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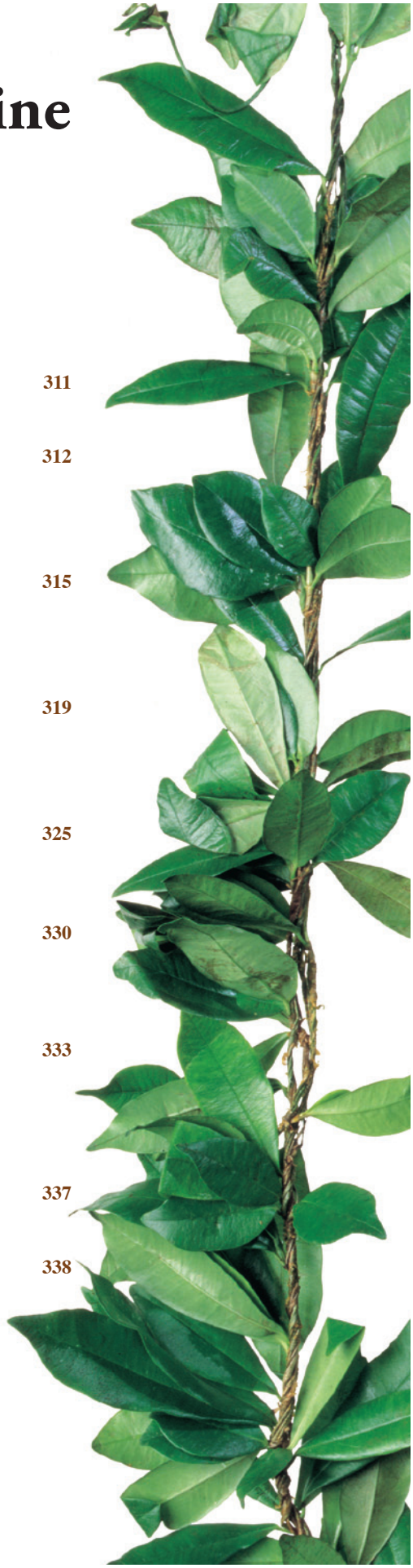

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LETTER TO THE EDITOR

Are Rapid Influenza Antigen Tests Still Clinically Useful in Today's Molecular Diagnostics World?
Valentina K. Trombetta; Yvonne L. Chan PhD; and Matthew J. Bankowski PhD, MS, D(ABMM), HCLD/CC(ABB)
Hawaii J Med Public Health. 2018;77(9):226-230.

Dear Editor,

We read with interest the report by Trombetta, Chan, and Bankowski (Hawaii J Med Public Health, 2018) and were surprised by the poor test sensitivity of the BD Directigen and BD Veritor tests for influenza virus A and B. Poor sensitivity of first generation RIDT assays such as BD Directigen is well-recognized, which is why in January 2017 the FDA reclassified the RIDTs and removed BD Directigen and similar assays from the market. In contrast, the FDA found the BD Veritor tests to be accurate and reliable. This was confirmed by the meta-analysis of rapid tests for influenza reported by Merckx, et al, (Annals Intern Med, 2017). They reported the sensitivity and specificity of the BD Veritor test was 83.0% and 80.0%, respectively. In contrast, Trombetta, et al, reported the BD Veritor sensitivity calculated on a monthly basis was 0 to 15.7% for influenza A virus and 0 to 33.3% for influenza B virus. However, these calculations are flawed because analytical performance was only calculated on specimens where both RIDT tests and nucleic acid amplification tests (NAATs) were ordered. Because RIDT tests are used primarily as screening tests, NAATs would be ordered primarily on negative RIDT tests. An accurate calculation of analytical performance would require both RIDT and NAAT tests to be ordered on all specimens. We request that our letter to the Editor be published and any response from the author.

Best Regards,

Courtney Jackson PhD, Manager, Point-of-Care, Becton Dickinson
Patrick Murray PhD, Senior Director of Scientific Affairs, Becton Dickinson

AUTHORS' RESPONSE TO THE LETTER TO THE EDITOR

Dear Editor,

We have read the comments in a letter addressing our September 2018 publication in HJMPH (Vol 77, pages 226-230) and are providing a response. We want to emphasize that the report was a retrospective study of a specific population (ie, Hawai'i) designed to evaluate the "real life" clinical (not analytical) performance of the flu antigen test compared to NAAT when both tests were freely ordered. This study is not a challenge of the analytical test performance for the antigen test in use. Furthermore, we have not chosen specific specimens or assigned any specific site(s) to enroll patients to be a part of a study. All testing was evaluated retrospectively over three flu seasons and the specimens included in the study consisted of those in their entirety where the provider initially tested with the antigen test and either added on or reflexed to NAAT. Since both the antigen and NAAT ("gold standard") were necessary to calculate clinical test performance, those HCP's ordering only antigen or only NAAT would not be included in the calculations. Furthermore, Table 1 is not a meta-analysis and only represents reports in the literature showing an overview of the poor test performance of the flu antigen assays, which is the point of this retrospective study. Likewise, Table 2 represents the actual "real-life" clinical performance when both tests were unbiasedly ordered and tested by our laboratory. The overall performance of the antigen test during the 2012-2015 seasons included all Ag+PCR+, Ag+PCR-, Ag-PCR+ and Ag-PCR- categories for a total of 5796 specimens. This revealed a sensitivity and specificity for influenza type A and B antigen testing of 9.0%/99.8% and 13.8%/100% respectively. Lastly, as stated in our study limitations, other factors could contribute to this poor antigen test performance. (eg, circulating subtypes in Hawai'i). We respectfully disagree with the implication of bias inherent within the data as stated by Dr. Courtney Jackson and Dr. Patrick Murray (Becton Dickenson) in their September 28, 2018 letter.

Respectfully submitted by,

Matthew J. Bankowski PhD, Yvonne L. Chan PhD, and Valentina K. Trombetta

High Resource Utilization of Psychiatric Emergency Services by Methamphetamine Users

Brian R. Schultz MD, PhD; Brett Y. Lu MD, PhD; Jane M. Onoye PhD; and Tara P. Toohey MD

Abstract

Methamphetamine use has increased throughout the United States in recent years, and is historically prevalent in Hawai'i. This retrospective study aimed to determine the effect of methamphetamine use on emergency department (ED) resources, by examining visits to an emergency department (ED) in an urban hospital in Hawai'i from 2007 – 2011. The rate of patients who tested positive for amphetamine was measured and broken down by year. Primary outcomes included length of ED stay, the administration of medication or physical restraints for safety, and the rate of psychiatric hospitalization. Overall, 15.1% of drug-screened patients (N = 16,018) tested positive for amphetamines over the study period. Amphetamine-positive patients spent more time per visit on average in the ED, and were more likely to require medication and physical restraints, compared to amphetamine-negative patients. Amphetamine positive patients were admitted to inpatient psychiatry less frequently than negative-testing patients. In summary, there is higher resource utilization per psychiatric emergency service visit by amphetamine-positive patients; however if patients can be stabilized in the ED, the increased ED resources utilized may be offset by the reduced burden on inpatient facilities.

Keywords

amphetamine; methamphetamine; emergency services, psychiatric; substance-related disorders

Introduction

Illicit methamphetamine use has waxed and waned worldwide since post-World War II years, particularly in the United States (US) beginning in the 1960s.[1] Use in the mainland US was initially concentrated in the West Coast, but a surge in use occurred in Hawai'i in the 1980s, with the availability of d-methamphetamine hydrochloride ("ice") from Far East sources.[1] Use increased and moved eastward across the US beginning in the late 1990s, began to decrease in 2008, but increased again in subsequent years.[2]

Relatively few studies have examined the impact of methamphetamine use on the utilization of psychiatric emergency services (PES). Studies thus far have shown significant utilization of resources in psychiatric and general emergency departments (EDs) by amphetamine-using patients, who were often found to be more agitated or experiencing psychosis.[3-12] A 1990 study in Hawai'i showed that over 90% of methamphetamine-using patients seen in a PES in Honolulu required psychiatric hospitalization.[13]

In recent years, physicians have anecdotally encountered an increased rate of acutely intoxicated, often psychotic or violent patients in the study institution's PES in Hawai'i. The study team hypothesized that methamphetamine use is related to an increased use of psychiatric emergency resources. This study analyzed the utilization of services by patients seen in an urban PES in Hawai'i from 2007 – 2011, to examine the demand for resources by amphetamine-using patients compared to other patients. No known previous reports have been identified that studied this topic over such a length of time or included as many amphetamine-related cases.

Methods

The study team performed a retrospective chart review from a high-volume ED in urban Hawai'i, encompassing a PES. The project received Institutional Review Board approval from the study institution. The charts reviewed, from 2007 – 2011 inclusively, included patients who were triaged directly to the PES and those who were evaluated in the general ED but subsequently required a psychiatric consult (N = 22,124). Only those patients receiving urine toxicology screening (72.4%, n = 16,018) were included in the analyses. Of note, the urine toxicology screen did not distinguish between methamphetamine and other amphetamines, including prescription amphetamines. Outcome measures taken from medical records included the results of the urine toxicology screen, the length of stay in the emergency department in minutes, the use of physical restraints, the use of intramuscular injection of psychotropic medications, and whether the patient was admitted to the psychiatric inpatient unit. T tests were performed to compare amphetamine positive and amphetamine negative groups on age and length of stay. Chi square analyses were conducted to compare amphetamine screen by year, gender, and for the outcomes of use of intramuscular injection, physical restraint, and psychiatric admission. A linear regression was calculated to predict the primary outcome of length of stay based on amphetamine screen, controlling for age and gender. All statistical analyses were performed using SPSS software (IBM SPSS Statistics, version 24, Chicago, IL).

Results

Of the 16,018 patients receiving a urine toxicology screen during 2007-2011, 2,414 (15.1%) tested positive for amphetamines (amp^+) (Table 1). Both the percentage and the absolute number of amp^+ patients significantly increased over time ($\chi^2(4) = 74.986$, $P < .001$), with the highest percentage and absolute number of amp^+ patients seen in 2011 (19.1%, or 678 amp^+ patients that year) (Table 1). Amp^+ patients were more likely to be younger on average (amp^+: 36.9 years old, amp^-: 38.9 years old, $t(16016) = 5.71$, $P < .001$) than amp^- patients, and were more likely to be male (15.9% of all males vs 13.9% of all females; $\chi^2(1) = 13.063$, $P < .001$).

The mean length of stay in the ED was longer for amp^+ patients compared to amp^- patients: 548 minutes (median 465

Table 1. Yearly Trends of the Percentage of Patients Screened Who Tested Positive for Amphetamine												
	2007 (n = 2,927)		2008 (n = 3,037)		2009 (n = 3,152)		2010 (n = 3,351)		2011 (n = 3,551)		Total (N = 16,018)	
	n	%	n	%	n	%	n	%	n	%	N	%
Amphetamine +	385	13.2	366	12.1	475	15.1	510	15.2	678	19.1	2414	15.1
Amphetamine -	2542	86.8	2671	87.9	2677	84.9	2841	84.8	2873	80.9	13604	84.9

$P < .001$ for overall trend.

min) vs 450 minutes (median 369 min), respectively ($t(16016) = -14.11$, $P < .001$). Compared to amp$^-$ patients, amp$^+$ patients received intramuscular (IM) medication more often (17.1% of amp$^+$ vs 11.4% of amp$^-$, $\chi^2(1) = 62.83$, $P < .001$) and required physical restraints more often (4.6% of amp$^+$ vs 3.4% of amp$^-$, $\chi^2(1) = 8.47$, $P < .01$). Regarding disposition, amp$^+$ patients underwent less psychiatric hospitalization (19.0% amp$^+$ vs 37.0% amp$^-$, $\chi^2(1) = 294.46$, $P < .001$).

Further linear regression analyses controlling for the effects of gender and age revealed the same significant findings: amp$^+$ patients had longer length of stay (+102 min, $F(3, 16014) = 144.625$, $P < .001$, R^2 of .026).

Discussion

The primary goal of this study was to determine the effect of methamphetamine use on emergency department resources. Due to the limitation in the toxicology screening that was available, amphetamine-positive screens were used as a proxy for methamphetamine use.

The length of stay in the ED averaged over 90 minutes longer for amp$^+$ patients compared to amp$^-$ patients. Other studies have similarly found amphetamine users spending more time in the emergency room compared to other patients.[5,7] The length of stay may partially reflect the acuity of the patients, which is also reflected in the higher rate of intramuscular injection and physical restraints utilized in the treatment of the amp$^+$ patients. Pasic, et al, reported similar findings of a higher rate of medication administration in the PES for methamphetamine patients.[7] However, the length of stay in the ED may also be related to decisions regarding psychiatric hospital admission.

The national rate of hospital admission (all types) for methamphetamine ED presentations in 2011 was 16%.[2] Other recent US studies have found no significant difference in admission rates between users and non-users of methamphetamine.[7,8] Of note, these recent results differ significantly from those of a small 1990 study in Hawai'i in which 93% of patients presenting with methamphetamine-induced organic mental disorders were admitted to the psychiatric ward.[13] Although the current study detects amphetamine exposure in general, the psychiatric admission rate of 19% for amphetamine$^+$ patients is similar to the national rate for methamphetamine related admission,[2] and certainly lower than the rates found in a similar locale in 1990.[13] While some of the decrease may be related to the likelihood that a portion of the amp$^+$ patients were not using methamphetamine specifically, or were not acutely intoxicated, amp$^+$ patients in the current study were hospitalized less frequently than amp$^-$ patients. Lower rates of methamphetamine-related admission in Hawai'i and elsewhere may be related to the practice of treating towards symptom resolution in the ED or PES, or to finding other treatment environments. Indeed, alternative treatment to psychiatric hospitalization has been noted in many cases to be effective and to decrease the burden on inpatient resources.[14] Allowing patients to recover in the ED, instead of on an inpatient unit, may also be related to the longer average length of stay observed in this study for amp$^+$ patients.

