BRISK may have overcome sociocultural barriers with a desire to know more about the disease and by wanting to help future generations. This was found by Pal and colleagues,¹¹ where minority women were willing to be in a breast cancer study because they had a desire to understand more about the risk of cancer for family members.

Recruitment of cases through health clinics proved to be a less effective strategy. Key recruitment challenges were identifying clinics willing to participate in recruitment, as well as coordination with administrative staff in busy clinics where recruitment for research is not a priority.¹² Participating health centers could have yielded low recruitment rates for many reasons, including that busy providers may have forgotten to mention the study to their patients, patients may have had low retention of the study information from physicians, and the study's long-term

benefits may not have seemed to out-weigh the difficulties of participation (time and effort), especially for those newly diagnosed or undergoing cancer treatment.¹⁰ A recruitment strategy with better "buy-in" from cancer clinics and physicians might have yielded higher success rates. However, Beskow and colleagues¹³ reported that participants in their study preferred to be contacted directly from the cancer registry rather than having a physician referral. Thus, encouragement and "buy-in" from cancer clinics and physicians are not always the best strategies to recruit cancer cases for research projects.

Vital Role of a Cancer registry in Cancer Research Recruitment

The Guam Cancer Registry (GCR) is a population-based registry that is tasked with recording all cancer cases occurring among residents of Guam. The Registry began in 1998 as one of many duties of the Territorial Epidemiologist.¹ At that time the main sources of data on cancer were death certificates on file at the Office of Vital Statistics, Department of Public Health and Social Services (DPHSS). In 2004 the GCR became a unit of the Cancer Research Center of Guam (CRCG), which was established as a joint venture of the University of Guam, the Guam DPHSS, and the University of Hawai'i Cancer Center. With funding provided by the National Cancer Institute¹, the GCR was able to hire a full-time data collection specialist. This greatly improved the ability of the GCR to collect more accurate and complete information regarding Guam cancer cases. In recognition of its progress, in 2006 the GCR was awarded full-member status in the North American Association of Central Cancer Registries (NAACCR).

The GCR is also a member of the US Affiliated Pacific Island (USPI) Pacific Regional Central Cancer Registry (PRCCR). PRCCR was initiated in 2003 in response to the lack of systematic and accurate collection of cancer data in the Pacific region. There are ten USPI jurisdictions in PRCCR, including Hawai'i, Guam, and CNMI. The Hawai'i Tumor Registry acts as a hub for PRCCR. Cancer data is collected by PRCCR from all US-Affiliated Pacific Island (USAPI) jurisdictions, and has a data-sharing agreement between these island registries. Abstracts are regularly submitted by GCR to PRCCR, which edits the data and then submits it to the Centers for Disease Control (CDC) in Atlanta. When the Guam Cancer Registry identifies cases that are residents of other jurisdictions, such as CNMI, GCR staff collect and transmit information on those cases to the appropriate registry. Information is hand-delivered during group trainings, securely mailed, or sent using WebPlus (a secure online program). Hawai'i Tumor Registry staff sometimes assist in this process, when using WebPlus. For example, cases are uploaded, on behalf of CNMI, to the Hawai'i Tumor Registry via WebPlus, and downloaded via WebPlus to CNMI. Also, GCR interacts through teleconference calls for training activities. Registrars in the various USPI jurisdictions consult with each other by phone, through Skype, or online for information or assistance.

Through mentoring by the Hawai'i Tumor Registry, the GCR continues to improve the accuracy, completeness, and timeliness of its cancer data in order to meet the exacting standards set by the NAACCR and the National Cancer Institute/Surveillance & Epidemiological End Results (NCI/SEER) research programs. Achievement of these objectives continues to be important because the GCR is a resource for health planners and the ongoing effort of the University of Guam to develop excellence in the fields of health education and research. Public Law 30-80, enacted in October 2010, increased tobacco taxes and established a dedicated source of local funding for GCR by giving it 1% of tobacco taxes collected annually through the Healthy Futures Fund. It also expanded mandatory cancer reporting to include non-medical entities such as insurance companies.

Thus, the Guam Cancer Registry (GCR) played a vital role in recruiting cases for the BRISK study despite initial challenges. Some of these challenges included an understaffed registry, lack of experience in recruiting subjects for cancer research, and competing priorities for GCR staff. Unlike most cancer registries in the US mainland, GCR performs the functions of both a hospital and central cancer registry. These functions include case-finding, abstracting, editing, and case consolidation of all new cancer cases for Guam residents.