National trends of ED visits involving methamphetamine use were stable from 2007 – 2009 and increased in 2010 and 2011.[2] Other studies of urban psychiatric EDs have shown varying data from a similar time period. An observational study of an ED in Portland, Oregon from February 2006 – February 2007 showed that 7.6% of visits to the psychiatric ED were methamphetamine related.[4] However, a retrospective study of an urban California ED from May 2009 – May 2010 counted 14.8% of patients receiving psychiatric evaluations that were amphetamine positive.[8] Based on the current results that suggest a higher resource utilization for amp$^+$ patients, the national increase in methamphetamine use could place a correspondingly higher burden on ED resources across the country. However, the results also suggest that allowing patients to stabilize in the ED or another 24-hour observational crisis center could be clinically more appropriate than utilizing inpatient resources for many of these patients.

This was a retrospective study, with inherent limitations. Over 25% of the patients presenting to the PES during the study period did not undergo urine drug testing, and therefore were not included in the analyses. This may be due to sampling bias, based on clinicians' opinions of which patients warranted such screening, or to lack of patient cooperation. Another limitation of this study is that the urine drug screen that was utilized did not distinguish between methamphetamine and other types of amphetamines such as prescription stimulants. A false-positive screen may also have resulted from other medications such as over the counter medications (eg, pseudoephedrine), prescription anti-emetics, or anti-depressants. While the study assumes that a significant majority of patients who screened positive for amphetamines had been using methamphetamine, there were likely patients counted in the cohort of amp$^+$ patients who were not using methamphetamine. Furthermore, a positive drug screen indicates exposure to the drug at some time over the prior 3 days, but not necessarily that the patient was intoxicated at the time of presentation, or that the presentation was related to methamphetamine use. The amp$^+$ patients in this study likely comprise

a combination of acutely intoxicated patients, patients in withdrawal, patients without residual symptoms, and patients not using methamphetamines. The study team expects that resource utilization is highest among acutely intoxicated patients. Since the amp$^+$ patient sample was likely diluted with non-intoxicated patients, the actual resource utilization by methamphetamine intoxicated patients was probably greater than the overall amp$^+$ data suggest. Confirmation of this hypothesis requires further investigation with observational or prospective studies.

In conclusion, methamphetamine use continues to be associated with a significant and increasing percentage of ED presentations nationwide.[2] The current study associates amphetamine use in general with an increased length of stay in the ED and an increased likelihood of requiring the administration of intramuscular medication or physical restraints. A prospective study measuring methamphetamine specifically, and recording the reason for presentation, would likely detect a smaller percentage of patients using methamphetamine than were amp$^+$ in this study, but also may find a greater impact on ED resources than are reported here, since it would be enriched solely for methamphetamine users. However, it is becoming clearer that inpatient psychiatric hospitalization is not necessary in many amphetamine-related ED presentations. These findings suggest the opportunity to provide other treatment settings that provide a safe environment for recovery from acute intoxication, but would be expected to require less of a burden on resources compared to the ED and inpatient units.

Conflict of Interest

None of the authors identify any conflict of interest.

Acknowledgments

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Dengue outbreaks in Hawai‘i After WWII – A Review of Public Health Response and Scientific Literature

Rachel J. Lew; Wen-Yang Tsai PhD; and Wei-Kung Wang MD, ScD

Abstract

The four serotypes of dengue virus (DENV) cause the most important and common arthropod-borne viral diseases in humans. There have been three major dengue outbreaks in Hawai‘i since 1946. The most recent and largest outbreak occurred on Hawai‘i Island in 2015-2016. This article reviews the public health response to dengue outbreaks over the period 2001-2016, as well as scientific literature on dengue outbreaks in Hawai‘i. As summarized in the assessment by the Centers for Disease Control and Prevention in 2015, Hawaii's response to the dengue outbreak was timely, appropriate, and well-coordinated. All facets of a public health response to the outbreak were adequately addressed, but communications and medical entomologic capacities could be improved. The observations of Aedes aegypti on Hawai‘i Island and of its co-localization with confirmed human cases highlight the importance of continuous vector surveillance and entomologic research. In-depth studies on the molecular epidemiology, entomology, and epidemiological investigation would provide new insights into the latest outbreak and into strategies to combat DENV and other arboviruses in the future.

Keywords

Dengue virus, Outbreak, Hawaii, Hawai‘i

Abbreviations

CDC = Centers for Disease Control and Prevention
DENV = Dengue Virus
ZIKV = Zika Virus
DF = Dengue Fever
DHF = Dengue Hemorrhagic Fever
DSS = Dengue Shock Syndrome
WHO = World Health Organization
HDOH = Hawai‘i Department of Health
DLI = Dengue-Like Illness
DEET = N,N-Diethyl-meta-Toluamide

Introduction

Dengue is a tropical disease spread among the human population by mosquitoes carrying the dengue virus (DENV). There are four serotypes, DENV1 through DENV4. DENV belongs to the genus *Flavivirus* of the family *Flaviviridae*, which includes several arthropod-borne viruses causing significant human diseases, such as West Nile virus, Japanese encephalitis virus, yellow fever virus, tick-borne encephalitis and Zika virus (ZIKV).[1,2] DENV is transmitted by *Aedes* mosquitoes, including *A. aegypti* and *A. albopictus*. Following DENV infection, individuals can be asymptomatic, or manifest with flu-like symptoms including fever, headache, retro-orbital pain, myalgia, arthralgia and rash, known as classical dengue fever (DF).[1,3] In some individuals it can progress to the more severe forms of the disease, dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), characterized by severe thrombocytopenia, hemorrhage, plasma leakage and shock that can lead to death.[1,3] A study in 2013 estimates that approximately 390 million individuals are infected with DENV every year, and about a quarter of them present with apparent diseases.[4] Infection with one DENV serotype provides long-lived protection against the same serotype but not other serotypes; epidemiological studies have shown that secondary DENV infection with a different serotype has a higher risk of developing severe disease, DHF/DSS, compared with primary infection.[1] While several dengue vaccine candidates have been in different phases of clinical trials for several years, only one, Dengvaxia from Sanofi Pasteur, is currently licensed in a limited number of countries. The efficacy of Dengvaxia is ~60% overall and ~40% among the dengue naïve population, who have never been exposed to DENV in the past. Due to safety concerns, Dengvaxia is no longer recommended for dengue-naïve individuals and was suspended in some countries like the Philippines recently.[5-7]

DENV1 was first isolated in Japan in 1943, followed by DENV2 in Hawai‘i in 1945.[2] Dengue is spread to Hawai‘i when individuals are exposed and infected by DENV out-of-state during their travels to endemic regions, and upon their return introduce the virus to *Aedes* mosquito populations in Hawai‘i. The indoor-feeding *A. aegypti*, known as the principal vector, is more efficient in DENV transmission compared with *A. albopictus*, which is more common in Hawai‘i. During the past three decades, population growth, urbanization, lack of effective mosquito control, increasing travel and other factors have contributed to the global emergence of dengue especially in developing countries[2,8] According to the Centers for Disease Control and Prevention (CDC), dengue is endemic in the following United States (U.S.) territories: Puerto Rico, the U.S. Virgin Islands, American Samoa, and Guam. At least 100 countries are endemic for dengue in Asia, the Pacific, the Americas, Africa, and the Caribbean.[9]

There have been three dengue outbreaks in Hawai‘i since 1946: on Maui, O‘ahu and Kaua‘i in 2001-2002, on O‘ahu in 2011, and on Hawai‘i Island (Big Island) in 2015-2016. During the most recent (2015-16) outbreak, there were 264 confirmed cases, 238 of which were residents of Hawai‘i Island.[10] This article reviews the public health response to dengue outbreaks over the period 2001-2016, as well as scientific literature on research of the dengue outbreaks in Hawai‘i. Despite the revised World Health Organization (WHO) case definition (dengue, dengue with warning signs, and severe dengue) published in 2009, this review uses the traditional case definition (DF, DHF, DSS) to be consistent with several references cited.[2]

Methods

The authors searched and reviewed reports from government, state and organizations, as well as published literature through the PubMed database. Searching with the key words "Dengue outbreak" and "Hawaii", as of October 12, 2017 resulted in a total of 27 articles, of which 17 were excluded due to non-Hawai'i (such as Marshall Island, South Pacific, Puerto Rico, etc) or non-dengue topics (such as West Nile virus, etc.). The remaining 10 articles (references 11 to 14 and 16-21) together with the references cited in these articles were reviewed.

Results

Outbreak in 2001-2002

The 2001 outbreak started in May 2001 and lasted into 2002. In total, there were 122 confirmed cases (92 on Maui, 26 O'ahu and 4 Kaua'i) of the DENV1 serotype. The virus was most likely imported by travelers from the Society Islands in French Polynesia, which at the time was undergoing a much larger dengue epidemic with over 33,000 falling ill from February to November of 2001.[11] This was supported by a molecular epidemiological study of sequences encoding the envelope-protein of DENV1 isolates, which showed that two strains of DENV1 were introduced to Hawai'i: one from Tahiti, which was identified in most of the isolates, and one from Samoa, identified in a single isolate.[12,13]

A study noted that confirmation of the outbreak in Hawai'i was delayed by the lack of in-state capacity to test for dengue at the time.[14] After the CDC confirmed the Hawai'i outbreak on September 21, 2001, the Hawai'i Department of Health (HDOH) immediately sent out a statewide email alert to physicians asking them to test all patients for dengue if they exhibited dengue-like illness (DLI), defined as "fever or chills plus two or more of the following symptoms: myalgia, headache, arthralgia, eye or retroorbital pain, rash, or hemorrhagic manifestation." Eighty nine percent of the laboratory-positive cases presented with DLI.[11] There were cases with hemorrhagic symptoms, but none with DHF or DSS, in contrast to the Society Islands outbreak in which 45% of the hospitalized cases presented with DHF, and some with symptoms of DSS.[11] Several possibilities may account for the difference in disease severity between the two outbreaks; one being that the population of the Society Islands, compared with that of Hawai'i, are more likely to have had a previous DENV infection and thus experience a secondary DENV infection, which has been shown to have a higher risk of causing DHF/DSS than primary DENV infection.[1,15]

Among the many public health measures implemented in Hawai'i were: free laboratory testing for all suspected cases, active surveillance at over 50 medical facilities in Hawai'i, a patient-tracking system, the utilization of Epi-X (an online CDC resource for public health professionals), assistance with phlebotomy, lectures on dengue given at local medical centers, press releases (eg, daily case counts, information on how to eliminate breeding sites), and more.[11]

Vector control during the outbreak included actively reducing mosquito populations and educating people on specific prevention methods. This was accomplished by spraying insecticide in a 200-meter radius around case homes (adulticiding), and by breeding site control through elimination of standing water and collection of trash that could hold standing water.[11,14,16] Public health authorities performed private and public property inspections to identify buildings in close proximity to large mosquito/larvae populations and mosquito breeding sites, even rolling out door-to-door source reduction campaigns. During the DENV1 outbreak on Maui, a seroepidemiological survey of a community with a high incidence of dengue, in comparison with another community with low incidence, reported that about half of the inspected properties contained mosquito larvae, suggesting a "need for more effective community mosquito control." The same study also identified the presence of birds in one's house or yard as "significantly associated with infection," and posited that *A. albopictus* may be attracted to birds or to environmental conditions that birds reside in.[17]

During the outbreak, HDOH vector control staff conducted entomological surveys in 29 communities on O'ahu, Maui, Moloka'i, and Kaua'i to identify the species responsible for transmitting DENV.[11] The species was found to be *A. albopictus*, compared with *A aegypti* which is a less competent vector for transmitting DENV but more common in Hawai'i. The islands' vegetation provides an ideal habitat for *albopictus*, which prefers to live in non-urban areas. A study of the vector-to-host ratio map confirmed that most cases in O'ahu were found in areas with "sparse settlements," as opposed to the population-dense city of Honolulu.[18]

The state of Hawai'i launched aggressive campaigns and responded proactively to provide the public with information, support, and transparency on the nature of the disease and updates on the outbreak. The HDOH held media interviews, public service announcements, and town meetings, and developed a dengue education website. Educational brochures for travelers and tourists were distributed at car rental agencies and hotels. In Hana, individuals were posted at highway checkpoints to distribute mosquito repellent and educational materials about dengue.[11,14]

A previous study suggested that, given the variation between communities in attending public information sessions or accessing media sources, public relations responses should be customized by community.[14] Due to the dependence of Hawaii's economy on tourism, the epidemiologic and vector control response "had to balance the need for protective action...with the need to avoid discouraging tourism."[14] However, a study of a group of 4,000 people who visited Hawai'i at the peak of the dengue outbreak showed that only "94 (3%) experienced a DLI either during their trip or within 14 days of departure," and 27 of the 94 tested were found to be negative for anti-DENV IgM antibodies. Researchers concluded that individuals who visited Hawai'i during the 2001 outbreak had a low risk for DENV infection.[19]

DLI can be presented by other acute febrile illnesses including viral and bacterial diseases, such as leptospirosis which is prevalent in Hawai'i. A study investigated anti-leptospira IgM

antibody in 1206 patients, who had DLI but were negative for dengue, and reported 54 leptospirosis cases during the 2001 outbreak.[20] The study identified three clinical symptoms (rash, chills and petechiae) significantly less common among leptospirosis cases compared with dengue cases, and indicated that many leptospiral infections in Hawai'i go undiagnosed. Another study in 2005 examined serum samples from seven Hawaiian residents who recalled experiencing flu-like symptoms during the WWII, and found the presence of antibodies to DENV1 more than 60 years after the 1943 dengue outbreak in Hawai'i.[21]

Outbreak in 2011

The second of the three dengue outbreaks in the 21st century began in February 2011 in Pearl City, O'ahu. An HDOH news release on March 24, 2011 announced two confirmed and two suspected cases of dengue on O'ahu, and stated that a medical alert had already been sent out to physicians "advising them to consider potential DENV infection in persons with compatible symptoms, request appropriate laboratory testing, and report all suspected cases to the HDOH". In total, there were 4 dengue cases; all were infected near their homes by mosquitoes.[22]

During the time, the HDOH immediately initiated several precautionary measures including additional testing, surveying and a mosquito control plan for the areas where cases were probably infected. Updated information regarding vector source reduction (such as cleaning up breeding sites, emptying standing waters, checking gutters, etc) and protection against mosquito bites (such as repellant containing 20%-30% DEET or picaridin to skin and clothing, window screens, lighter-colored clothing, etc) were provided on the HDOH website.[22]

Outbreak in 2015-2016

The most recent dengue outbreak in Hawai'i started in September 2015 on Hawai'i Island, primarily in South Kona.[10] Two-hundred sixty-four confirmed dengue cases (218 adults and 46 children) were reported. It was the largest outbreak of dengue in a non-endemic area of the U.S. since 1946. The 2015 and 2001 outbreaks were similar in scale. One difference between the two outbreaks was that fears surrounding the 2015 outbreak were followed by fears of ZIKV spreading in Hawai'i, given that the *Aedes* mosquito transmits both DENV and ZIKV. The 2015 outbreak happened to occur around the same time that many countries were experiencing Zika outbreaks, and the WHO declared Zika a Public Health Emergency of International Concern on February 1, 2016.[23]

The mayor of Hawai'i County, William P. Kenoi, declared a state of emergency on Hawai'i Island on February 2, 2016.[24] The state of emergency included the suspension of a county law allowing tires to be deposited at Hawai'i County landfills; discarded tires collect small pools of water that serve as prime breeding spots for *Aedes* mosquitoes. Several activities also occurred well before the state of emergency. The HDOH updated its website to include an online map of disease risk areas that was routinely updated until April 20, 2016. [10] Electronic information and resources on DF and mosquitoes were provided, including brochures in Spanish, Samoan, Marshallese, Japanese, Ilokano, Hawaiian, English, Chuukese, Tongan, and Tagalog. Also, phone lines to call for additional information or to report suspected cases of infection were made available. The state also launched a disease education campaign called "Fight the Bite."[10]

In a report assessing the state's response to the outbreak, the CDC lauded the extensiveness of Hawai'i County's community outreach efforts to encourage individuals to protect against and report infection.[25] Overall, it considered Hawaii's outbreak response a "model for others." However, it recommended a greater social media presence and the organization of online information in a more user-friendly manner, and repeated its past recommendation to customize public relations responses at the community level. Moreover, a CDC team member failed to find information about dengue at the few selected hotels and airports that he visited; while not from a systematic evaluation, the observation appears to contrast with the 2001 outbreak response tactic of distributing information at tourist- and traveler-heavy areas.[25] Indeed, efforts to distribute information were ongoing as the outbreak progressed, so information likely reached more areas and individuals. The same CDC report stated that the epidemiologic surveillance was "timely and sufficiently sensitive to monitor temporal trends and geographic patterns of spread."[25] However, the report suggested future assistance from the CDC, describing the epidemiological resources as "taxed" and hypothesizing that another outbreak or significant health event would overwhelm state resources. For example, the report found that all of Hawai'i depends on two HDOH entomologists stationed in Honolulu.

Regarding entomologic control, the state aimed to reduce mosquito populations by adulticiding, primarily around case homes where individuals had been infected, as well as around schools. The CDC cited the amount of dense vegetation around households, long distances between households, unoccupied homes, homeowner and farm owner opposition to chemicals, and the scarcity of staff and equipment as factors preventing more widespread, standardized adulticiding (ie, at non-case properties).[25] The state also employed "mosquito surveys," larvicidal mechanisms by which standing water was dumped out or treated with soapy water. The soapy water treatment is not standardized or scientifically proven to be larvicidal in the field.[25,26] Laboratory testing of DENV, on the other hand, had improved since the 2011 outbreak, and in 2015 were done in-state within 1-2 days of sample receipt at the State Laboratories Division in Honolulu.[25]

The first scientific report of the 2015-2016 outbreak by the Hawai'i Dengue Response Team has been published.[27] Two studies on the mosquitoes in Hawai'i before this outbreak provide important insights into the outbreak.[28,29] They reported the presence of *A. aegypti*, the principal vector of DENV, on Hawai'i Island, and interestingly the distribution of *A. aegypti* co-localizes with the distribution of human cases, mainly in the east and west coasts of Hawai'i Island, including Hilo and Kona and Keelakekau.[10,28]

Conclusion

Compared with dengue-hyperendemic regions, the three dengue outbreaks in Hawai'i since 1946 were relatively small with less than 300 confirmed cases, no DHF or DSS cases, and comprised a single serotype during each outbreak. The public health response including disease surveillance and testing capacities has greatly improved.[25] As summarized in the CDC report in 2015 for the most recent outbreak, the response of the HDOH to the dengue outbreak has been timely, appropriate and well-coordinated between the state and county. All facets of a public health response to the outbreak have been addressed adequately, including community outreach, surveillance, diagnostic testing, medical care, and vector control, although communications and medical entomologic capacities could be improved.[25]

The 2001-2002 outbreak may have been limited in scale due to the transmission by the less competent vector *A. albopictus*.[11] However, the most recent outbreak took place on Hawai'i Island, where the more competent vector *A. aegypti* was present and co-localized with the confirmed human cases, raising concerns of the role of *A. aegypti* and/or *A. albopictus* in this outbreak and/or for future outbreaks of DENV or other arboviruses (including ZIKV and chikungunya virus, both transmitted by the two species). Continuous vector surveillance and entomologic research in Hawai'i are needed. Although the most recent outbreak has passed, dengue and other arboviral diseases continue to pose a very real threat to Hawai'i and similar regions. A limitation of this review is the lack of peer-reviewed scientific papers associated with the two most recent outbreaks. Future studies on the molecular epidemiology, entomology, epidemiological investigation and risk factors would provide new insights on the introduction and spread of DENV in the Hawai'i Islands. This multidisciplinary approach and collaboration is exemplified by a recent investigation of ZIKV in Florida.[30] This information is not only important for the scientific community to understand the largest dengue outbreak in non-endemic regions of the U.S. since 1946, but is also relevant to local community and public health sectors. New strategies based on research done in Hawai'i to fight against DENV and other arboviruses in the future are critically needed.

Conflict of Interest

None of the authors identify any conflicts of interest.

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Inappropriate Laughter and Behaviours: How, What, and Why? Case of an Adult with Undiagnosed Gelastic Seizure with Hypothalamic Hamartoma

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Abstract

Gelastic seizures (GS) are a rare form of epilepsy characterized by inappropriate, uncontrolled laughter. They are highly associated with abnormal cognitive development and behavioral problems in patients. Research has shown that GS can originate from hypothalamic hamartomas (HH), non-neoplastic masses consisting of gray matter with large and small neurons interspersed with glial nuclei. GS have also been observed in patients with frontal and temporal lobe lesions.

The patient in this case report is a 40-year-old man with a past medical history significant for brain tumor, diabetes mellitus, and schizophrenia who presented with a long standing history of sudden, involuntary laughter occurring 2-3 times a week since 8 years old. Since the onset of these laughing spells the patient has displayed gradual cognitive impairment and increasing behavioral problems. Subsequent EEG (21-channel electroencephalogram) showed focal epileptiform activity in the right frontotemporal region and MRI studies revealed a mass arising from the hypothalamus suggestive of a HH.

Other conditions should be considered in the differential diagnosis for laughing spells and distinguishing different causes can be challenging. As demonstrated by this case report, in patients with behavioral issues, especially those with inappropriate uncontrolled laughter, gelastic seizures need to be included in the differential diagnosis. Thus, a thorough workup should include neuroimaging with attention to the suprasellar region and EEG. Accurate, early diagnosis and patient education are critical in avoiding excessive and unnecessary treatments. This condition may be pharmacoresistant and is often associated with progressive cognitive and behavioral issues. Studies have shown a surgical treatment approach may be effective.

Introduction

Gelastic seizures (GS) are a rare seizure form characterized by inappropriate laughter. They classically occur in infancy with high frequency and periodicity.[1-3] There is currently limited knowledge of the epidemiology, particularly in the adult population, but one study conducted at a major epilepsy center in London found that GS were found in fewer than 0.8% of patients.[4] They may also occur in association with other seizure semiologies and therefore may go unrecognized.

Laughing seizures were first described by Trousseau in 1877 as bursts of laughter lasting only a few seconds.[5] In 1957, Daly and Mulder coined the term "gelastic seizure," from the greek word "gelos" meaning laughter, to describe a seizure pattern with laughter as the predominant feature.[6] GS have been classically associated with hypothalamic hamartomas (HH), rare lesions that often present in early infancy.[3] However, they can also be caused by temporal and frontal lobe pathologies.[4] Clinical features range in severity from a pressure to laugh to more debilitating seizures, precocious puberty, and cognitive impairment. [2,7,8] Given the rarity of this condition, practice guidelines for treatment are currently not available. We present a case of a 40-year-old man with a history of inappropriate laughter in the context of worsening behavioral issues and MRI findings suggestive of a HH.

Case Report

A 40-year-old man was referred to a Hawai'i comprehensive epilepsy center for management of medically refractory seizures. His seizures began at the age of 8 and occurred at a stable frequency of approximately 2-3 times per week. His episodes were not preceded by any noticeable aura and the ictal semiology comprised of sudden, involuntary laughter that was unrelated to external stimuli. The patient also described several episodes of breath-holding and one occasion in which he suffered a generalized tonic-clonic seizure. Medications that he had tried in the past included carbamazepine, sodium valproate, and levetiracetam; however, these agents were unsuccessful in controlling the episodes.

The patient's seizures had been attributed to an optic glioma that was diagnosed in childhood, for which he received radiation therapy. Subsequently, the patient's father noted the gradual development of cognitive impairment in his son. The patient's past medical history also included diabetes mellitus and schizophrenia. His medications at the time of consultation included metformin, quetiapine, aripiprazole, fluoxetine, low-dose aspirin, and B12 supplements. He was unemployed and received assistance with activities of daily living from his father. He denied any substance abuse. His family history included neoplastic disease in his grandparents, although the tissue origin and degree of invasiveness were unknown.

On physical examination, the patient appeared as an overweight man of stated age. He was afebrile and hemodynamically stable. He was alert and orientated to time, place, and person. He exhibited mild cognitive deficits. Cranial nerve examination found no deficits. His pupils were equal and reactive, he had full range of extra-ocular movements and he had no visual field defects. He had normal facial movements and sensation, and his tongue and palate moved symmetrically. Likewise, examination of the patient's extremities demonstrated normal tone, power, reflexes, coordination, and sensation.

In light of the patient's reported history of optic glioma and recurrent seizures, a standard 21-channel electroencephalogram (EEG) and magnetic resonance imaging (MRI) scan were performed. The patient's EEG was reviewed by an epileptologist

and showed several bursts of diffuse spike and wave activity, more prominent in the right frontotemporal region and ranging from 1 to 6 seconds in duration (Figure 1). The activity increased in amplitude as time progressed and then stopped sharply, consistent with epileptiform activity. Although no clinical changes were noted by the recording technician, the patient appeared to blink abruptly afterwards suggesting a possible alteration in awareness. The blinking occurred several times following this type of event during the recording.

The patient's MRI, reviewed by a neuroradiologist, demonstrated several abnormalities. Of these, the most notable was a mildly T1 hypointense, T2 hyperintense, non-enhancing mass arising from the hypothalamus that projected inferiorly into the prepontine cistern (Figures 2A, 2B). It exhibited no visible mass effect and conformed to the shape of adjacent structures including the clivus anteriorly and the brainstem posteriorly. Interestingly, the mass did not appear to arise from the optic nerves, chiasma, or tracts (Figure 3). Previous MRI's dating back to 2001 were obtained and demonstrated stability of the mass over time. Collectively, these findings were suggestive of a hypothalamic hamartoma.

Secondly, the appearance of the anterior temporal lobes was abnormal, with areas of T2 hyperintensity and T1 hypointensity (Figure 4A), and multiple scattered foci of susceptibility consistent with hemosiderin (Figure 4B). Given the patient's history and foci of hemosiderin, these findings were most consistent with post-radiation change, although trauma was also in the differential.[9] Dysplasia was considered unlikely due to the presence of hemosiderin.

Thirdly, there was an abnormality involving the superior aspects of the cerebellum with focal interdigitation of the two hemispheres, consistent with a developmental anomaly.

The patient was educated on the nature of his brain lesion. His management plan included continuing antiepileptic treatment until further clinical workup was performed, including plasma drug levels. An overnight, long-term video EEG was also scheduled to facilitate clinical EEG correlation.