Obtaining timely data from GCR was problematic in the early stages of the BRISK study, due to limited staff and a backlog of cases. The CNMI Cancer Registry was in its infancy stage during the initiation of the BRISK Project. The CNMI Cancer Registry was one of the last cancer registries organized of all the Pacific Island jurisdictions participating in PRCCR, and experienced difficulty with personnel retention and training as well as data reliability in identification of cases. Finding valid addresses for the breast cancer cases was difficult at times since registry data varied in quality and completeness. As time progressed, additional registry staff were recruited and trained, and new policies and procedures were put in place to facilitate quicker information exchange. The BRISK Project, as with many other studies, demonstrated that registry-based recruitment was very successful, much more so than community-based recruitment.¹³⁻²⁰

The Cancer Registries were critical to successful recruitment of breast cancer survivors to BRISK. Registries have been found vital by providing unbiased identification of breast cancer cases in other studies as well.^{13,14} As the Registries continue to evolve with more complete and timely information, future research recruitment will become easier. Timely contact information for cases is critical to breast cancer research. At the same time, the establishment of a breast cancer research study was also helpful to development of the registry, by recognizing the type of data and the timing of communicating that data needed for success.

Conclusions

Development and use of two new cancer registries was critical to recruit breast cancer cases for research in this underserved minority population. In a population where breast cancer re-

search is new and unfamiliar, it takes time to develop cultural acceptability and registry processes for breast cancer research, even when researchers are from the local native culture. Development and maintenance of tumor registries for underserved populations is vital to the ability to conduct breast cancer research to serve them.

Conflict of Interest

None of the authors identify a conflict of interest.

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Biostatistical Guideline for HJM&PH

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



HERE'S A PAL YOU DON'T REALLY NEED.

As if there weren't already sufficient avenues for booze consumption, now Palcohol is coming on the scene. Powdered crystals of ethanol can be attached to carbohydrates and marketed in packets for mixing in liquids. The Alcohol Tax and Trade Bureau approved the compound but later Tom Hogue, a spokesman for the Bureau, notified the Associated Press that was an error. A large cocktail of criticism followed the approval with Senator Charles Schumer of New York demanding an immediate ban. That is not likely since there will be widespread ways to use the product other than human consumption, eg, fuels, and sterilizing agents. So it will not be appearing soon on liquor shelves, but the product will eventually be available. Initially, Palcohol is planning to offer 6 varieties: rum, vodka, and four cocktails — Mojito, Powderita, Lemon Drop and Cosmopolitan. A bag will weigh about an ounce and can easily be slipped into a pocket. Snorting is not recommended because the compound will burn the mucus membrane and is slow to be absorbed. Isn't modern science wonderful?

THE PEN IS MIGHTIER THAN THE CANON.

Johns Hopkins Health System will pay out millions for secret photos taken by a gynecologist on their staff. A co-worker reported that the 54-year-old doctor was wearing a device around his neck that resembled a pen while performing pelvic examinations. The doctor was using a pen-like camera to snap photos of patients, the health system reported. A security employee found similar pens around the doctor's office and on the doctor himself. The doctor was fired. Law-enforcement officials searched his home and found "an extraordinary amount of" images of patients stored on his home server. The images included 60 minors. Investigators found no evidence that any images were shared. No criminal charges were filed against the physician, who committed suicide during the investigation. A class-action lawsuit was brought against Johns Hopkins Health System alleging improper supervision of the physician. Plaintiffs include between 7,000 and 8,000 women. Johns Hopkins settled the suit for \$190 million.

HE BROUGHT LIGHT TO A WORLD OF DARKNESS.

Born in 1809 Luis Braille became blind at age three as a result of a knife injury to one eye, followed by presumed sympathetic ophthalmia to the fellow orb. At age ten he was enrolled in the Haury Institute for Blind Youth where he learned a form of tactile writing. Captain Charles Barbier developed a system of raised dots for battlefield soldiers to communicate in the dark. It proved too complicated for Braille, but he recognized its potential. He devised another method of raised dots and at age twenty, published his "Method of Writing Words, Music and Plain Song by Means of Dots for Use by the Blind." He taught his fellow blind students who quickly recognized the genius of their schoolmate. Initially, the authorities did not share the students' enthusiasm, and tried to destroy all books and writing equipment. The students were horrified. A staff assistant recognized the value of the Braille system and pointed out the benefit to the school and the administrators. They changed their minds. Braille died in 1852 an unsung hero. He did not live to see the *Universal Congress for the Improvement of the Lot of the Blind and Deaf-Mutes* accepted as the international system of reading and writing for the blind in 1878.