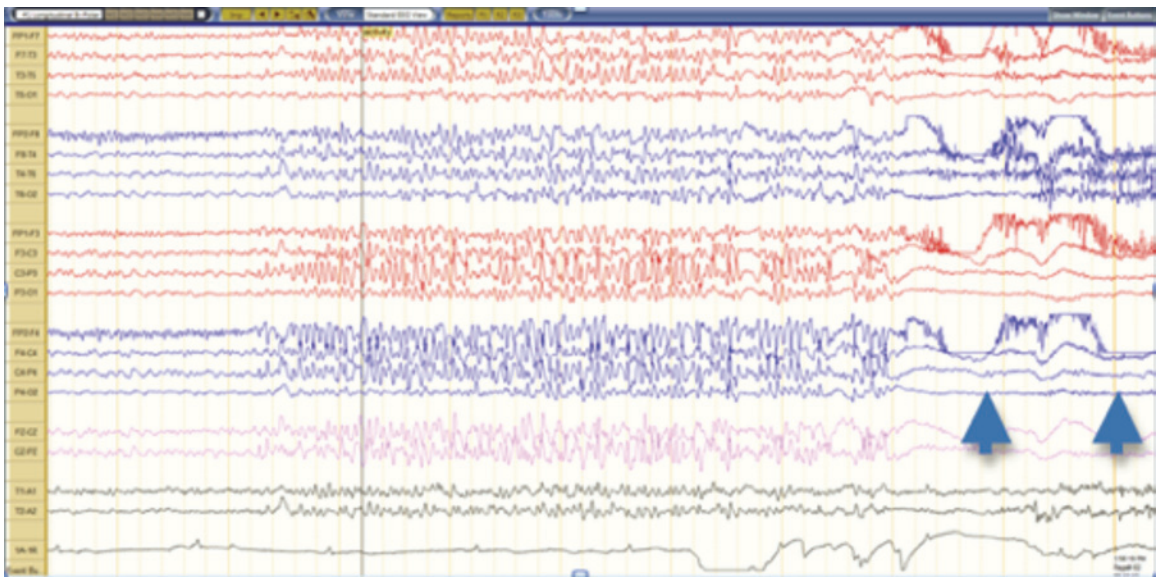

Figure 1. EEG activity showing 6 seconds of generalized epileptiform activity during monitoring.

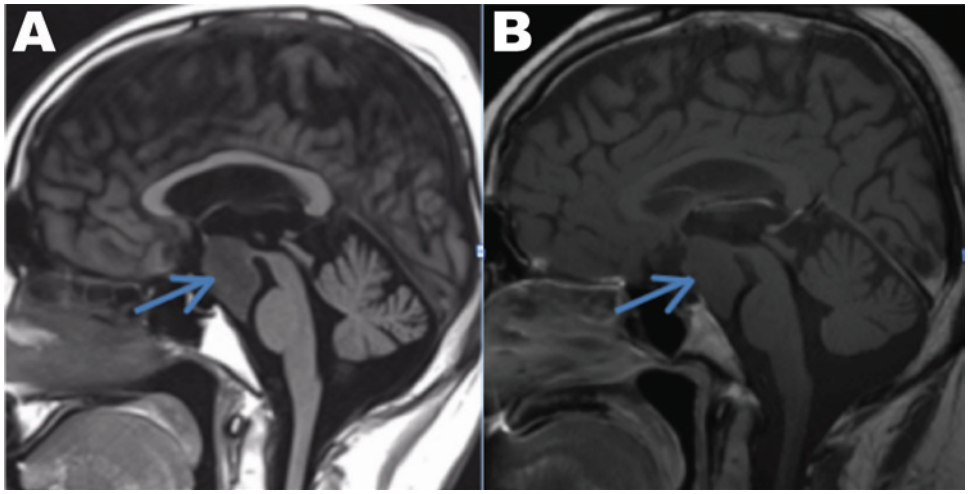

Figure 2. (A) Sagittal T1W image demonstrating a mildly hypointense mass arising from the hypothalamus and extending inferiorly into the prepontine cistern without any significant mass effect. (B) Sagittal T1 post contrast demonstrates no enhancement within the mass.

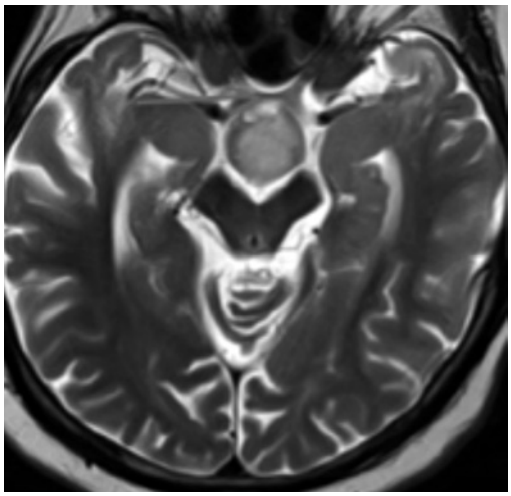

Figure 3. Axial T2W image demonstrates a mildly T2 hyperintense lesion posterior to the optic chiasm (arrow) without involvement of the chiasm or optic tracts.

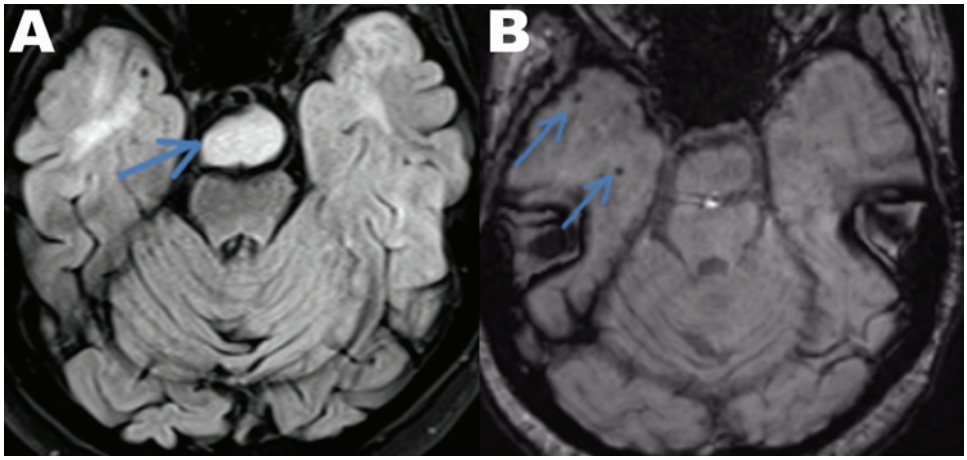

Figure 4. (A) Axial T2 FLAIR demonstrates abnormal T2 hyperintensity within the anterior temporal lobes. The hypothalamic hamartoma is visible within the prepontine cistern (arrow). (B) Axial susceptibility weighted imaging demonstrates foci of susceptibility consistent with hemosiderin (arrows).

Discussion

To understand the clinical manifestations of this patient's condition, it is helpful to understand the mechanisms involved in the production of laughter. Laughter has both an emotional and a motor component. Various parts of the brain are involved in producing laughter when it is emotionally provoked, including the amygdala, fusiform gyrus, parahippocampal gyrus, thalamus, hypothalamus, and dorsal tegmental brainstem.[10] In contrast, non-emotional laughter involves the anterior cingulate premotor frontal and opercular areas. The emotional response is modified by the cerebral cortex and the physiological manifestations are controlled by the bulbar nuclei. Additionally, the hypothalamus plays an important role in integrating cortical and bulbar signals. Theoretically, a disruption anywhere along these pathways can generate laughter separate from emotional provocation.

Although there are many anatomical parts involved in the generation of laughter, researchers have shown through functional imaging studies and EEG recordings that gelastic seizures originate in hypothalamic hamartomas, especially those located at the mammillary level of the posterior hypothalamus.[11-13] More specifically, hamartomas of the tuber cinereum have been known to cause GS. Hypothalamic hamartomas are masses consisting of gray matter with large and small neurons interspersed with glial nuclei.[13] Both myelinated and unmyelinated fibers are present and can be haphazardly arranged, diffusely distributed, or clustered. Within the HH, two different types of neurons have been noted. The first are small, clustered GABAergic neurons that display spontaneous rhythmic firing. These "pacemaker" cells project to other HH neurons, creating synchronous activity that serves as the foundation of the intrinsic epileptogenicity of HH and the starting point for the generation of gelastic seizures.[14] Supporting this hypothesis, ictal SPECT has shown hyperperfusion of HH during gelastic seizures.[15] The second type of cell found in HH are large, quiescent pyramidal-like neurons. These neurons have more extensive dendritic and axonal arborization.[13]

Hypothalamic hamartomas can be divided into subtypes based on anatomical structures and clinical correlations: parahypothalamic and intrahypothalamic hamartomas. Parahypothalamic hamartomas are pedunculated and attached to the floor of the hypothalamus by a narrow base and seem to be more associated with precocious puberty with less frequent neuropsychological compromise.[16] Intrahypothalamic hamartomas are sessile with a broad attachment to the hypothalamus and are more associated with GS, mental retardation and aggressive behavior.[17] Both forms are associated with seizures that can evolve into tonic, tonic-clonic, and secondary generalized seizures.[7,16] Our patient's MRI and clinical evaluation suggest he had an intrahypothalamic hamartoma associated with psychological and behavioral changes, which may have evolved into tonic clonic seizures.

One question that arises is: Can the epileptiform activity observed in patients with gelastic seizures arise from areas of the brain independent from the hypothalamus? A review of the literature shows cases of GS in patients with frontal and temporal lobe lesions, rather than hypothalamic lesions.[18] A majority of these cases have been observed in adults, although large case studies are lacking. Patients with GS originating from the frontal lobe presented with motor signs but lacked laughter associated emotions (the laughter generated is described as unnatural and is not associated with feelings of mirth).[13] In contrast, GS with temporal origin were more often associated with a sense of joy and happiness or pleasant sensations and feelings.[19-20] It remains difficult to differentiate between HH induced seizure activity and secondary epileptogenesis—that is GS due to seizure activity progressing over time to involve connections of the hypothalamus, frontotemporal lobes, limbic circuitry, and thalamus in a patient with a HH.[13]

The clinical presentation of GS ranges in severity from a "pressure to laugh" to severe cases with the triad of early onset gelastic seizure, precocious puberty, and developmental delay that may progress to epileptic encephalopathy.[1,7-8] Laughter may be combined with facial contortion suggestive of a smile.[8,19] GS are unmotivated and mostly involuntary[21]—although rarely patients are able to suppress the urge to laugh.[8] GS have been associated with altered consciousness and patients may be amnestic of the event.[20-21] Autonomic features such as tachycardia, flushing, and changes in respiration are often present. In addition, many adults report an unpleasant epigastric sensation.[22] Seizures are usually brief and stereotyped with a high frequency that usually occurs in clusters.[13]

GS in pediatric patients are highly associated with abnormal cognitive development and major behavioral problems. The extent of cognitive deficits largely depends on the severity and onset of the seizures as well as the size and location of HH.[13] Late onset cases of patients with small HH might not cause cognitive deficits or behavioral disturbances.[7,13] Our patient was diagnosed with schizophrenia when he was 7 years old—around the same time the hypothalamic mass was first discovered. His family also reported that he has had episodes of anger and rage. It is unclear whether his behaviors preceded the mass. However, it is possible that the patient's behavioral and cognitive changes are manifestations of the HH.

The diagnostic criteria for GS were first outlined in 1971 by Gascon and Lambroso. Criteria included stereotyped recurrence, absence of external precipitants, concomitance of other epileptic manifestations (tonic or clonic movements, loss of consciousness, automatisms), presence of interictal or ictal EEG epileptiform discharges, and absence of other causes of pathologic laughter.[23]

The diagnostic workup should include an EEG, video EEG (VEEG), and MRI. Previous studies indicate that a majority of GS fail to demonstrate EEG changes.[24] However, present findings include slowing of background activity, interictal focal activity (mostly in patients with temporal/frontal region onset), generalized paroxysmal activity in the form of slow spike and wave complexes, and other various ictal patterns.[13] Because EEG changes are variable, it is vital that gelastic epilepsy not be ruled out in the absence of EEG changes.

VEEG may play an important role in making the diagnosis in cases where neuro examination and MRI appear normal. In the case of a 2-year-old boy who presented with abrupt laughter without provocation, VEEG captured a GS with concurrent head deviation and twitching. Subsequent EEG revealed GS originating from frontal and temporal regions of brain.[19]

On MRI, HH appear as abnormalities in the region of the tuber cinereum and third ventricle.[13] They are characteristically well-defined, pedunculated or sessile lesions that can be solid or cystic. They appear iso- or mildly hypointense with T1-weighted sequences, and iso- to hyperintense with T2-weighted sequences. Contrast enhancement and calcifications, as well as long-term changes in the size, shape, and signal intensity, are not characteristically found on MRI.[25] The characteristic findings of HH were noted on our patient's MRI scans: the hypothalamic mass appeared mildly hypointense on T1-weighted sequences and mildly hyperintense on T2-weighted sequences. Furthermore, the hypothalamic mass observed in our patient remained stable in size when compared to previous studies, which, as described in the literature, is typical of hypothalamic hamartomas.

Management of GS should begin with patient education, especially as these seizures can be quite distressing for the patient and family. They tend to be refractory to antiepileptic drugs (AEDs) and therefore surgery is the predominant treatment option.

Neurosurgical techniques, particularly removal of the HH, tend to rapidly resolve symptoms. Rosenfeld first popularized surgical resection by utilizing a transcallosal approach to access the lesion from above.[26] Less invasive surgical techniques, such as microsurgical resection and endoscopic disconnection through the foramen of Monro, are favored over open surgery due to decreased associated morbidity.[16] Endoscopic treatment has yielded a 48.5% seizure free rate[27] but may only be applicable in approximately 50% of cases.[16]

Newer procedures include radiofrequency ablation, disconnecting surgery, interstitial brachytherapy, stereotactic radiosurgery, and gamma knife radiation.[13-28] The last has reported favorable outcomes (60% saw dramatic improvement and 37% are completely seizure free) according to a recent trial.[28] This has the potential for being a safe and effective treatment option for sessile HH in small children.[28] However, frequency of complications and adverse effects remain unknown.

Temporal lobe or frontal lobe resections are also performed in some cases. However, outcomes have not been studied in depth.

Differential Diagnosis

The differential diagnosis for inappropriate, uncontrollable laughter is broad. As demonstrated in a case report by Holmes and Goldman, recognizing the different conditions that cause incessant laughter is critical in the emergency setting as some diagnoses warrant acute treatment, while others necessitate further work-up.[29] The differential should include gelastic seizures, pseudobulbar affect, intoxication, poisoning, psychogenic nonepileptic seizures, Angelman syndrome, psychiatric pathology, and normal laughter.[29-31] Since gelastic seizures have been observed in patients with hypothalamic, frontal lobe, and temporal lobe lesions a thorough workup should include neuroimaging of the brain, as well as an EEG.

From a neurological perspective, another important consideration is whether the laughter represents pseudobulbar affect (PBA), also known as involuntary emotional expression disorder.[30] PBA is characterized by uncontrolled crying or laughing which may be disproportionate or inappropriate to the social context and may be encountered in the setting of amyotrophic lateral sclerosis (ALS), as well as extrapyramidal and cerebellar disorders, such as Parkinson's disease, multiple system atrophy, and progressive supranuclear palsy. It has also been noted in the setting of multiple sclerosis, traumatic brain

injury, Alzheimer's disease, various types of dementias, stroke, and brain tumors.[30] The etiology is thought to originate from disruption of pathways involving serotonin and glutamate, particularly in the corticolimbic and cerebellar pathways, leading to disinhibition. PBA is commonly misdiagnosed as depression or bipolar disorder. It is effectively treated therapeutically with a combination of dextromethorphan and quinidine. Thus, early diagnosis can be beneficial. The use of DSM-5 criteria for the diagnosis of mood disorders, as well as the use of published criteria to help differentiate PBA from depression, can aid in distinguishing PBA from other psychiatric diagnoses in the setting of incessant laughter.[30]

Another important diagnosis to consider on the differential is intoxication especially with alcohol, LSD, and cannabis.[29] Urine toxicology screening may be warranted if the history and clinical presentation raise suspicion of accidental or intentional ingestion of these substances. Laughter may also be a manifestation of psychogenic nonepileptic seizures (PNES), which are abrupt, involuntary seizure-like attacks characterized by changes in consciousness or behavior.[31] PNES are not associated with electrophysiologic seizures, unlike with epilepsy. Video-EEG monitoring can be useful in differentiating these attacks from seizures. Other diagnoses to consider on the differential are genetic conditions, such as Angelman syndrome, other psychiatric conditions, and normal laughter. Genetic testing and psychological assessment can be performed to investigate genetic and psychiatric basis of the behavior.

In summary, the differential for incessant laughter is extensive and distinguishing different causes can be difficult. Neuroimaging techniques, video EEG, toxicology and psychiatric screening, and genetic testing can all aid in narrowing the differential, in addition to a thorough history and physical exam.

Conclusion

In patients with behavioral issues, especially those with inappropriate, uncontrolled laughter or giggling, gelastic seizure needs to be included in the differential diagnosis. Furthermore, a thorough workup should include neuroimaging to rule out a hypothalamic or temporal/frontal lobe lesion, and an EEG to investigate epileptiform activities. Because this condition is often pharmacoresistant and progressive with worsening cognitive and behavioral issues, early and accurate diagnosis, as well as patient and family education, is critical.[7]

Unfortunately, GS usually does not respond to AED and therefore minimally invasive surgical or radiosurgical therapies are often used to remove primary lesion with variable results for improvement of symptoms.[13,28] Existing data shows early removal of HH can rapidly resolve symptoms. However, long term outcomes and complications have not been studied in depth.

Conflict of Interest

None of the authors report a conflict of interest.

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Health Locus of Control: Beliefs in Health Care Providers in the Pacific Basin

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Abstract

As part of the strategic plan to improve preconception care, health care providers are advised to counsel women about developing a reproductive life plan. Women are asked think about whether they want to become pregnant and have children and if so, when they would like to do so. The utility of a reproductive life plan is based on the premise that an individual has control over their own health and reproduction. Less is known regarding the beliefs of health care providers which may be important for strategizing educational and training programs. We conducted this project to examine whether health care providers in the Pacific Basin region who are providing reproductive health care, believe they have control over their own health. The Multidimensional Health Locus of Control Scale was used to survey attendees of the Annual Title X Reproductive Health Conference in Saipan, Commonwealth of the Northern Marianas. The cohort of reproductive health care providers surveyed (n=21) showed high internal control scores with a mean of 29.9 (SD = 3.5) and a range of 21 to 36 (maximum score = 36) consistent with individuals who have a strong belief that their health is most influenced by their own behavior. Chance and "powerful others" scores were consistent with means noted in other studies of healthy individuals. Understanding providers' health beliefs can aid in designing and executing more effective interventions to improve reproductive health outcomes.

Background

Approximately half of all pregnancies are unplanned resulting in 2.8 million unintended pregnancies in the United States every year.[1] Due to co-existing medical conditions such as obesity, diabetes, and infectious disease, pregnancy can represent a significant source of morbidity and mortality for some women. Certain racial and ethnic groups are disproportionately affected by co-existing medical conditions and health disparities. Studies report Pacific Islander women may have a higher risk of perinatal morbidity.[2,3] Nearly 14% of all pregnancies among Pacific Islander women are complicated by diabetes.[2] One study found Pacific Islander women have more than 3.5 times higher the risk of macrosomia compared to other women.[4] Another study found Pacific Islander women had two to four times the risk of pregnancy-associated hypertension and four to six times the risk of eclampsia compared to other women.[5] Though most Pacific Islander women have healthy pregnancies, preconception care and the prevention of unwanted pregnancy is important in improving maternal and neonatal outcomes for all women. The Centers for Disease Control and Prevention (CDC) along with the American College of Obstetricians and Gynecologists (ACOG) fully endorse providing preconception care to all women of reproductive age.[6,7]

As part of the strategic plan to improve preconception care, health care providers are tasked with advising women to create a reproductive life plan.[7] A reproductive life plan incorporates the short- and long-term life goals for individuals or couples including educational and career goals. Central goals of the plan include the timing and spacing of pregnancy as well as pre-pregnancy health improvement milestones. For example, women planning pregnancy should try to optimize conditions like asthma, diabetes, and epilepsy and transition to medications that are safe and effective during pregnancy. Women planning pregnancy should work towards smoking cessation, minimize alcohol exposure, and make sure their vaccinations are up to date.[8]

The utility of a reproductive life plan is based on the premise that an individual has control over their own health and reproduction. Fatalism, defined as a perceived lack of control over life events, including health, correlates with less participation in preventative health care.[9-11] Fatalism about pregnancy, the idea that pregnancy happens when it is your time, regardless of an individual's actions, correlates with less pregnancy planning and less contraceptive use.[12] The two concepts, a reproductive life plan and fatalism about pregnancy, seem to directly conflict with each other.

We were interested in providing training and resources to health care providers in the Pacific Basin on reproductive life planning. We conducted this project to examine health care providers' perceived control over their own health. A health care provider's beliefs on what determines their own health is not the same as what they think their patients believe, nor is it the same as what their patients actually believe. However, understanding the beliefs of health care providers is important in strategizing educational and training programs.

Methods

In this cross-sectional study, we used a validated survey, the Multidimensional Health Locus of Control Scale. The survey was distributed to all attendees (n=35) of the Annual Title X Reproductive Health Conference in Saipan, Commonwealth of the Northern Marianas from April 25 to 27, 2012. Conference attendees consisted of reproductive health care providers, including physicians, registered nurses, nurse practitioners, and health educators practicing in the Pacific Basin region (Guam, Commonwealth of the Northern Marianas, American Samoa, Palau, the Federated States of Micronesia, the Republic of the Marshall Islands). The survey was administered in paper form. Participation was anonymous and voluntary, and incentives were not offered. Data was entered into SPSS version 22 (IBM, Chicago, IL) for analysis. This study was granted exempt status from the University of Hawai'i (UH) Institutional Review Board (CHS 20107).

We asked participants demographic questions on gender, race, type of health care provider, marital status, location of practice, income, education, and the number of children they had. The Multidimensional Health Locus of Control Scale consists of 18 questions (Table 1) to assess an individual's health beliefs.[13,14] The Multidimensional Health Locus of Control Scale is based on the premise that an individual believes control over their health is either external or internal. If a person believes that their health is most influenced by their own behavior, they have an internal locus of control orientation. If a person believes their health is determined by factors outside their control, they have an external locus of control orientation. Individuals with an external locus of control orientation believe their health is determined by two external factors: (1) fate, luck or chance or (2) "powerful other" such as one's doctors, family, members, or friends. The 18 questions in the Multidimensional Health Locus of Control assess the importance of three factors (1) internal control, (2) chance, and (3) powerful others in health beliefs. Respondents provided answers to each of the 18 questions using a 6-point Likert scale (strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, strongly agree). We instructed respondents to answer questions according to their own personal beliefs and emphasized there were no right or wrong answers.

For each of the three subscales (internal control, chance, powerful others), an individual can get a score between 6 and 36. The higher the score, the more an individual believes health is determined by that particular factor. For example, an individual who believes that positive health results from their own doing, willpower, or effort, will have a high internal control score. In contrast, if an individual believes that fate, supernatural occurrences, or other individuals determine their own health, they will have a low internal control score and a high chance and powerful others score. Other studies have demonstrated different normal values for various groups of individuals (Table 2). In general, individuals who take an active role in improving their health (ie, those who attempt smoking cessation or participate in exercise programs) have mean scores for internal control of 29-30.[15] Individuals who experience illness because of conditions like cancer have lower internal controls scores of 21-22.[16] Healthy individuals generally have chance scores of approximately 15 and powerful others scores of 19-20, while those who are ill due to conditions like cancer have higher chance scores of 19-20 and powerful others scores of 23-24.[16,17]

Results

A total of 21 out of 35 surveys (60%) distributed were returned though not all respondents answered all demographic questions (Table 3). The average age of respondents was 47 (SD = 9) years. Female respondents made up 90% (17/19) of the sample. Most respondents were married (63%) and had an average of 3 (SD = 2.0) children. The most commonly identified races were Micronesian (35%), Filipino/Filipina (25%), and Other Pacific Islander (20%). The most common location of practice was the Commonwealth of the Northern Marianas (40%) and the Federated States of Micronesia (25%). Seven of 18 respondents (39%) were registered nurses, three were health educators (16%), and three were physicians (17%). Respondents were highly educated with 68% reporting a College Degree (Bachelors or Associates Degree) and 26% reporting a graduate degree.

Internal control, chance and powerful other scores are shown in Table 4. The cohort of reproductive health care providers showed high internal control scores with a mean of 30 (SD = 4) and a range of 21 to 36. Mean chance and powerful others scores were 15 (SD = 8) and 18 (SD = 7) respectively. The proportion of respondents who gave a particular answer for each question is described in Table 1.

A majority of respondents responded that they strongly agreed with statements indicating high internal control such as, "If I take the right actions, I can stay healthy" (67%) and "If I take care of myself, I can avoid illness" (62%). A majority of respondents answered they strongly disagreed to questions suggesting chance plays a large role in health such as, "Luck plays a big part in determining how soon I will recover from an illness" (62%). A majority of respondents strongly disagreed that powerful others had a large role in health such as, "health professionals control my health" (67%).