WE DON'T NEED ANOTHER WINDMILL FARM.

Owen Patterson was recently replaced as the British secretary of state for environment, food, and rural affairs. He left the post with great misgivings about the power and irresponsibility of the "Green Blob." That was his phrase referring to the mutually supportive network of environmental pressure groups, renewable energy companies, and public officials. They keep each other well supplied with funds, scare

stories, and green tape. This triangle of unelected busybodies claims to have the interest of the planet at heart, but focus on the wrong issues. The same triumvirate exists in the United States and does real harm while profiting handsomely. Conservationists in the field do wonderful work to protect and improve wild landscapes, as do farmers, rural businesses, and ordinary citizens. They are a world away from the highly paid globe-trotters of the Green Blob with their self-serving demands many of which harm the natural environment.

WOULD LEONARDO HAVE BEEN PROUD?

The research team at Sloan-Kettering Cancer Center in New York was surprised to learn that bladder cancer surgery with the Da Vinci robotic device was not superior to open operations. With a randomly assigned group of 118 patients, surgical complications and length of stay following surgery were not significantly improved. The report was peer reviewed, a spokeswoman said. Patient enrollment was stopped early after an interim analysis showed there was no benefit in favor of robotic surgery. The average cost per procedure with Da Vinci was \$16,250, 11.2% more than open surgery cost of \$14,010. Urologist Bernard H. Boehner, co-author of the study said, "If we do studies and it doesn't provide a benefit, the costs and benefits need to be questioned." Add on the hospital equipment cost of about \$2 million, and one can see why administrators with tight budgets are reluctant to buy Da Vinci. Still, it is great technical art.

I'M VERY DEPRESSED. IS THIS DIAL-A-PRAYER?

The Minnesota Supreme Court ruled that encouraging someone to commit suicide is not a crime. William Francis Melchert-Dinkel posed online as a depressed suicidal female nurse building bonds with others who were considering death. He urged Mark Drybrough in England and Ottawa native Nadia Kajouji to hang themselves while he watched on webcam. Drybrough, age 32, hanged himself in his bedroom. Ms. Kajouji, 19, leaped off a bridge to her death. Rice County District Attorney prosecuted the case. Melchert-Dinkel was found guilty under a law that made it illegal to "advise, encourage or assist" in a suicide. On appeal the court rejected the argument that his words went beyond free speech, and said encouraging someone to commit suicide is not a crime.

SHE IS A FIRST CLASS MOOOOTHER.

Amelia Boomker, age 37, of Bollingbrook, Illinois, was accepted into the Guinness Book of World Records. Her fame was earned by her donation of 127 gallons of her own breast milk from 2008 to 2013 to critically needy infants all over the midwest. She also nursed her four sons, three during the donation period, while she was giving to the Indiana Mother's Milk Bank. Here's a lady with truly great jugs.

ADDENDA

- First plant to be genetically engineered was the tomato in 1982. By 2013, 169 million acres of US farmland were planted with genetically engineered corn, soybeans and cotton.
- BUFF is the Air Force acronym, Big Ugly Fat Fellow, slang for the B-52 (I think they cleaned it up a little).
- Impotence is grounds for divorce in 24 US states (Bring on the Viagra).
- The Chinese were the first to use a decimal system in the 6th century B.C.
- When you get older your body gets more fragile. I injured myself playing Scrabble.
- She once had an hourglass figure. Now it's more like an hour-and-a-half.
- He put French doors in his bedroom. They don't open unless you lick them.
- Kilometers are shorter than miles. Save gas; on your next trip use kilometers.

ALOHA AND KEEP THE FAITH *rt*

(Editorial comment is strictly that of the writer.)



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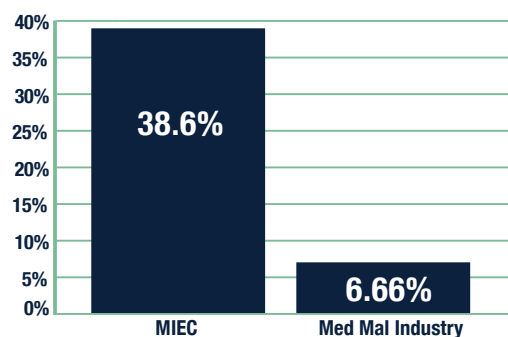
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