Table 1. Multidimensional Health Locus of Control Questions. Respondents answered questions using a 6-point Likert scale (strongly disagree, moderately disagree. N=21 (not all respondents answered all questions)

	Strongly disagreed % (n)	moderately disagree % (n)	slightly disagree % (n)	slightly agree % (n)	moderately agree % (n)	strongly agree % (n)
Internal Control Questions						
If I get sick, it is my own behavior which determines how soon I get well again. (N=21)	0 (0)	5 (1)	5 (1)	14 (3)	33 (7)	43 (9)
I am in control of my health. (N=21)	5 (1)	5 (1)	0 (0)	10 (2)	29 (6)	52 (11)
When I get sick, I am to blame. (N=21)	19 (4)	5 (1)	24 (5)	10 (2)	14 (3)	29 (6)
The main thing which affects my health is what I myself do. (N=20)	0 (0)	5 (1)	5 (1)	10 (2)	25 (5)	55 (11)
If I take care of myself, I can avoid illness. (N=21)	0 (0)	0 (0)	0 (0)	5 (1)	33 (7)	62 (13)
If I take the right actions, I can stay healthy. (N=21)	5 (1)	0 (0)	0 (0)	5 (1)	24 (5)	67 (14)
Chance Questions						
No matter what I do, if I am going to get sick, I will get sick. (N=20)	20 (4)	25 (5)	5 (1)	30 (6)	10 (2)	10 (2)
Most things that affect my health happen to me by accident. (N=21)	48 (10)	19 (4)	5 (1)	(14) 3	5 (1)	10 (2)
Luck plays a big part in determining how soon I will recover from an illness. (N=21)	62 (13)	10 (2)	14 (3)	10 (2)	5 (1)	0 (0)
My good health is largely a matter of good fortune. (N=19)	43 (10)	5 (1)	0 (0)	26 (5)	11 (2)	5 (1)
No matter what I do, I 'm likely to get sick. (N=20)	40 (8)	10 (2)	10 (2)	30 (6)	5 (1)	5 (1)
If it's meant to be, I will stay healthy. (N=20)	45 (9)	15 (3)	0 (0)	25 (5)	5 (1)	10 (2)
Powerful Others						
Having regular contact with my physician is the best way for me to avoid illness. (N=20)	15 (3)	20 (4)	25 (5)	20 (4)	0 (0)	20 (4)
Whenever I don't feel well, I should consult a medically trained professional. (N=21)	19 (4)	0 (0)	26 (5)	26 (5)	14 (3)	19 (4)
My family has a lot to do with my becoming sick or staying healthy. (N=21)	33 (7)	5 (1)	14 (3)	10 (2)	29 (6)	10 (2)
Health professionals control my health. (N=21)	67 (14)	5 (1)	14 (3)	10 (2)	5 (1)	0
Whenever I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me. (N=19)	21 (4)	16 (3)	11 (2)	26 (5)	21 (4)	5 (1)
Regarding my health, I can only do what my doctor tells me to do. (N=21)	43 (9)	10 (2)	10 (2)	14 (3)	19 (4)	5 (1)

Table 2. Previously Published Norms for the Multidimensional Health Locus of Control Scale						
Sample Description	Internal Control		Chance		Powerful Others	
	Mean	SD	Mean	SD	Mean	SD
Adherers to an exercise program[18]	29.97	7.2				
Healthy female adults in the US[17]	24.84	4.50	14.93	5.21	19.76	4.49
Healthy male adults in the US[17]	25.37	5.32	16.23	6.28	20.32	5.94
Female professionals in the US[16]	23.51	5.27	15.78	4.38	16.27	5.63
Physicians[16]	24.90		16.50			
Nurses[16]	25.20		14.10			
Undergraduates[19]	32.80	7.16				
Chemotherapy patients[16]	21.83	6.49	19.31	4.56	23.93	4.95

Discussion

We found this cohort of reproductive health care providers had high internal control scores consistent with individuals who have a strong belief that their health is most influenced by their own behavior. Chance and powerful others scores were consistent with means noted in other studies of healthy individuals. Questions associated with the concept that powerful others control health, had the widest range of scores (6-32).

Family planning is an important component to women's health, especially for patients with co-existing medical conditions for whom pregnancy can cause severe morbidity and mortality. The CDC and ACOG fully endorse providing preconception care and creating a reproductive health plan for women of reproductive age.[6,7] Communicating the concept of the reproductive life plan to patients assumes health care providers who are tasked to do this believe individuals have control over their own health and reproduction. Conveying the concept of a reproductive life plan could be difficult for individuals who do not believe they are in control over their own health. We sought to use a previously validated survey to describe the amount of control health care providers thought they had over their own health. We found individuals who provide reproductive health care in the Pacific believe that their health is most influenced by their own behavior. Of note, though we did not ask specifically about the use of a reproductive life plan, those surveyed did not express high levels of health care fatalism. Other studies have demonstrated that clinicians can have an impact on the contraceptives a woman decides to use though their counseling techniques which should incorporate patient-centered decision making. We also did not assess the efficacy of health care providers in influencing the contraceptive decisions patient make. However, those surveyed did not express high levels of health care fatalism. Conveying the concept of a reproductive life plan could be difficult for individuals who do not believe they are in control over their own health.

Limitations should be noted. The population studied, reproductive health care providers working in six countries, is diverse. This study was descriptive and because of the small sample, we did not compare scores between individuals of different ages, races, nationalities or location of practice. We also focused on health locus of control and did not ask questions specific to family planning.

There is much work to do in this field of research. Future studies should examine the relationship between health locus of control and self-efficacy in contraception and preconception care to determine whether there is an association between overall health self-efficacy and reproductive health self-efficacy. Future studies should specifically examine how the beliefs of health care providers influence how they communicate with and treat their patients. It would seem logical that understanding providers' health beliefs can aid in designing and executing more appropriate clinician educational interventions. However, it is important to note that the beliefs of health care providers, who have self-selected into health care occupations, may be different than the beliefs of patients. Though we examined the beliefs of health care providers, we did not examine the beliefs of reproductive age Pacific Islander women. Little is known about the attitudes of Pacific Islander women towards reproductive health; this should be examined further.

Conflict of Interest

None of the authors identify a conflict of interest.

Disclosure

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Table 3. Demographic Characteristics of the Study Population (n=21). Not all respondents provided an answer to each demographic question

	n (%)
Mean (sd)	
Age	47.3 (8.9)
Number of children	2.6 (2.0)
Gender	
Male	2 (10.5)
Female	17 (89.5)
Ethnicity	
Hispanic	3 (20.0)
Non-Hispanic	12 (80.0)
Race	
Filipina/Filipino	5 (25.0)
Micronesian	7 (35.0)
Other Pacific Islander	4 (20.0)
Caucasian	1 (5.0)
Black	1 (5.0)
Multiracial	2 (10.0)
Type of Provider	
Physician	3 (16.7)
Nurse Practitioner/Nurse Midwife	2 (11.1)
RN	7 (38.9)
MA/LPN/CAN	3 (16.1)
Health Educator	3 (16.1)
Marital Status	
Married	12 (63.2)
Partnered	1 (5.3)
Single	6 (31.6)
Highest Education Level	
Graduate degree	5 (26.3)
College degree	13 (68.4)
High school degree	1 (5.3)
Less than high school	0 (0.0)
Location of Practice	
Commonwealth of the Northern Marianas	8 (40.0)
Federated States of Micronesia	5 (25.0)
Republic of the Marshall Islands	2 (10.0)
Palau	2 (10.0)
Other	3 (15.0)

Table 4. Mean and Median Scores for Internal Control, Chance and Powerful Others

	Mean (SD)	Median (Range)
Internal Control	29.9 (3.5)	30 (21-36)
Chance	14.5 (7.9)	11 (6-30)
Powerful Others	18.3 (7.2)	18 (6-32)

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Evolution of the Medical School Dean — Interview with Jerris Hedges MD, Dean, John A. Burns School of Medicine, University of Hawai'i

Kathleen Kihmm Connolly PhD and Jerris Hedges MD, MS, MMM

In 1993, the Medical School Hotline was founded by Satoru Izutsu PhD (former vice-dean UH JABSOM), it is a monthly column from the University of Hawai'i John A. Burns School of Medicine and is edited by Kathleen Kihmm Connolly PhD; HJMPH Contributing Editor.

The role of the medical school dean has evolved over the last century: from a figure-head patriarchal role to a diversified profile in executive management. In the past, the dean was predominantly in charge of decision-making related to accreditation maintenance and state and tuition monies allocated to the medical school. Now, the role of dean has evolved to be the coordinator of mission-focused leadership teams in collaborative decision-making environments. This change in dean leadership predominately started after World War II, when medical schools became more integrated with parent universities, and could no longer operate in silos. Additionally, over time clinical practice integration and oversight for a diversified funding stream emerged as a major focus of the dean. Subsequently, additional regulations and policies from both the federal and state level began to govern medical practice, sponsored research, and school finances.[1] This changing environment has affected clinical and research dollars available to universities. Thus the role of the medical school dean has expanded to management roles beyond the medical education program itself.

With this increased multi-mission (education, research, clinical service, and university –professional – community service) oversight responsibility, leadership teams were developed and the role of associate deans emerged. As the medical school environment became more complicated, so did the financial environment. With reductions in state support for medical schools and the increased cost of specialized faculty members, deans faced economic pressure to seize financial revenue opportunities that included extramural grants, clinical revenues, tuition increases, as well as philanthropic dollars.[1] As a result, the role of dean continued to evolve within a larger system of relationships. The job of dean became more complex. The dean not only oversees the educational mission and accreditations (for the medical doctorate, graduate degree programs, and residency/fellowship training), but also oversees the school's financial integrity and fundraising, research enterprise, clinical service/faculty practice plans, academic leadership development and coordination, as well as, maintaining relationships with hospital partners, university administration, and with other schools and colleges within the university. Throughout, there must be excellent communication and operational/fiscal transparency for all stakeholders.

To add to this complexity, each medical school environment portrays a unique situation. There is no one size fits all approach to managing a medical school. Each school has a unique history, location, organizational structure, traditions, and culture. The John A. Burns School of Medicine (JABSOM), University of Hawai'i (UH) started as a two-year medical school program in 1965. The founding dean, Dr. Windsor Cutting, had a vision to create a medical school that would be the center of medical education in the Pacific. Convincing local medical establishments that having a local medical school was a good idea was one of his first big endeavors. After successfully creating the two-year program, the challenge for the graduates of the two-year medical certificate program was to transfer into medical schools on the continental United States to obtain their medical degree. Further, the ability to bring these graduates back to practice in Hawai'i declined with each year they were away.

Dean Cutting had a vision to create a four-year medical degree program to alleviate these issues. For this to happen, partnerships with community hospitals for clinical training had to be formed. Again the dean had to convince the Hawai'i community that a four-year degree program would be a good idea. In addition, the dean had to recruit capable faculty members to Hawai'i to create a viable medical program. Dean Cutting, with significant support from Governor John A. Burns, was again successful and able to pave the road to a four-year medical degree program, which was realized in 1973, under then Dean Terry Rogers.[3]

Other major milestones for JABSOM included, in 1989, the introduction of the problem-based learning curriculum, championed by then Dean Christian Gulbrandsen. And in 2005 then Dean Ed Cadman envisioned the opportunity to enhance the research mission and expand the school with the construction of a new Kaka'ako campus. At the time, continued accreditation of the medical school was dependent upon development of an enhanced, modern teaching facility. New buildings included the construction of a state-of-the-art research building and

educational facilities.[3] Over the years, new hospital and clinical partnerships were formed, new academic departments were created, and research was expanded to address both generally common health topics and those specific to the communities of Hawai'i and the Pacific region.

Current Dean Jerris Hedges has held the deanship for over ten years. An interview with the dean reveals insights into his role as dean, and his vision for the future of the school.

Q: What draws you to the role of dean of the medical school?
A: The answer is multifactorial. We all seek to make a difference in the world and being a dean provides such an opportunity. Making a difference requires an organization with a great purpose (mission), exceptional people, and a culture that supports and celebrates personal and collective success. JABSOM has all these essentials and more. It is also an organization that has great collaborations and partnerships that are synergistic with the appointed responsibilities that come with the title. Being a dean was not an end of itself, but a means to provide exemplary service in an environment that is always changing and evolving. There are the interlocking missions of education, research, and clinical and community service. There is a duty to UH, teaching hospital affiliates, and the community at large. There is an increasingly challenging clinical practice arena which demands curricular adjustment for our students and trainees. These interdependent responsibilities provide constant stimulation and the need for diplomacy, innovation, and relationship building. None of these are easy and the school and its leaders must evolve. I chose JABSOM and Hawai'i in part for the academic and personal challenge, but also for the opportunity to share time with people who I admire and whose company I enjoy. Life is too short otherwise.

Q: What is your vision for the medical school, and has that changed over your tenure?
A: Shortly after my arrival, the JABSOM leadership and faculty members adopted shared values, a vision for the future and clarified the school's mission. The vision fits the mnemonic ALOHA – Attaining Lasting Optimal Health for All. This vision emphasizes that our health goals for Hawai'i are long-term, that we are addressing optimization of health and not simply finding and treating disease, and that we seek to provide health to all in Hawai'i and the greater Pacific. This basic tenant has not changed, although the challenges we have faced and the strategy and tactics we have used to build ALOHA in Hawai'i have changed as the environment within UH and within Hawai'i has changed. We have increasingly partnered with other health science disciplines in service delivery and research. Ideally, UH would formalize a JABSOM-led health sciences leadership structure that builds synergy across the health sciences and brings additional extramural resources into UH. Such a structure at UH System could help UH achieve its U-Healthy Hawai'i goals as summarized by Aimee Grace (Director of Health Science Policy for UH System): to ensure a robust healthcare workforce (for Hawai'i), to discover and innovate to improve and extend lives, to promote healthier families and communities, and to advance health in all policies. The successful implementation of a trans-professional and inter-disciplinary multi-mission approach to the health sciences in Hawai'i will depend upon active engagement and leadership from JABSOM.

Q: What are the key challenges and greatest assets in achieving your vision?
A: The organic growth of UH has led to the balkanization of much of UH, resulting in perennial challenges in cross-unit and cross-campus communication, collaboration, and efficiencies. UH academic leaders have often focused on reallocation of resources without addressing how resources are currently deployed or how they can be grown and leveraged for optimal community outcomes. Infrastructure programs have been redundant between units and UH leadership has commonly focused on internal politics rather than community service. JABSOM has been fortunate to have built relationships with a number of community organizations and leaders. These external relationships have permitted a larger vision and some success beyond the confines of UH. One strength of the medical school is its affiliated practice plan (shared with nursing, pharmacy, and the cancer center). The University Health Partners has helped support faculty members and academic programs through the delivery of clinical service. As the health care environment evolves, this practice plan will need to seek greater alignment and integration with local health systems. Given growing internal health sciences collaboration and external clinical partnerships through the practice plan, there remains a need for UH to develop a complementary cross-unit and cross-campus structural format overseen by the JABSOM Dean which can both guide internal and external collaborations and encourage the implementation of a larger multi-mission health sciences vision for the coming decade.

Q: You have been dean of JABSOM for over ten years. What has allowed you to continue to achieve and to elude "dean burn out"?
A: Mainly, I have worked with good people. I have been fortunate to inherit and recruit people with great skills. I have varied my focus and tried to personify the concepts of a Stage 4 or 5 leader as described in the text *Tribal Leadership* by Logan, King and Fischer-Wright.[4] I have accepted that although an outcome may be inevitable and an approach may be right for most people, there is a time and a setting when things best come together. Outcomes can be nudged, but they cannot be forced. An old adage with much truth is to "know when to fall upon your sword." That is, there are some things you must do because many people depend upon your action, but wisely choose the time when to take that action if it may offend some with whom you must work, such that the chances of success are optimized.

Q: Do you have any advice to future deans?
A: JABSOM is in a unique place (center of the Pacific and rich with cultures) at a unique time in the world. The multicultural

and multiethnic environment affords an opportunity to experience an international experience with a (relatively) small town level of inter-connectivity. If one thinks as those living on the east coast (fast paced and inwardly focused), you will not succeed in Hawai'i. The dean must play many roles and be a connector. The dean must be truly humble and self-aware. Yet the dean must be content competent in multiple areas (medical knowledge, research grantsmanship and oversight, academic regulations, practice plan operations and leadership, organizational dynamics and leadership, philanthropy, co-opetition skills, etc). The medical school dean must build upon skills previously used to lead her/his academic unit to now lead leaders of multiple academic units. The dean must be community focused and look far beyond her/his own academic unit to be successful. Of course, one must embrace the culture of Hawai'i and continue to learn. The role of the medical school dean is not growing simpler.

As exemplified, deans of medical schools today must have a variety of skills that include financial management, people management, negotiation, conflict resolution, as well as strong leadership abilities. In interviews conducted with medical school deans, the key characteristics and personal qualities identified that make a medical school dean successful include "fairness, integrity, listening skills, personal warmth, respect for people, lack of arrogance, and the ability to get the best out of people."[2] As a result of the high demands and complex nature of the job, the average dean tenure is typically around four years.[1]

Dean Hedges is an outlier in his position. He has successfully lead JABSOM through two primary medical school accreditations, helped build a strong faculty practice plan, and expanded graduate education to neighbor islands. He continues to lead JABSOM as one of the top community-based medical schools in research and primary care.

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Ke A‘o Mau: Strengthening Cultural Competency in Interdisciplinary Education

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Abstract

In order to successfully address social determinants of health and to achieve social justice for kanaka *and all the people of Hawai‘i, we must broaden our understanding of and approach to healing/health through interdisciplinary, culturally-informed education. Strengthening cultural competence within an Interprofessional Education framework, has potential in meeting important challenges in patient and population health, including meeting the increased demand for culturally trained professionals, increasing access to providers, and reducing health inequities in* kanaka *(Native Hawaiians). We present a model of course design and delivery,* Ke A‘o Mau *(Learning Preserved), intended to provide* haumana *(students) with a unique body of culturally-anchored and community-based knowledge, skills and values that facilitate work with* kanaka. Ke A‘o Mau *was implemented in the 2017-2018 academic year at University of Hawai‘i (UH) at Manoa and optimized the authenticity of cultural learning through the engagement of* kumu loea *(expert teachers) to instruct in their area of expertise. Design and delivery of the course began with the understanding and honoring of* kanaka *worldviews, knowledge, and practices. Appraisal of* haumana *learning showed strong evaluative scores, of knowledge development, skills training, and instructional materials. This course not only seeks to resolve critical challenges in patient and population health but also provides a model to support the UH Manoa strategic priority of “striving to be a foremost indigenous-serving institution.”*

Keywords

Native Hawaiian, Cultural Competency, Interprofessional Education

Introduction

The complex and urgent challenges in meeting patient and population health, including increasing access to culturally trained providers and reducing the significant health inequities seen across many outcomes from *kanaka* (Native Hawaiians), necessitate innovation in health care. Cross-disciplinary training holds promise to help address these challenges by increasing professional collaboration, improving patient engagement, and improving health and well-being outcomes.

Interprofessional education (IPE) “occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes.”[1] This process emphasizes a team-based approach that supports an integrated model of care drawing from diverse disciplines such as social work, public health, medicine, nursing, and law.

While the concept of IPE is not novel,[2] advocates in health system improvement and patient safety, including accreditation bodies, are increasingly urging educational programs to refine and include IPE in degree granting programs.[3] Increasing evidence shows that IPE improves health care in terms of quality, safety, and efficiency of services.[4,5] Further, IPE collaboratives maximize the use of human resources in a time of global health workforce shortages. A small body of literature examines the IPE framework for strengthening cultural competency training to address health disparities.[6]

This article describes a course at the University of Hawai‘i (UH) at Manoa Myron B. Thompson School of Social Work that supported cultural competency in the social work and health workforce utilizing an IPE framework. The course is important to building a Hawaiian place of learning at the University of Hawai‘i at Manoa. Specifically, this elective course, *Ke A‘o Mau* provided *haumana* (students) with a unique body of culturally-anchored and community-based *‘ike* (knowledge), skills, and values that facilitate work with *kanaka* (Native Hawaiians). This supports the goal of building upon community strengths in health and wellness and reducing health inequities for *kanaka*.

This article (1) establishes the cultural exemplar for course design, (2) identifies methods of instruction, (3) identifies the educational backgrounds of the IPE *haumana* participants, and (4) briefly summarizes the appraisal of *haumana* learning. We conclude with implications for the utility and feasibility of building IPE programs to improve our work with *kanaka* and other populations who experience health disparities.

Cultural Exemplar for Course Design

The cultural exemplar for course design begins with understanding and honoring *kanaka* worldviews, knowledge, and practices. Traditional worldviews are found in *kanaka* creation chants such as *Haloa* and the *Kumulipo* that depict the strength of *pilina* (relationships) of spiritual realm, *‘aina* (land), and *kanaka*. *Kanaka* have a holistic view of life.[7] Within this worldview, the

continuum of time—past, present and future, and *mo'okuauhau* (family lineage) are essential elements, which allow for a deeper understanding of and connection to the relativity of all things seen and not seen, physical and non-physical. The *kanaka* worldview embodies a complex system that is embedded in the relationship and interactions of body, mind, and spirit, and is directly tied to pro-social human relations and pro-spiritual relations.[8] As stated in the influential text *Native Land And Foreign Desires* by L Kame'eleihiwa:

> "The Hawaiian stands firmly in the present, with his back to the future, and his eyes fixed upon the past, seeking historical answers for present-day dilemmas."[9]

In seeking knowledge from the past, *kanaka* understood and applied practices originating in cultural values and beliefs. Illustrative values and beliefs such as *'ohana* (family), *kaiaulu* (community), *kuleana* (responsibility) and *mana* (spirituality) are evident in native practices such as *ho'oponopono* (family resolution) and *la'au lapa'au* (herbal healing). There is a deep need for a return to *kanaka* solutions to addressing, promoting, and managing wellness as they relate to the social determinants of health and social justice. In the wake of lowered socio-economic status and diminishing academic achievement of *kanaka* and other native peoples relative to other groups today, indigenous, native and culture-based education models provide a strong impetus for integrating systems designed for healing and restoration. Primary transmitters of worldviews, knowledge, practices and principles were esteemed *kupuna* (elders) and *kumu* (teachers) who were able to share familial and cultural information through generations.

This course to improve cultural competency in the social work and health workforce wove key aspects of traditional *kanaka* worldviews, knowledge, practices and principles, with contemporary perspectives. By emphasizing a cultural exemplar in the design of the course, we optimized the authenticity of cultural learning. Table 1 shows themes that informed cultural competency in the curriculum.

Table 1. Curricular Themes
Holistic worldview - spiritual realm, *'aina*, and *kanaka*
Continuum of time - past, present, and future
Mo'okuauhau - familial lineage
Cultural values, practices, principles and beliefs
Kupuna and *Kumu* - source of knowledge transmission

A unique attribute of this course was in the invitation to *kumu loea* (expert teachers) to instruct in their specific area of expertise, including *kanaka* ideologies and practices such as *mana* (spirituality), *aloha 'aina* (caring for the land), *ho'oponopono* (family/group resolution), *mea'ai* (nutrition), *lua* (fighting and healing) and *la'au lapa'au* (herbal healing). Some teachers were affiliated with the University of Hawai'i, others were affiliated with community agencies, but all had a strong foundation in community engagement. *Haumana* were taught the value of integrating native knowledge, principles, and practices in order to build social justice and health for the community, family, and individual. A centerpiece to *haumana* learning was participation in community service projects in which they contributed to the work of an organization with a priority focus on *kanaka*. The act of "service" and giving back to a community instilled *haumana* learning. As stated in an *'olelo no'eau* (Native Hawaiian proverb):

> "'Ike aku, 'ike mai, kokua aku, kokua mai, pela ka nohona kanaka."[10]
>
> Watch, observe. Help others and accept help. That is the family way.

Methods of Instruction

In line with the cultural exemplar for course design, there were strong efforts to utilize methods of instruction anchored in cultural competence. The instruction by *kumu loea* created opportunities to incorporate experiential cultural learning, seminar discussions, *oli* instruction, small group interactions, and community-based participation. These delivery modalities were appropriate for the interdisciplinary *haumana*. Illustrative highlights can be seen in Table 2.

Finally, although the use of the Hawaiian language in class was not required, when *kumu loea* utilized words and phrases in the native language, *haumana* would respond in the native language also. The skill level of *haumana* in Hawaiian language varied tremendously from those who were fluent to those who were familiar with only a few commonly used words. The exposure to language seemed to benefit all, allowing *haumana*

Table 2. Delivery models	
Experiential Learning	There were experiential learning of native practices such as *lomilomi* (massage) through demonstration of select techniques with *haumana*, or native practices such as *la'au lapa'au* through sensory contact (eg, smelling, touching) with medicinal plants.
Seminar Discussion	There were guided discussions around issues including, the impact of historical, structural, economic, and political factors on health and the design of contemporary health care services. For example, topics included the preservation of cultural and historic sites as a basis for cultural perpetuity and the fostering of *mana* to promote health and leadership.
***Oli* (chant) Instruction**	A special *oli* honoring the namesake of the School, Myron B. Thompson, and gifted to the School by Social Work Alumni Brandee Aukai and Kelly Anne Beppu, was taught to the *haumana* with practice throughout the semester.
Small Group Interactions	*Haumana* utilized "talk story" conversation to discuss key concepts and to explore personal development in small groups. For example, *haumana* became aware of their personal and professional values as they relate to *kanaka* ways of knowing, and began to clarify possible conflicting values and ethical dilemmas.
Community Participation	All *haumana* selected or created a project serving *kanaka* in a community organization and incorporated course learning into their activity.

to better understand the value of language in perpetuating the culture and in its value in health care.

Student Participants

Haumana were drawn from disciplines with an emphasis in health across the UH Manoa campus, including social work and public health at the Myron B. Thompson School of Social Work and medicine at the John A. Burns School of Medicine. In Table 3, vision statements from these units reflect the shared focus on health.

There is a strong need for professionals prepared in these fields to work with *kanaka* clients and their families. Hawai'i is one of the healthiest states in the United States.[11] However, the circumstances for *kanaka* are vastly different. *Kanaka* consistently have the lowest life expectancy of Hawaii's largest racial/ethnic groups,[12] and experience complex and multiple health disparities. Health disparities for *kanaka* are often linked to social determinants such as age, gender, socioeconomic status, educational attainment, and geography.[13] The social challenges that exist include poverty, homelessness, lack of access to healthcare, and lower socioeconomic status.[13] In association with these factors, *kanaka* have greater prevalence of and mortality rates from certain diseases.[13]

The interdisciplinary nature of the course required collaboration with faculty leaders and advisors from different disciplines in order to attend to the unique academic/credit needs of the targeted *haumana* from social work, public health, medicine, nursing, and law. *Haumana* informational materials were developed and contact was made with discipline leaders and advisors to aid in recruitment. *Haumana* were offered the option to participate in the full semester, three-credit elective course or enroll for a certificate of completion which entailed attending five of the 12 sessions. Of the 18 *haumana,* 15 enrolled in the three credit elective option and three enrolled in the certificate of completion option. Faculty mentors/advisors from the disciplines played a significant role in encouraging *haumana* to consider course enrollment. Additionally, the majority of *haumana* who enrolled in the certificate of completion option were encouraged by a faculty mentor/advisor to consider participation for their professional development.

Table 3. Vision Statements

MBT SSW (Social Work and Public Health)	JABSOM
Achieving social justice and health equity for the people of Hawai'i and citizens in a changing world	*Maika'i Loa*: Attain Lasting Optimal Health for All (ALOHA)

There was also an opportunity to expand the training beyond the registered *haumana* to others who had an interest in Native Hawaiian culture. Two sessions were designated an "open community forum" in which those with an interest in the topic of *mana* (spirituality) and *ma'i* (illness) were invited to attend through webinar or in-person. Additionally, social work continuing education credits were made available for these classes, which made it more desirable for social workers in the field to attend.

Appraisal of *Haumana* Learning

The course offered many *haumana* their first opportunity to engage in a course rooted in a culturally anchored IPE framework. The 18 *haumana* were given two opportunities to evaluate the course: (a) an assessment tool uniquely created for this course in its evaluation of cultural aspects and (b) the standard course tool administered by UH Manoa eCafe which evaluates general aspects. Evaluative scores indicated strongly positive appraisal of the training, instructional materials, and contribution to overall knowledge and education. Based on a Likert scale assessment tool (1=strongly disagree to 5=strongly agree), 100% of *haumana* agreed or strongly agreed with the statements shown in Table 4. UH Manoa eCafe also used a

Table 4. Haumana Narrative Comments

Using a Likert scale assessment tool (1=strongly disagree to 5=strongly agree), 100% of haumana agreed or strongly agreed with the following statements:
Through *Ke A'o Mau* and the *kumu loea*, I have a broad understanding of Native Hawaiian history and recognize the implications for the present and future circumstances of this population.
I have developed an appreciation and cultural grounding of the Native Hawaiian worldview including *aloha 'aina*, *mo'oku'auhau*, and *mana*.
I am able to identify and understand select issues/problems that affect Native Hawaiian health and well-being.
***Haumana* narrative comments shared from UH Manoa eCafé.**
"It was valuable to have this unique and special experience with *kumu loea* in our midst to teach, do demonstrations, and answer questions. It was valuable and engaging to learn in various ways (lecture, seeing and touching cultural objects, trying cultural practices, doing a service project). I feel these experiences allowed for a greater expansion of knowledge and development of a deeper appreciation for traditional Hawaiian culture."
"This may be the best and most valuable course I have taken at this university. It incorporates everything about knowledge, Hawaiian knowledge, and how to directly work with people of different cultural backgrounds, with a deeper understanding of one's own culture. It is an amazing course, and I highly recommend this class for all public health, social work, and really all students at the university."
"This class was AMAZING. It provided the framework needed to work with Native Hawaiian populations and essentially the entire State of Hawaii…The course provided a network of interdisciplinary class members, to which we can call upon in the future…"
***Haumana* narrative comments from the thank you cards.**
"No words for how grateful I am. So proud to be part of the School."
"Thank you for this opportunity and for broadening my mind..."

5-point scale and the average was 4.83, indicating that 100% of *haumana* agreed or strongly agreed on the positive attributes of the course. Additionally, *haumana* chose to share *mahalo a nui loa* (thank you) cards with lead faculty at the close of the course, allowing for less structured evaluations of the course.

The narrative comments provided by *haumana* highlight an interest in opportunities for cultural learning, along with an expectation that this is something their academic education should provide. The narratives also indicate the strength of the IPE framework with the inclusion of community-based cultural experts, some of whom have their doctoral degrees and others with decades of community-based practice.

Implications

From our experience in designing and teaching this course, we provide four key lessons for development of other culturally-anchored training within an IPE framework.

First, building interdisciplinary teams that are culturally competent and prepared to work with diverse populations such as *kanaka* for health-related goals requires the close collaboration of diverse disciplines such as social work, public health, medicine, nursing, and law. In our course, core faculty from social work worked with faculty from other disciplines to recruit and invite an interdisciplinary student base. *Haumana* from different disciplines come with their own professional, educational, cultural, and personal perspectives, which shape their approach to health care. Within the diversity of disciplines, the opportunity to engage with interdisciplinary peers and cultural leaders created an environment for all *haumana* to prioritize the role of culture, culturally-connected assessments, and culturally-based interventions in service/practice delivery.

Second, the inclusion and leadership of *kumu loea* ensured a cultural authenticity in both course design and delivery. The weaving and integration of culturally-anchored knowledge, practices, principles, and values provided a more holistic view of health and health care, with the overall goal of improving our work with *kanaka* and other populations who experience health disparities.

Third, through in-depth exposure to cultural practices *haumana* were afforded an increased familiarity with each practice. This familiarity creates spaces for the inclusion of the cultural practice as an element of any assessment, prevention effort, or intervention. Additionally, awareness of culturally-anchored practices provides an opportunity for *haumana* to further their own understanding of the practices through *kumu loea*. For example, a *haumana* could receive one's clinical license while pursing cultural training in *ho'oponopono* (family resolution). After having gone through strict and rigorous training, the *haumana* may begin incorporating *ho'oponopono* into his/her practice under the continual supervision of his/her kumu.

Fourth, the course was partially supported with a one-year grant from the HMSA Foundation with a need for a sustainability. Courses such as these are critical to a University driven by a strategic priority of "striving to be a foremost indigenous-serving institution."[14] They are also highly desired by students, as seen in the course comments. However, the funding for these courses can be challenging, as they may not be deemed "essential" for accreditation and other standards, which are governed nationally. Creating and sustaining courses such as these that are vital to the health of our state and community will likely require innovative collaboration across disciplines.

E ala! E alu! E kuilima![10]
Up! Together! Join hands!

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HAWAI'I JOURNAL WATCH

KAREN ROWAN MS

Highlights of recent research from the University of Hawai'i and the Hawai'i State Department of Health

Rethinking the Use of GDP

Improvements in a country's healthcare system should not be measured only by their effect on the country's gross domestic product (GDP). GDP does not include any measures of environmental quality, societal equitability, or longevity, and therefore it undervalues human health, according to a new analysis paper published in The BMJ (https://www.bmj.com/content/363/bmj.k4371). Lead author Victoria Fan ScD, with UH Public Health, and colleagues argue that other measures, such as the value of life years (VLYs), can better illustrate the benefits of investing in health care and should be used instead of GDP when a country is considering system improvements. Greater education and awareness about such measures could challenge the dominance of GDP in the popular discourse and in policy-making decisions.

High-Rise Fires

Residents of a high-rise building in Hawai'i who experienced a fire reported spending three or more minutes deciding whether to evacuate, according to a new qualitative study. During this time, the residents looked for cues such as smoke, flames, and screaming to determine whether there was a true fire or a false alarm, according to the paper published in August in PLoS Currents (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6128701/?report=printable). All participants reported limited support from the building leadership for fire-preparedness efforts, according to lead author Gary Glauberman MS, RN, with the School of Nursing and Dental Hygiene, and colleagues. The findings show that fire drills and safety education are needed to help high-rise dwellers prepare for fires and make better judgements in fire situations, especially in light of the local and global proliferation of high-rise buildings.

Race and Precision Medicine

For health care providers serving the racially diverse and highly admixed populations of Hawai'i, Asia and the Pacific, using a patient's self-reported race when deciding on medications and dosing may have several pitfalls, according to a new viewpoint article published in September in The Pharmacogenomics Journal (https://www.nature.com/articles/s41397-018-0046-0). The burgeoning field of pharmacogenomics, which considers how a patient's genes affect the way he or she metabolizes and responds to medications, may provide better tools, according to author Youssef Roman PharmD, PhD, with The Daniel K. Inouye College of Pharmacy. Although there are examples of racial groups that have higher rates of certain genetic variations within drug-metabolizing enzymes, the concept of race is imprecise. To provide more patient-centered care, pharmacogenomics has the potential to help providers better predict patients' responses to drug therapy.

Heart Disease in Men

Men in Japan and Korea have a lower prevalence of plaque in their carotid arteries compared with white men, a new cross-sectional study of nearly 1,000 middle-aged men shows. Researchers including Kamal Masaki MD, of the John A. Burns School of Medicine, looked at data from carotid ultrasounds and found that 4.8% of Japanese men, 10.6% of Korean men, and 22.8% of white men had plaques in their carotid arteries. None had been previously diagnosed with cardiovascular disease (CVD). The lower plaque burden in Japan and Korea could not be explained by traditional CVD risk factors, so the researchers hypothesized that lower carotid plaque rates in Japan may be due to low levels of inflammation or genetic factors. Koreans are genetically similar to Japanese people, and yet had a higher plaque prevalence, suggesting that this difference may be due to unknown environmental factors, the researchers wrote in their study, published in September in the International Journal of Cardiology (https://www.ncbi.nlm.nih.gov/pubmed/29887456).

Cancer Survivors in Oncology Research

There is a critical need in oncology for leadership from researchers who are also cancer survivors. These researchers have exclusive access to evidence on the psychosocial aspects of cancer treatment as a result of having survived cancer as teens or young adults, writes Christabel Cheung PhD, with the Myron B. Thompson School of Social Work. These researchers are a self-actualized and highly motivated group. They have scientific skills plus lived experiences to draw upon in their work, writes Cheung, a cancer survivor herself, in a viewpoint article recently published in Cancer Therapy & Oncology International Journal (https://juniperpublishers.com/ctoij/pdf/CTOIJ.MS.ID.555795.pdf). Established cancer researchers should partner with cancer survivors in oncology research to gain insights into patient experiences and to provide mentorship to the growing cadre of survivor-researchers.

Alcohol and Colorectal Cancer

New findings from the ongoing Multiethnic Cohort Study suggest that the previously identified link between alcohol consumption and increased colorectal cancer risk also exists in Native Hawaiians, Japanese Americans, Latinos, and whites, but not in African Americans. Overall, the risk of colorectal cancer was 12% higher in those who reported consuming approximately one to two drinks per day, and 24% higher in those who consumed more than two drinks daily, according to findings from lead author Song Yi Park PhD with the UH Cancer Center. Beer and wine, but not liquor, were found to be linked with an increased risk of colorectal cancer. The paper was published online Sept. 15 in the American Journal of Epidemiology (https://academic.oup.com/aje/advance-article-abstract/doi/10.1093/aje/kwy208/5098396?redirectedFrom=fulltext).

THE WEATHERVANE

RUSSELL T. STODD MD; CONTRIBUTING EDITOR

DEATH THE FINAL ACT.

A few generations ago a young house officer at Los Angeles County General Hospital (your editor) was called to a different ward to affirm a man's death. Approaching the nurse he asked about vital signs. "Vital signs? The man's dead." Would that it were still that simple. For decades, physicians have had the authority to declare a person brain-dead. In the United States it was defined as the irreversible cessation of all brain function, including the brain stem—even when the heart and lung activity can be maintained with machines. The medical profession determined the acceptable tests and procedures used to make the diagnosis. Recently some families are challenging the determination of brain death of loved ones in a small number of high profile cases. Social media have prompted some doctors to publicly discuss their definition of death. Facebook, Instagram, Twitter and other social arenas bring public conversation around brain death. Some doctors are encouraging patients' families to observe when tests are conducted that help determine brain death; pupillary reactions, absent reflexes, lack of pain response. The American Academy of Neurology established criteria for determining brain death in adults, and it urges all doctors and hospitals to follow the more recent 2010 guidelines. But now published research indicates variability in how doctors and hospitals approach brain death. How many doctors are required to administer tests, how long to wait between testing of brainstem reflexes, and even what type of physician is qualified to make the determination? Given all the challenges to long held standards, the concept of brain death is eroding, according to David Greer, Chairman of Neurology at Boston University School of Medicine. Editor's note: hearken back to the salty RN of the 1950s, The Man's Dead.

THE ANTI-PLASTIC STRAW STAMPEDE IS ON.

Reality-TV star Kim Kardashian West told her 115 million Instagram followers that her household had stopped using plastic straws. Almost immediately our ovine pop culture became the summer of plastic-straw ban. Bans on straws swept through cities, businesses, restaurant and even sporting venues. Officials in cities from New York to Miami Beach to Santa Barbara to Portland, Oregon, proposed or passed bans on single-use plastic straws. Seattle became the first major city to put the ban into effect. The story of how plastic straws went from ubiquitous to utensil non grata is one of psychology and the power of social media. Susan Clayton Professor of psychology and environmental studies at College of Wooster in Ohio uses the term moral licensing in which some people feel good about themselves for changing certain behavior. They don't need to take further action. "I've done my part. Now I can drive to Starbucks and skip the walk." There is a backlash of advocates for disabled people who need drinking straws, leading to exceptions to some rules. Some opposed government getting into their soft-drink cups for no substantial reason. A critic said, "It's so trivial. If they get rid of the lid next, I'll have to find another way not to spill my coffee."

READY OR NOT HERE COMES CRISPR.

CRISPR has ignited a revolution. It's a relatively recent discovery in the history of biotechnology, but CRISPR has become a standard laboratory tool. A Swedish scientist, Fredrik Lanner at the Karolinska Institute in Stockholm is the first to publicly acknowledge editing genes in viable human embryos. Other researchers are almost certainly doing similar experiments out of the public eye. Chad Cowan, a stem biologist at Harvard University notes that CRISPR'S ease and precision have made the prospect of editing human embryos inevitable. Such experiments are surely going on privately in the United States, China and elsewhere. Sweden and other countries require proper justification and ethical oversight to do such research. Lanner wants to discuss these important experiments openly in scientific and general public forums because the impact may be profound.

GIVE IT TO ME STRAIGHT, DOC.

Your very sick and failing patient may ask, "How long do I have to live?" For all the advances we have made in biomedicine, the answer to this kind of question is always uncertain. And what about quality? Is a day at home more valuable than a week in the hospital? Even a small improvement in our ability to gauge the life expectancy of a seriously ill patient could provide enormous value for them and their families. A new algorithm developed at Stanford Medicine could help. Analyzing data from hundreds of thousands of anonymized medical records, the model predicts which patients are likely to die in the next 3 to 12 months. In early tests, the algorithm analyzed medical data from patients who had already passed away and correctly predicted their remaining life expectancy in 9 out of 10 cases. AI is not going to deny nor discourage care, but it can give patients information they have never had before. This is no panacea. An algorithm is not going to make decisions for doctors or patients, but it can help inform choices with insight they never had before.

THE LOCALS ARE CRYING FOWL.

In Gilbert, Minnesota, an early frost fermented local berries. Young birds have been eating them and becoming intoxicated. This in turn has led to unorthodox behavior with birds flying low and close, running into windows and automobiles. The police department received several calls seeking an explanation. Apparently confused by the weather, many of the birds had not migrated south. Perhaps they decided to stay in town and party.

ADDENDA

- The shortest film role to win an Oscar: Sylvia Miles, on screen for six minutes in "Midnight Cowboy."
- Ban pre-shredded cheese. Make America grate again.

ALOHA AND KEEP THE FAITH rts

(Editorial comment is strictly that of the writer.)

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The 4th Annual
Hawai'i Journal
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